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The Agricultural EDUCATION MAGAZINE

Agricultural Literacy

A Fresh Start: Looking Ahead to 2018

by John C. Ewing

As I reflect on the last 6 issues of the Agricultural Education Magazine, I think of the many articles that have been written that provide practical examples of how to be a better agricultural educator. These articles included a look at the history of agricultural education via exploration of the 100th anniversary of the Smith-Hughes Act, to articles on ways to take advantage of professional development opportunities. Other issues provided advice on how to best utilize our advisory boards to benefit the entire agricultural education program. In the same vein of making agricultural education the best that it can be, our 2018 issues will get our readers thinking about the current status, as well as our future as a profession. The goal of each issue is to help teachers be successful each and every day. As I look to 2018 and the great lineup of theme editors for the six issues selected, I am excited to think of the possibilities for growth in our profession. Please see the chart below for the themes, as well as contact information for each of the theme editors for 2018. Please consider contributing to the profession by submitting articles to the Agricultural Education Magazine via our theme editors!

Issue	Theme	Theme Editor
January/February 2018	Potpourri Issue – Variety of Topics to Engage Teachers	Eric Rubenstein, Assistant Professor Agricultural Leadership, Education, and Communications Department, University of Georgia 706-542-3191 erubenstein@uga.edu
March/April 2018	Using STEM to Help Students Bloom	Kate Shoulders, Associate Professor Department of Agricultural Education, Communications and Technology, University of Arkansas 479-575-3799 cshoulde@uark.edu
May/June 2018	Connected #TeachAg: Utilizing Technology for the Premier Delivery System of #AgEdu	OP McCubbins, Assistant Professor School of Agriculture, Tennessee Tech 931-372-6047 omccubbins@tntech.edu Daniel Foster, Associate Professor Department of Agricultural Economics, Sociology, and Education, The Pennsylvania State University 814-863-0192 foster@psu.edu
July/August 2018	Agricultural Education for All	M. Susie Whittington, Professor Department of Agricultural Communication, Education, and Leadership whittington.1@osu.edu Stacy Vincent, Associate Professor Department of Community and Leadership Development 859-257-7588 stacy.vincent@uky.edu
September/October 2018	Professional Conversations: Crossing Borders to Advance Agriculture Education	Daniel Foster, Associate Professor Department of Agricultural Economics, Sociology, and Education, The Pennsylvania State University 814-863-0192 foster@psu.edu Melanie Miller-Foster, Assistant Professor of International Agriculture, The Pennsylvania State University 814-867-3831 mjm727@psu.edu
November/December 2018	Advocating for Agriculture	Gaea Hock, Assistant Professor Department of Communications and Agricultural Education Kansas State University 785-532-1166 ghock@ksu.edu Courtney Meyers, Associate Professor Department of Agricultural Education and Communications Texas Tech University 806-834-4364 courtney.meyers@ttu.edu

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CONTENTS

Agricultrual Literacy

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E-mail: NAAE@uky.edu

Article Submission
Articles and photographs should be submitted to the Editor or Theme Editor. Items to be considered for publication should be submitted at least 90 days prior to the publication date of the intended issue. All submissions will be acknowledged by the Theme Editor and/or the Editor. No items are returned unless accompanied by a written request. Articles should be approximately four double spaced pages in length (1500 words). Information about the author(s) should be included at the end of the article. Photos and/or drawings appropriate for the "theme issue" are welcomed. Photos/drawings should be submitted in an electronic format (jpg or tiff format preferred – minimum 300 dpi). Do not imbed photos/drawings in the Word document. A recent photograph (jpg or tiff format preferred– minimum 300 dpi) of all authors should accompany the article unless photographs are on file with the Editor. Articles in the *Magazine* may be reproduced without permission but should be acknowledged.

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Agricultural Literacy in an Ever Evolving Society

by Michael Martin

We have reached an amazing point in the history of agricultural education history. People from all walks of life are becoming more aware and passionate about agriculture and food. We should not overlook or understate this current reality. I tell my students and constituents that people are not making "So God made an Electrician" videos. They are making "So God made a Farmer" videos. The public is increasingly interested in what they eat and how that food is produced. This is an opportunity for us to make a difference.

Yet, as many of you know, this opportunity comes with a challenge. Not everyone shares the same values in agriculture and food. Sometimes these differences can be dramatic and even confrontational. Reoccurring issues include genetic engineering, organic agriculture, and animal welfare. Not every emerging topic is controversial, like food preservation techniques and niche marketing. There are people on both sides of these agriculture and food issues which are solidified in their view points. This is understandable considering that so many people base their livelihood on agriculture and food and/or place so much value on agriculture and food. However, we in agricultural education must resist the urge to harden our message on these issues. Many people are in the middle of these debates and they need us to provide reliable and trustworthy knowledge and perspectives on agriculture and food topics. I would consider agricultural educators to be on the front line of agricultural literacy for society.

How can agricultural literacy efforts best reach our diverse population in the United States? I would argue that we have to think broadly about agriculture and food issues. We must meet people where they are at on the agriculture/food spectrum. For instance, many of us use the phrase "farm to table", which implies that we start a lesson at production agriculture topics and then connect back to food topics. This approach works for some people and some contexts. Nonetheless, a "table to farm" approach may work best in other situations. This would imply that the topics of food (or other finished agricultural product) drives the lesson and then production agriculture topics are connected back afterwards. The big educational concept behind this idea is the role of previous knowledge in the learner. The more a leaner's previous knowledge can be utilized in a lesson the more likely they can use and retain the knowledge and be motivated for action.

Being able to switch from "table to farm" or "farm to table" requires that agricultural educators have access to a variety of lessons, units, or chunk of content. This *Agricultural Education Magazine* Issue tries to illustrate this variety across a spectrum of agriculture and food topics. The topics range from water issues to agricultural science to food mapping. Furthermore, the articles profile approaches for a wide audience, spanning adolescents to adults and rural through urban and suburban residents. Finally, these articles were written by educators who are on the front line of agricultural literacy from various fields, including school-based agricultural education, food justice, and agricultural literacy. The experiences of these authors is significant as they are on the forefront of innovation and excellence. The variety represented in these articles is a snapshot of what is needed in an ever evolving society.

I am often asked why we should be ready to think differently on agriculture and food topics. This is an important question. Over the past decade or more there have been a variety of groups that have emerged which conduct agriculture and food education. They often work on narrow educational topics, like gardening education or cooking classes. These types of educational initiatives and groups are appearing everywhere and seemingly every day. We in traditional agricultural education are becoming just one of many groups doing this type of work. We have to be ready to reach out to a wide variety of people or face being cornered out of the marketplace of educational ideas. I would also argue for working with these different groups even when the groups don't share the same values as you. Society and agriculture has more to gain when we approach agricultural literacy as multiple groups rather than individual organizations.

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Adult Agricultural Literacy Education: Beyond the Conventional Boundaries

by Matthew Mars

The notion of agricultural literacy is firmly rooted in a movement that mostly targets elementary and secondary student populations with a curricular focus that is heavily anchored in science, technology, engineering, and mathematics (STEM) content (Kovar & Ball, 2013; Pense, Leising, Portillo, & Igo, 2005; Russell, McCracken, & Miller, 1990). In this dominant context, agricultural literacy is celebrated as a platform that simultaneously brings 'real life' applications to STEM curricula and provides K-12 students with a deeper understanding of where and how the foods, fibers, and natural resources they consume are produced.

Unfortunately, the agricultural literacy movement has largely left out an important and significant demographic: adult learners. For example, Kovar and Ball (2013) found that only 12.2% of the studies on agricultural literacy published between 1988–2011 addressed non-educator adults. This exclusion is problematic considering adults are the primary decision-makers when it comes to food and fiber consumption. The argument here is not that there is little value in expanding the agricultural knowledge of K-12 learners based on their consumer agency (or lack thereof). However, there is also little logic to neglecting the agricultural literacy needs and interests of adults, especially when considered in the consumer market context.

Why has the agricultural literacy of adults been overlooked? The answer is that it has not! Adults have been mostly left out of the agricultural literacy narrative specific to formal learning. This near omission is not surprising considering the capacity to reach adult learners through formal education channels are relatively limited. One notable exception is post-secondary education, which represents a formal learning environment with unmet opportunity to expand the agricultural knowledge of young adult learners (Kovar & Ball, 2013). Moreover, not all adults attend a college or university, which further limits the scope of post-secondary education initiatives aimed at the dissemination of agricultural information and knowledge.

Adult agricultural literacy has been mostly left to the advocacy and promotional strategies of agricultural enterprise and associated organizations (e.g., lobby groups, non-government organizations). As such, agricultural information and knowledge is being conveyed to adults largely through marketing and industry-sponsored public awareness campaigns (Gikerson, Swenson, & Anderson, 2016; Holt & Cartmell, 2013). For instance, adult consumers are the targets of conflicting advertisements, public service announcements, and sponsored journalist pieces that convey polarizing, and often biased, arguments for and against genetically modified organisms. Other controversial topics thrust upon adults with the intent of swaying their consumer decisions include, but are far from limited to animal and livestock rights versus management, chemically-treated versus organic crops, and corporate versus localized production. While there are educational elements to some strategies and campaigns, most are neither balanced nor complete regardless of the bend in agenda and position that is being promoted.

Adult agricultural educators (e.g., Extension educators) are encouraged to develop and deliver instructional innovations that are designed to bring deeper content and more vibrancy to the adult agricultural literacy domain. Regardless of topical area, such innovations should be designed to ensure accessibility, practicality, and objectivity. These three basic attributes, each of which are briefly discussed below, have the potential to lead to practical applications and meaningful contributions to the agricultural literacy of adults.

First, the accessibility of agricultural knowledge primarily hinges on the delivery of information via non-formal and informal channels. As previously indicated, the constraints and boundaries of formal education excludes a large portion of adult learners from the agricultural literacy movements. Yet, the notion of non-formal learning must be extended beyond conventional workshops and seminars, such as those that are offered through Extension programming, to include more contemporary, multi-media venues and technologies. For instance, the non-formal delivery of agricultural content through blogs, podcasts, and other social media channels have the promise of reaching a far wider range of adult learners compared to location, day, and time-based alternatives.

Accessibility can also be broadened by integrating agricultural messaging into the various environments and settings in which informal learning inherently occurs (e.g., family and peer interactions, media outlets, workplaces). Informal learning is by definition the result of an unstructured process. Nonetheless, adult agricultural educators are encouraged to seek out and act on opportunities to leverage such processes through the integration of strategically placed content within widely shared public spaces. For example, broadcasting

public service announcements during conventional 'drive-time' radio programs and integrating informational materials into more contemporary social media news sites has the potential of sparking better informed family conversations of agricultural production and consumption. Similarly, the strategic placement of educational materials in grocery stores, restaurants, and other agriculturally-related venues with high and diverse traffic patterns has the promise of enhancing the agricultural literacy of adults who informally engage in self-education. To clarify, such initiatives should be designed to be objective informational materials rather than biased promotional pieces.

Second, practicality is in reference to how agricultural literacy initiatives view and respond to the practical needs of adult learners. In particular, initiatives should be developed according to two principle questions: What do most adults need to know about agriculture? And, why? 'Most' is emphasized based on the assumption that agricultural literacy initiatives are best positioned to serve adults who lack substantive prior knowledge of and/or experience in agriculture, which represents a large majority of the adult population in the United States (see Kovar & Ball, 2013). Accordingly, the content included in curricula (formal and non-formal), public awareness campaigns, and informational materials should be developed around concepts that allow learners to develop a firmer sense of agriculture as it relates to and informs their specific needs, values, and decision-making. In practical terms, agricultural content should be developed and delivered in ways designed to aid adults in making informed decisions as both consumers and voters. Advanced, overly-complex scientific and technological concepts and principles should be avoided due to the risk of creating "information overload" and consequently causing more apathy than interest (Verbeke, 2005). Instead, adult agricultural educators should focus on the delivery of elemental information and applied content that is not only understandable, but more importantly relevant and compelling to the adult learner.

Third, adult agricultural literacy initiatives should also be grounded in objectivity rather than advocacy. The all too often tendency of agricultural campaigns to take a biased approach to messaging (i.e., 'agvocacy') that leaves audiences with one-sided perspectives on issues and topics is counter-productive; if not irresponsible. The role of adult agricultural education, whether formal, non-formal, or informal, should not be to persuade individuals on what products to buy or what votes should be cast. Instead, agricultural literacy initiatives should be anchored in a steadfast commitment to objectively and comprehensively educate and inform adults so they are adequately equipped to meaningfully engage in agricultural consumption and citizenry. Indeed, enhancing the capacities of adults to critically assess, refine, and act on their agricultural beliefs, knowledge, and perspectives should displace bias efforts to simply persuade them what to think.

The intent of this article has not been to provide specific and detailed methods for developing agricultural literacy initiatives that target adult learners. Instead, the purpose has been to provoke greater attention toward adult agricultural literacy and catalyze a renewed conversation among adult agricultural educators on how to strategically deliver meaningful agricultural content to adults. Lastly, accessibility, practicality, and objectivity have been proposed as the primary pillars for shaping the initiatives that are expected to emerge from the forthcoming dialogue.

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Getting Explicit: Making the Connection between Agriculture and Science Obvious

by Katie Stofer

One of the crucial components of agricultural literacy today is the connection of agriculture to ongoing research, that is, science. Understanding that agriculture is a changing field, with decisions facing producers, policymakers, and ultimately, every citizen, is vital to support for the long-term viability of food and fiber production that supports our burgeoning population. However, we have little evidence of if, let alone how, people see the connections between what have been conceptually separated in public education in the United States for years. What is natural and obvious to professionals in the fields of agricultural research and education may be less so to others who have not been alerted to the idea explicitly.

Since the 1980's, agricultural educators have made an effort to reverse this separation (National Commission on Excellence in Education, 1983; Thoron & Myers, 2008), moving to create agriculture courses in public schools that can count for science credit, which has lately been reserved for abstract biology, chemistry, and physics courses, except for the occasional marine science or astronomy course. Due to the historic separation of agriculture and science in public K-12 education brought about by the U.S. legislature, students who pursue agricultural or vocational courses in high school in particular are often considered to be taking "career-preparation" paths versus those who take abstract science courses in a "college-preparation" path. This separation does a disservice to both populations, however, as career-prep students may miss out on the connections to a breadth of new career fields with high-paying technical jobs in "STEM" (science, technology, engineering, or math). College-prep students may miss out on the natural context of agriculture that everyone could relate to, given the need for everyone to eat.

One recent study set out to examine exactly how people spontaneously connect (or don't) the concepts of science and agriculture (Stofer & Newberry III, 2017). My co-author and I asked a local public population to create meaning-maps, a variation of concept maps without a set correct answer, on the topics. Adult participants in groups or alone, and sometimes with children, made a meaning map of either one or the other term when visiting a public library or local natural history museum. For the map, they listed any ideas, thoughts, feelings, or opinions that they had related to the topic, and then linked those ideas with lines. They wrote whatever they wanted, not just facts. We analyzed the data by looking for patterns and themes across the information in each map.

Only two out of thirty groups wrote "agriculture" on their maps about science, and only one out of twenty-four groups wrote "science" on their maps about agriculture. So our participants didn't seem to explicitly connect these ideas. However, both sets of maps had words related to the other. We found several themes common to both of the maps, though the distribution of the responses in each category varied. For example, while both science maps and agriculture maps talked about physical objects, non-physical ideas, and careers, agriculture maps emphasized the physical and careers more than the non-physical aspects. On the other hand, science maps more frequently had topics were not physical, such as outcomes and benefits to society. This indicates that agriculture may be more closely associated with physical products including crops, livestock, and tractors, while science is more frequently thought of as intangibles such as technologies and research. However, since these three most frequent themes were the same for both topics, these areas could be starting points for discussion about where people do see some connections drawn between agriculture and science, albeit at a more unconscious level.

Yet simply creating courses that may be called "agriscience" is not enough. Nor is it likely that starting to talk about agriculture more through agricultural communication and awareness raising will alone make the connections for people. In fact, people in the United States may see these as very separate disciplines. Public trust in science and scientists overall in the U.S. remains relatively high since the 1970's, though on some

issues trust may be lower. On the other hand, public studies of trust in agriculture reveal that the public has less trust in agriculture, potentially aligning agriculture with ideas of heartless industry rather than selfless scientific enterprise. As well, science education suffers from its own problems with scientific literacy, so hitching one wagon to another alone is not likely to make much difference.

As educators in classrooms and Extension and other free-choice learning settings, there are several steps that can support efforts to re-emphasize the underlying commonalities of science and agriculture to support agricultural literacy. First, simply stating explicitly, potentially repeatedly, that the two are connected is a starting point. Since few people in the meaning maps study listed the other term on their map, it seems they are not readily making a conscious connection between the disciplines. Defining your terms is important; simply stating up front that you connect the two is a starting point. You could also have your learners stop to think about their own definitions of agriculture and science, and talk about whether those definitions overlap.

Another idea is to have a discussion with your learners or audience about how the disciplines are connected, and why people may see agriculture as more associated with physical inputs and products but science as more associated with benefits to society. Start with what connections they naturally see, perhaps by using a meaning-maps exercise to have them individually put down their thoughts on the connections. Later, meaning maps could be used as a post-assessment exercise after lessons on the connections are finished. When discussing career opportunities, be sure to talk about things across the agriculture and STEM spectrum – emphasize that there are laboratory jobs in agriculture research using similar techniques as in chemistry labs, for example, or discuss how farmers participate in research by analyzing their crop yields.

The University of Florida, among others, has some resources for educators who wish to improve their work as they re-connect agriculture and science for their learners. Many of these are listed on our Ag-STEM lab web site: http://aec.ifas.ufl.edu/about-us/affiliated-programs/ag-stem-lab/. I also have several how-to documents related to science and STEM education in the context of agricultural awareness at http://edis.ifas.ufl.edu/topic_a-stoferk. One additional resource for drawing connections in your curriculum between agriculture and science is a framework report from a group of university researchers who went through the Agriculture, Food, and Natural Resources Career Pathways and cross-listed them with the Next Generation Science Standards. http://aec.ifas.ufl.edu/media/aecifasufledu/Framework_for_AgSTEM_Education.pdf

Luckily, agriculture is all around us, as is science. As educators, it should be easy for us to make people more consciously aware of the connections between the two concepts, strengthening our understanding of both in turn. However, we may fall into the trap of thinking that it is too obvious to mention. Since I continue to hear questions from our friends and neighbors asking, "Why should I care about agriculture – I just go to the grocery store?" we may realize that the relation between the two is actually not that obvious. I have to admit, I was one of those people before I stumbled into agricultural education after years of studying science education.

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Destination: Agricultural Literacy

You can get there using the National Agricultural Literacy Curriculum

by Debra Spielmaker

Most of us have a story to tell concerning agricultural literacy, it starts out like this "I have a friend who did not know that… (something you think they should know, I'll finish the sentence) brown eggs are the same as white eggs, flowers become fruit, cheese is made of milk, and a personal favorite, cows have to have a calf each year to produce milk. These are very basic food related concepts, but there are more complex concepts that need to be understood as consumers have questions about the production and processing of their food, clothing, and shelter. Their questions are usually related to concepts in science which oftentimes have social implications.

> An agriculturally literate person understands and can communicate the source and value of agriculture as it affects our quality of life.

Agricultural literacy has been defined and nuanced by many researchers (National Center for Agricultural Literacy, 2017). The current definition used by the National Agriculture in the Classroom Organization (n.d.) states that "An agriculturally literate person understands and can communicate the source and value of agriculture as it affects our quality of life." This definition captures the ability of a person to make meaning (understanding) from concepts in science, technology, engineering, math and economics and apply or synthesize these concepts contextually within agriculture.

In an effort to educate K-12 students and their teachers about agriculture (rather than in agriculture which is the level sought by school-based agriculture education programs), the National Agriculture in the Classroom Organization, the National Center for Agricultural Literacy, and the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) supported the development of the National Agricultural Literacy Curriculum Matrix. The National Agricultural Literacy Curriculum Matrix, or more simply, the Matrix, is an innovative approach to increase agricultural literacy among K-12 students.

Specifically, the Matrix (https://agclassroom.org/matrix) is an online collection of educational resources that are relevant, engaging, and designed to meet national education standards in science, social studies, nutrition, and career education while at the same time meeting the National Agricultural Literacy Outcomes (Spielmaker & Leising, 2013). The Matrix provides instant access to nearly 400 lessons and over 600 supportive companion resources.

As a Web 2.0 project, the Matrix is a collaborative effort where agriculture literacy professionals submit resources for inclusion in the database. Those materials are reviewed and evaluated based on how well they connect with agricultural literacy outcomes, content standards, and Common Core standards. Many states have developed curriculum, this project provided a mechanism for larger distribution. The Matrix is essentially a three-dimensional curriculum map where educational standards, agricultural literacy outcomes, and contextualized content in agriculture come together. This curriculum map provides educators with resources to contextualize educational standards with meaningful experiential activities for learning.

> The Matrix provides instant access to nearly 400 lessons and over 600 supportive companion resources.

Teachers at all grade levels can access the Matrix materials through easy-to-use searching filters. For example, a search of

"dairy" returns several lessons plans—in multiple grade levels—as well as a companion resources such as books, activities (e.g., making butter and biotech cheese) and video links—one that features a cleverly-produced science fiction tale of an alien race finding much-needed calcium in Earthly cows. A search on "pollination" results in a lessons for upper and lower grades along with several companion resources. All companion resource in the Matrix are required to link to instruction and contextualize the content in authentic ways. Users can browse freely all resources, can print lesson plans and the associated companion resources, or store a link to the lesson in MyBinder. Creating a binder on the site is easy and keeps favorite lessons in one easily accessible space. Furthermore, if the lesson is updated in the database, the resources are automatically updated in MyBinder. The resources on the Matrix may be browsed freely and are copyleft, though Creative Commons. Meaning users can share and adapt the resources with appropriate attribution (credit) but may not use the resources for commercial purposes.

The Matrix is a platform for curating quality resources that support academic requirements and increase agricultural literacy. When you need high quality instructional resources to advocate and educate for agriculture consider starting your search on a site with vetted, engaging, and relevant resources found on the Matrix.

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Cross-pollination of agricultural literacy: Engaging diverse perspectives through formal and non-formal collaboration

by Sarah Cramer

Modern American agriculture, and society as a whole, is full of many divisions, dichotomies, and clashes (Martin, 2016). We see tensions and disconnects between urban and rural, organic and conventional, and formal and non-formal education. Additionally, researchers and practitioners alike have called for a more diverse approach to agricultural literacy initiatives beyond traditional school-based agricultural education, FFA or 4-H programs (Mars & Ball, 2016). They encourage bridging these physical and philosophical agricultural divides by engaging learners of all ages in agricultural literacy programs, welcoming new and different worldviews, and expanding to informal and non-formal settings. In this article, I share information about and experiences with one such example of a boundary-stretching, innovative, and quantifiably successful agricultural education non-profit, and offer suggestions of how collaboration with organizations like this non-profit may help increase the reach of agricultural literacy efforts and bridge agricultural divides.

The Columbia Center for Urban Agriculture

One sunny afternoon in May I sat down with Lori McCurdy, Outdoor Classroom Program Manager, and Kyle Holland, Urban Farm Educator, from the Columbia Center for Urban Agriculture (columbiaurbanag.org) to talk about agricultural literacy. I had just finished helping with the morning's field trip, during which dozens of seventh graders descended on the farm to learn about fruit and vegetable production, as well as erosion and pollution. As a non-traditional agricultural educator myself (my background is in public health, school gardening, and garden-based education), I have always felt at home at CCUA. However, as a PhD candidate in Agricultural Education at the University of Missouri, I have also become well versed in the lingo of the traditional agricultural education world—terms like "agricultural literacy" included. I threw the term around repeatedly while telling Lori and Kyle about this issue of *Agricultural Education Magazine*, and while setting up our interview. It was not until after we began talking about their work that Lori volunteered, "I haven't heard of that term. I've never used the term agricultural literacy to define what we do here…" Oh. Right. This is indeed a different world of agricultural education. However, that revelation made me excited to explore this disconnect, and to share examples of untapped potential for collaboration.

The Columbia Center for Urban Agriculture (CCUA) is a gem of our community here in Columbia, MO. What began as an extracurricular project of students at the University of Missouri in 2008 (consisting of demonstration gardens, a small composting program, and service learning classes) has grown into a non-profit organization with a dozen full-time staff members, several AmeriCorps members, and hundreds of volunteers. The centerpiece of the organization is the 1.3-acre Urban Farm that lies in the heart of Columbia, a mile from the University. In 2016, the farm produced 14,651 pounds of fruits and vegetables, a majority of which were donated to the local food bank. CCUA's reach, however, extends far beyond the Urban Farm. The Opportunity Gardens program establishes free vegetable gardens, complete with three years of supplies and mentorship, at the homes of qualifying low-income residents in Columbia. In 2016, 94 new opportunity gardens were established. As Outdoor Classroom Program Manager, Lori works with students and teachers at seven different local schools to develop, maintain, and utilize their outdoor classroom spaces.

Education at CCUA

Though they don't refer to it as such, agricultural literacy permeates every corner of CCUA's work. Their mission statement reads: CCUA works to enhance our community's health by connecting people to agriculture and the land through hands-on learning opportunities from seed to plate. In terms of output and fulfilling this mission, CCUA is quantifiably succeeding on all fronts. The seventh grade field trip that I helped with on that May morning was a pilot for a Farm-to-School grant that, if funded, will bring every single second- and seventh-grader in Columbia Public Schools to the Urban Farm for a half-day field trip next school year. Last year, 2,246 students participated in hands-on gardening and cooking activities on site.

Lori described her educational philosophy on the farm as one that used "food as the hook." In discussing their programming, Kyle said, "we take a holistic approach here—the environment and the way the production of food is impacting the environment." He also said, "we target people of all ages. We're trying to teach everyone where their food comes from, how it's grown, and if they're interested, how to grow it at their own house." In everything that they do, food remains at the center. Their tagline, in fact, is Food is Good. While agriculture as a potential vocation may seem far-fetched to some, or environmental activism may feel overwhelming, CCUA recognizes the motivating, universal, and powerful connections we all have to food. As Lori told me, "Not everybody wants to talk about pollution, but the hook can be food, and how food fits into natural systems. Not everybody cares about nature, but everybody eats."

Opportunities for Collaboration

As we visited, the conversation repeatedly highlighted the total lack of collaboration, or even communication and awareness, between these non-formal food educators and formal agriculture teachers. As an inhabitant of both worlds, I was not surprised by this, but nevertheless it strikes me as an odd gap. Aren't we all trying to teach people about food and agriculture? This gap had been readily apparent earlier in the spring when I brought my students from our department's non-formal education class to the Urban Farm for a field trip. These students, most of whom participated in FFA and many of whom came from farm backgrounds, were visibly uncomfortable during our visit. I noticed my students trying to catch our guides in agricultural knowledge slipups (like the student who pounced on a CCUA employee who briefly confused a layer and a broiler), or rolling their eyes at the mention of organic farming practices. Despite this discomfort, palpably felt by all of us, I saw glimmers of connection and interest. Such as when, for example, a student asked about their French drain, and remarked, "oh, it's like tiling on a farm!" I forgave her for insinuating that CCUA was not operating a farm.

It is my hope that these agricultural clashes become things of the past, and I believe the best way forward is through collaboration and cooperation with the CCUAs of the world. Below are a few recommendations developed from my experiences and conversation with Lori and Kyle:

- Share curriculum and resources. Kyle said that he would love to see the middle school and high school agriculture curricula, and that "I think that would be a great way for us to complement what they want to learn." Non-profits and other non-formal agricultural education entities are forced to do a lot of reinventing the curricular wheel. Additionally, formal agricultural educators may not have the flexibility or time to cover the greatest diversity of topics, while non-formal organizations could help fill in those gaps. Collaborating at the curriculum level can potentially maximize the impact and efficiency of all parties.

- Visit urban farms, community gardens, or farm-to-school programs with agriculture students. Kyle recalled one time when the local FFA visited the Urban Farm for a field trip. He said that they commented that

it was "such a cute little garden," reflecting the biases my students had held as well. As our society becomes more urbanized, and the average age of farmers continues to rise, it will be important to expose students to a variety of agricultural methods, and to redefine what they think of as a "farm." Visiting and collaborating with diverse programs also creates a more welcoming environment for students who may be interested in food and agriculture, but do not come from a farm or rural background.

- Collaborate to reach younger students. CCUA, and similar organizations, often focus much of their educational efforts on pre-k through elementary students. In my own experience as a garden educator, we had a robust garden program at the elementary school, and then nothing for students until high school agriculture classes. As Lori said, "I can't say that we have a relationship with agriculture teachers. Mostly because we have historically had an emphasis on younger kids." Partnerships between formal and non-formal educators can help bridge this gap, and create an agriculture "pipeline" for students throughout their schooling. This collaboration capitalizes on each group's strengths and respective audiences, and contributes to greater agricultural literacy across the population.

Conclusion

CCUA, along with the City of Columbia and the Columbia Farmers Market is leading the charge in raising funds for a new agriculture park and permanent farmers market structure. Once completed, the non-profit will move from its current urban farm site to the new park. The early success of this initiative reflects not only the strengths and reach of CCUA, but also the city's confidence in their work and commitment to diverse and expansive agricultural education in the community. It is a great time to be in Columbia, and with the construction of this new park, it will be even more important for formal agriculture teachers to join forces with CCUA. In Kyle's words, "I would say to agricultural educators, 'Come to the Urban Farm! We want to meet you!'

I second Kyle's sentiment, and strongly encourage formal agricultural educators at the middle school, high school, and college levels to seek out these sorts of entities in their own or neighboring communities. The faces of American agriculture, and the agricultural landscape itself, are rapidly changing. The task of developing an agriculturally literate society is a large one, and cannot be accomplished without collaboration and partnerships. Beyond simply cultivating agricultural literacy, programs like CCUA make agricultural production something that is accessible to all, regardless of location, space, knowledge, or income level. Those of us who grow, teach about, or even enjoy eating food are all on the same team. Rather than remaining in our respective agricultural or educational silos, we all stand to benefit from a little cross-pollination of practices and ideas.

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Food Mapping: Cupboards, Classrooms, and Communities

by R. Alan Wight and Karima Samadi

Looking for a new kind of assignment and community engagement activity to do with your students? Interested in helping them think deeper about our food and agricultural systems? Want to talk about food choices and the impact they have on health, economics, and the environment? If so, then perhaps it is time to do some Food Mapping (FM).

What is Food Mapping and Why do it?

There are many definitions of FM or mapping of the food environment. Deborah Albon (2007) views FM as a way to explore people's relationships with food and the places and individuals associated with different kinds of foods. Others define FM as the process of assessing an individual's or family's access, affordability, awareness, acceptability and appropriateness of obtaining food (Bowyer, S., Caraher, M., Eilbert, K., & Carr-Hill, 2009). Some scholars map the food environment to highlight disparities, and/or conduct ecological foodshed analysis, chart agricultural sustainability, and document food-related disease prevalence, food safety, and animal welfare issues (Sweeney, Hand, Kaiser, Clark, Rogers, & Spees, 2015). For our purposes, FM is as an asset-based exercise, which focuses on the positives, while acknowledging the areas that need improvement. We defined FM as the process of developing a picture of the food sources and resources in a certain area. FM is a fun, learner-centered, experiential, S.T.E.M and art-based activity that can be done with a variety of age groups.

Think about it: people have been "mapping" food sources since before recorded history, as nomadic tribes hunted and gathered their way across the land, noting where the plants were and the animals gathered. Today, if we are hungry things are a bit easier. We go to our garden, fridge, and kitchen cupboards, grab some food, and cook a meal; we can find a list of restaurants or grocery stores on our smart phones, hop in the car and go buy what we want; or we can place a take out/delivery order. However, not everyone has space for a garden, knows how to grow food, has food to cook at home, knows how to cook, has a full-line grocery store near by, a car to drive, or money to buy healthy foods. It can be a challenge to get our students to understand poverty, the complexities of our modern agrifood systems, and how these variables impact our individual, family, and community health. Food Mapping is one way to begin these conversations. So how do we do it?

We defined FM as the process of developing a picture of the food sources and resources in a certain area.

Where to begin and What is the Food Mapping Process?

Over 10 different FM toolkits and guides have been developed over the years to assist K-12 and Extension educators, community organizers, and health advocates with this process. An important starting point is to decide the scope of your mapping project. You can take the eco-map approach and have your students explore their own households and consumption patterns (Figure 1). This kind of map is great for younger children and can engage parents around healthy eating habits. If you want to use FM as a classroom/school activity, you can have the students map the assets on their school grounds. Where are the vending machines, water fountains, kitchens (cafeterias) and refrigerators? If your unit is focused on biology, outdoor education, or plant iden-

FM is a fun, learner-centered, experiential, S.T.E.M and art-based activity that can be done with a variety of age groups.

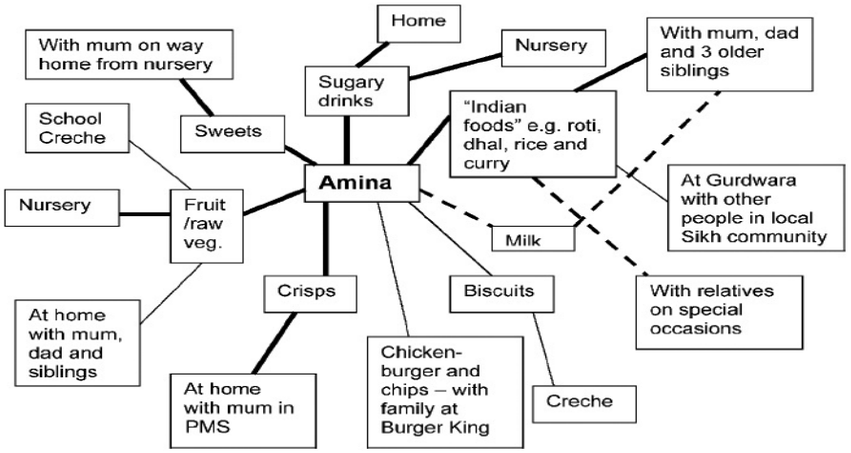

Figure 1. Deborah Albon (2007) Individual Food (Eco) Map
The lines represent frequency regarding food, person, and place. The dark solid lines means the relationship occurs daily or more than once per week. The thinner solid line means the relationship occurs once per week. The dotted line means the relationship occurs once a month.

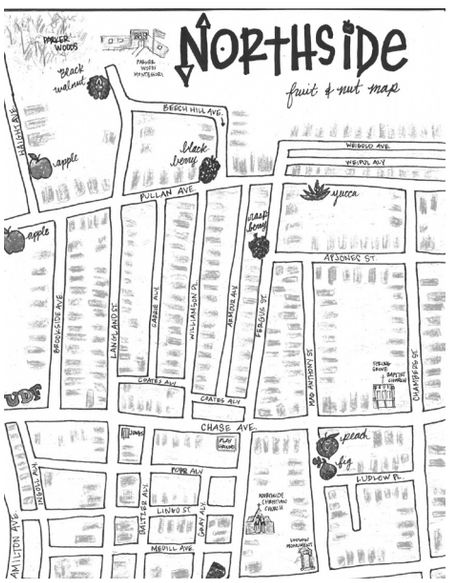

Figure 2. Student Drawn Map of Edible Plants in Northside, Cincinnati, Ohio

tification, you can have your students identify edible plants (Figure 2).

FM is also a great way to engage the community. Figures 3 shows a neighborhood map in Covington, Kentucky, where community members collected that data and local artists help design the icons. You can make maps of community gardens, nearby farms, farmers markets, drop-off locations for community supported agriculture (CSA) programs, soup kitchens, food banks, and food forests to name a few ideas. Often the best place to start is by asking your students what they want to map. The scope and scale of the FM project is flexible.

There are differences among the toolkits and you are encouraged to explore these to find the right one for your students. See the resource section for links to the toolkits, activities, and smartphone/computer apps to make maps. Here are our basic suggestions for materials and protocols.

Materials:

- Blank paper for notes and drawing map routes
- Clipboards
- Pencils
- Walking shoes
- Smartphones (for pictures, videos, and map apps)
- Base/Blank map of the area
- Data collection sheets (depending on the purpose)
- Compass (optional)

Steps:

1. Team up with another classmate and take a walk around the school or neighborhood. Engage with other people, talk to them about what you are doing, and visit different types of food locations and sources.

   Food locations can be fast food retailers, restaurants, grocery stores, gardens, gas station convenience stores, corner stores, vending machines, wild edibles, or any place where 'food' is available.

   School/community assets could be: murals, people, libraries, churches, community

Figure 3. Covington's Westside Community Asset and Food Map

centers, gyms, bike paths, green spaces, businesses, etc.

If you are interested in the healthy eating and active living environment, consider documenting aspects of the physical space (parks, sidewalks, convenient/corner stores). Which ones are supports or barriers to wellness?

2. Take notes, pictures, and record the nearest address/landmark on the map. Ask critical questions such as, where does the food come from, who grew it, was it grown using organic or conventional methods, how far did it travel, etc. For a more complete list of questions see Wight (2013).

3. Return to the starting location for conversation and debriefing. Students should be given ample time to draw their own maps. You can make one large class map, group maps, or individual maps. Afterwards, the information and maps are collected, transcribed, and translated into digital maps (this last part can take awhile to complete, and if working with younger children, it is often the teacher who ends up doing this).

4. Maps should then be shared with community members/ school administration for feedback and edited accordingly. Maps can then be made available as hard copies and on websites. See resources for examples.

Making Maps

The scope of your project influences the kinds of maps you make. We suggest starting small.

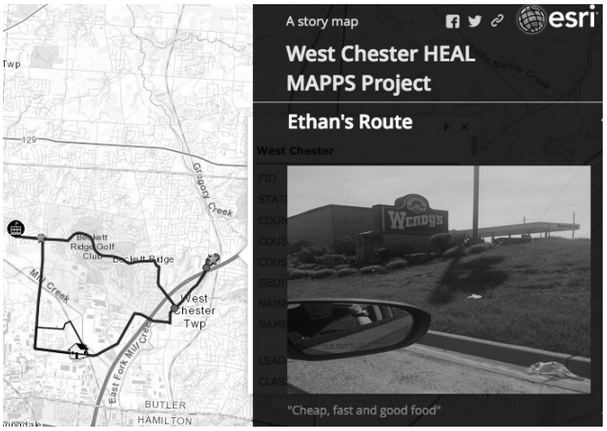

Figure 4. West Chester Story Map

You can always do a succession of maps, with the students mapping their home kitchens and yards first. Then have them do a few neighborhood streets, the school classroom, or part of the school. If you work with high school or college students, you can use computer programs and mobile applications to make digital maps, or have your students upload information to websites like Falling Fruit (https://fallingfruit.org/) – where the location of wild edibles are recorded all over the world. You can put on art shows to display your student's maps, or hang them up on school family night. Other final FM products include hand-held brochures, maps of neighborhoods that encourage walking tours; wall posters and murals; or even interactive story maps (e.g. West Chester example). FM is also a great opportunity to build public speaking and leadership skills. Some Extension offices have allowed FM to become "Self-Directed" 4-H projects, where youth work independently or in teams, and then present at the fair.

To help you get started, check out the resources links to different FM toolkits, mobile applications, software, and map examples. As you decide what kind of mapping project is best for your students and community, keep in mind that you can mix up these ideas. You can map just about anything, change the protocols and scope to be age and developmentally appropriate, and involve other students, teachers, parents, and community members. If you are working at the college level, these kinds of mapping projects are meant for collaboration—team up with geographers, planners, health promoters, artists, and community–based organizations and make some sweet maps!

Resources - Smart Phone Mapping Applications and Software

Best Mapping Apps	Takes Photos	Tracks Routes	Geocodes	Text Ability	User Friendly		Cost	
					Youth	Adult	Free	Paid
Mapplar	•		•		•	•	•	
Strava	•	•	•		•	•		•
GPS Tuner	•	•	•		•	•	•	
Survey 123	•		•	•		•	•	
Collector	•		•	•		•	•	
Google Map Maker	•		•	•	•	•	•	

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Resources - Food Mapping Tool Kits

Organization/Author	Name, Location, and Hyperlink
Sustain, the alliance for better food and farming (2001)	Making Links: A Toolkit for Local Food Projects https://www.sustainweb.org/publications/making links a toolkit/
Barbara Cohen, IQ Solutions, Inc. United States Depart. of Agriculture (2002)	Community food security assessment toolkit http://www.sustainablecitiesinstitute.org/Documents/SCI/Report Guide/Guide USDA CommFoodSecurityAssessmentToolkit.pdf
O'Neill, M.	Putting food access on the radar: how to target and prioritise communities at risk. *National Consumer Council, London.* https://www.oxfordshire.gov.uk/cms/sites/default/files/folders/documents/roadsandtransport/transportpoliciesandplans/localtransportplan/ltp2/ltpaccessibilitystrategyB.pdf
Caraher, Martin., & Bowyer, S. (2007)	Food Mapping Toolkit. Centre for Food Policy, London. http://www.city.ac.uk/arts-social-sciences/sociology/centre-for-food-policy
Oregon State University, Grow Healthy Kids Community - HEAL MAPPS™ (2011)	Healthy Eating Active Lifestyles: Mapping Attributes using Participatory Photographic Surveys http://extension.oregonstate.edu/growhkc/sites/default/files/heal-mapps-manual-preview.pdf
Campaign to Protect Rural England. Messer and Barratt (2012)	Mapping Local Food Webs Toolkit http://www.cpre.org.uk/resources/farming-and-food/local-foods/item/3076-mapping-local-food-webs-toolkit
Greater London Authority (2012)	Takeaways Toolkit: Tools, Interventions and case studies To help local authorities develop a response To The health impacts of fast food Takeaways https://www.london.gov.uk/sites/default/files/takeawaystoolkit.pdf
Food Mapping Manitoba (2013)	A Food Mapping Tool-Kit: How to Organize a Workshop in your Community. Our Food Our Health Our Culture. http://www.foodmattersmanitoba.ca/wp-content/uploads/2014/04/Food-Mapping-tool-kit.pdf
Wight & Killham (2014	Food Mapping: a psychogeographic method for raising food consciousness http://www.tandfonline.com/doi/full/10.1080/03098265.2014.900744

Resources - Example Food Maps and Projects

Organization / Author/ Location	Food Mapping Products with Hyperlinks
Detroit Food Map (2011)	Zoomable Map of Detroit displaying data gathered by basic Google search for food stores in the Detroit area and through field visits to neighborhoods around the city (Apr 2011 - Oct 2011). Data was checked against a listing of full-line grocery stores from the Detroit Economic Growth Corporation (DEGC). http://detroitfoodmap.com/
Food: An Atlas (2013)	This crowd funded book project is a collection of maps - from the local, to the regional, national, and international levels. The atlas fuses traditional cartography, poster art, infographics, and journalistic text to showcase maps as narrative devices. Subjects include global cropland distribution, Los Angeles's historic agrarian landscape, community supported fisheries, the redistribution of food surpluses in Italy, and Oakland Taco Trucks; chapters focus on food production, distribution, security, & cuisine https://www.kickstarter.com/projects/1276177353/food-an-atlas-0
Falling Fruit (2014)	Using the Google Map Platform, this crowd sourced, citizen cartography allows uses to upload data points for edibles: fruit and nut trees, herbs across the globe. https://fallingfruit.org/
HEAL MAPPS, Rainer, Oregon (2015)	One of many HEAL MAPPS projects, this PDF report that includes demographics, relevance of the project to the community, an assessment of community readiness, physical activity, healthy eating, and several different static maps. http://extension.oregonstate.edu/growhkc/sites/default/files/community report rainier 2015final.pdf
HEAL MAPPS West Chester, Ohio (2015)	This is an interactive story map, which shows the routes, pictures, and video interpretations of the participants. http://kirwan.maps.arcgis.com/apps/MapJournal/index.html?appid=c12da86f50c7431599957b1b41dda6a5
Green Umbrella, Local Food Advocate, Marian Dickenson, Cincinnati, Ohio (2016)	Google Map Platform, zoomable layers with: farms, farmer markets (including those that accept EBT/SNAP), community supported agriculture and herd share pick ups, restaurants and stores sourcing local food products, wineries, distilleries, breweries, and community gardens (cut and past URL into browser) https://www.google.com/maps/d/viewer?hl=en&authuser=0&mid=1RAMIlyzr XnwxcsTz0U-tYw0Z-c&ll=39.116159356415 85%2C-84.56764287705079&z=9

Alan is an environmental sociologist and educator at the Christ College of Nursing and Health Sciences in Cincinnati, Ohio. His research, teaching, and advocacy agenda focuses on raising people's food, health, and ecological consciousness. Alan works with communities and schools to map their food assets and create sustainable agro-forest projects. His dissertation examines the types of learning and education that occur within the CSA context.

Karima is a public health professional with extensive experience in nutrition education. After earning her Bachelor degree in Dietetics from the University of Kentucky, she worked in various programs ranging from child obesity prevention to agricultural education. Formerly an EFNEP Program Assistant, she taught limited resource families how to eat healthy on a budget. Recently earning her Master degree in Public Health from The Ohio State University, she hopes to leverage her research and work in food insecurity to influence policy, systems, and environment change through community-based participatory research. Karima is the Extension and Research Coordinator for HEAL MAPPS.

Water Literacy: Training the Next Generation of Water Advocates

by Gaea Hock, Katelyn Bohnenblust, Grace Roth

National FFA recognizes the need "to include literacy and advocacy as foundational skills for their student members" (National FFA Organization, 2015, para. 1). We can teach these skills in the agricultural education program, but extending the opportunity to apply these skills outside the classroom is vital.

Need for Water Literacy

One of the most important, if not the most important, aspects of a successful agricultural operation is water. In Kansas, like many states, we are keenly aware of the importance of having the right quantity and quality of water. The major source of water in western Kansas is the Ogallala Aquifer. The ability to maintain irrigated agriculture and livestock production in western Kansas is directly linked to a community's ability to maintain its schools, libraries, hospitals, and other critical quality of life elements.

In January 2015, a team of state agencies developed the Long-Term Vision for the Future of Water Supply in Kansas to address the issue of water depletion in our state. The vision includes a mission, goals, and action items, with one of them being the need for education and outreach. The Education and Public Outreach Supplement of the Vision specifically states, "Increase awareness and knowledge of Kansas youth on water-related issues through K-12 education and beyond-the-classroom opportunities" and "Develop partnerships between industry, community, and educational institutions that will promote and train for water-related careers" (A long term vision…, 2015, p. 72).

One action item states, "Collaborate with youth-related organization leadership on water-related educational opportunities and establish sessions and experiences focused on water" (A long term vision…, 2015, p. 75). While the Vision directly states the need to involve youth in communicating and educating others about water, the idea for a training program to prepare youth for this challenge was the dream of a western Kansas girl.

Western Kansas Girl's Dream

Grace Roth, a freshman FFA member from Holcomb, Kansas, developed the idea for a youth water conference. When Grace started her freshman year, she was tasked with creating a Supervised Agricultural Experience (SAE). The foundation and inspiration for her SAE was her family commitment to conserve the limited water resources available in western Kansas. Her father, Dwane Roth, along with two other farmers in the state volunteered their farms for designation as a "water technology farm." Water technology farms are demonstration farms that allow the installation and testing of the latest irrigation technologies such as soil moisture sensors. Grace recognized the need to educate more people about efficient water use by observing work done on the water technology farm.

Rather than a typical production-focused SAE, Grace decided to focus on water advocacy for the state of Kansas. She traveled to Manhattan, in December 2016 to meet with Susan Metzger and Russell Plaschka at the Kansas Department of Agriculture. She received advice from these mentors about ways the project could be started. She then traveled to Lawrence to meet with the Kansas Geological Survey and learn more about the decline of the Ogallala Aquifer.

Grace shared her story and mission with the Kansas Association of Agricultural Educators (KAAE) at the Mid-Winter Ag Ed Symposium. After her presentation, Dr. Gaea Hock, assistant professor of agricultural education at Kansas State University, offered to help her in making the project a reality. After several on-campus meetings and conference calls, the idea for a water advocacy training program was refined and planning began.

Making it Happen

Many people came together to help this student realize her dream and work toward the bigger goal. In addition to the adults already, actively engaged two college students were recruited to assist with the program. Katelyn Bohnenblust had just finished her first year at KSU and was wrapping up her year of service as the State FFA Treasurer. Her background made her uniquely qualified to help in the planning and delivery of the water conference. In addition, Kyler Langvardt, communications intern at the Kansas Department of Agriculture, assisted with planning and coordinating the event. He was a previous state FFA officer and valued the goals of this endeavor.

KS YWAC

The first-ever Kansas Youth Water Advocates Conference was held July 12-14, 2017 in Manhattan, Kansas. Eleven high school agricultural education students attended. The students were in grades 9-12 from nine different high schools across the state.

Students participated in two full days of educational workshops and skill-building sessions. Sessions included a variety of water topics: the Kansas Water Vision, Kansas water careers, general water issues, the Ogallala Aquifer, watershed management, community and organizational leadership, and urban water issues. The students also participated in workshops focused on professional development such as extemporaneous speaking, elevator speeches, researching the topic, and integrating work into an agriscience fair project. Each student wrote and delivered a short water presentation to practice the skills they learned during the conference.

The intention of this conference is to motivate and prepare youth to speak on important topics related to our water resources. Following the conference, the students serve as a member of the Kansas Youth Water Advocates team. During the students' year of service, they will receive mentorship to help them fully develop their knowledge and skills. The over-arching goal of this program is to increase the number of water conscious citizens in the state. This goal is much more attainable when students are equipped to educate their communities about water issues.

Youth Engagement

Grace Roth shared her feelings about this program, "This past year I have seen my future unfolding before me. I have realized that what we do today will impact what happens tomorrow. If we as FFA members take action, we will not only be able to impact agriculture in our communities, but in the state of Kansas. We will not only play an active role in creating our future, but we will ensure the future of agriculture for all."

Investing in young adults now is crucial in their ability to solve the challenges of the future. The youth who participated in the Kansas Youth Water Advocates Conference will educate their communities about how they can help conserve and protect our water resources so the livelihood of many Kansas families remains viable. Adults involved in planning and supporting this program intend for it to grow and expand with a new class of water advocates each year.

Agricultural Literacy and Advocacy

Each state has its own unique set of agricultural issues and areas of concern. Agricultural education students are a great resource to educate community members about those crucial topics. The three-circle model of agricultural education encourages the extension of classroom learning to supervised agricultural experiences and FFA leadership events. The avenues to start your own group of trained youth advocates are numerous.

- Encourage students to conduct exploratory SAEs to learn more about important agricultural topics.
- Partner them with community members who work in the agricultural industry.
- Solicit support from state agencies who work to enhance a sector of the industry (such as a state forest service, commodity groups, breed associations.)
- Engage with cooperative extension and area research stations.
- Participate in Farm Bureau events at the local and state level.
- The creation of the KS YWAC is one example of how a group of people got behind a high school student's dream and made it a reality. What are your students passionate about? Who are the experts in your community and state eager and willing to serve as mentors? How can you maximize your students' experiences while in high school? As we work to increase the agricultural literacy of all citizens, we must consider how to capitalize on the resources available to us while also meeting the needs of our students. Suggestions include:
- Design educational assignments that encourage students to research local issues.
- Compete in FFA CDEs and LDEs that allow students to extend their learning beyond the classroom.
- Examples: Agricultural Issues Forum, Marketing Plan, Prepared Public Speaking, Extemporaneous Public Speaking
- Conduct research that can be used to compete in the FFA Agriscience Fair
- Integrate local agricultural issues and advocacy efforts in your chapter's Program of Activities and National Chapter Award application

As agricultural educators, we can help prepare our students to lead the agricultural industry through purposeful engagement in literacy and advocacy programs. All it takes is a student with a big idea and the right group of mentors to take it to the next level.

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Dr. Gaea Hock is an assistant professor of agricultural education at Kansas State University.

Katelyn Bohnenblust is a sophomore in agricultural education at Kansas State University.

Grace Roth is a sophomore at Holcomb High School and the Southwest District FFA Treasurer.

THEME ARTICLE

Agriscience Literacy: Identifying the Science in Agriculture Awareness

by Hannah C. Parker and Amber H. Rice

Agriculture teachers nationwide are committed to producing agriculturally literate students. In fact, when agriculture teachers in a recent study were asked what they believed was the purpose of agricultural education, agricultural literacy was mentioned by every participant as critical for guiding their curriculum and instruction (Rice & Kitchel, 2017). School-based agricultural education (SBAE) is continuously evolving to meet the current needs of students, communities, industry, and education; including an increased focus on agricultural literacy. However, this rapid evolution has also led to an ambiguous description of what agricultural literacy is, and how it should be taught. And while agricultural literacy is widely recognized as a responsibility of SBAE, successful incorporation of agricultural literacy lacks clear direction and consistency across agriculture programs.

Expanding SBAE's conception of agricultural literacy to more explicitly target science, technology, engineering, and math (STEM) could be one potential solution to this problem. The majority of agriculture teachers across the United States are already teaching STEM concepts through their agriculture classes (Despain, North, Warnick, & Baggaley, 2016). Agricultural science and agriscience are common terms in SBAE that blend science and agriculture. While attempts to incorporate science through SBAE is not new, attempts to include science in the dialogue specifically regarding agricultural literacy have been weak at best. Frequently, agricultural literacy is presented from a consumer and voter standpoint (Rice & Kitchel, 2017), which while important, often excludes the science component to many agriculture concepts. While agriculture is widely viewed by agriculture teachers as an applied science, a recent study found the general public fails to overlap the definitions of science and agriculture (Stofer & Newberry, 2017). This disconnect between agriculture and science impacts literacy efforts for both disciplinary domains.

In recent years, both agriculture and science have sparked public controversy over a multitude of topics. Information overload, inaccuracy of information, and source bias have plagued both disciplines as they attempt to reach the public through nonformal, informal, and formal channels. The various roles of SBAE are important to consider when incorporating agricultural literacy into the formal curriculum. SBAE should not neglect traditional agricultural topics, but with changes in society and education, science is playing an increasingly crucial role in the future of agriculture. SBAE should be preparing our students to not only be agriculturally and science literate, but also agriscience literate. Students who are agriscience literate can accurately identify and communicate how science impacts the food and fiber system economically, environmentally, and socially.

The following recommendations are provided as initial strategies for further encompassing agriscience literacy into SBAE:

Classroom/Laboratory

- Become Curriculum for Agriculture Science Education (CASE) certified. CASE provides resources for teachers that emphasize the science within agriculture. It connects current Agriculture, Food, and Natural Resources (AFNR) standards to Next Generation Science Standards (NGSS).
- Collaborate with science departments. Agricultural teachers often find ourselves "hiding" away in our world of agriculture, but there is an entire science staff that wants students to succeed just as much as we do!
- Incorporate literacy in advanced agriculture classes. Often the focus of literacy is in introductory level courses, which misses an opportunity to reach students in years three and four that are ready to dive deeper into agriscience concepts.

- Increase social media posts about classroom experiences, not just FFA events. Incorporate social media into agriculture communication classes, even let students "take over" social media for a day.

Supervised Agricultural Experience (SAE)

- Begin to foster career exploration within agriculture while emphasizing a need for science literate professionals. USDA (2015) projects 27% of employment opportunities within agriculture will be in the STEM field between 2015-2020.
- Place greater emphasis on research and exploratory SAE's that develop agriscience skills. Encouraging students to build on current SAE's will provide increased buy-in (i.e., creating a feed regiment experiment based on recommended protein values).
- Plan and deliver SAE fairs showcasing exceptional students to school administrators and community members. This could be during Meet & Greets with parents, county community meetings, school board meetings or community organization meetings.
- Invite guest speakers with science backgrounds and who are not the typical "norm" within the field to talk to students about careers in agriculture (i.e., agronomist, environmental analyst, agricultural engineers, meteorologists etc.).

FFA

- Use FFA Week to communicate what we do in SBAE to the entire school and community. DON'T just focus on your agriculture students during this week! Take the opportunity to plan events for the entire school that also involve the community.
- Create an additional officer position specifically for agricultural literacy. An Agriculture Literacy Officer can focus on initiating, planning, and coordinating outreach events for FFA members. Additionally, the National FFA should consider adding an agricultural literacy committee to address literacy on a national level.
- Increase participation in Agriscience Fairs. Agriscience Fairs are one of the easiest ways to incorporate science, but also easy to overlook. Encourage students to expand on labs conducted in the classroom and/or create their own questions to answers.
- Increased participation in CDE/LDE contests related to science (i.e., agriculture issues, soils, agronomy, and anything related to science!). Tie in science concepts from the classroom to CDE/LDE's.

Regardless of what SBAE wants to call it: agriculture, science, agricultural science, agriscience, etc., we can't deny the need for literacy. "As we consider the future of SBAE, one thing is almost certain, the discipline will change" (McKim, Velez, Lambert, & Balshweid, 2017, p. 107). It is essential to recognize that impact comes from how we respond to change. At one point in time, most students came into the classroom with some background and knowledge in agriculture, but this is no longer the case. We should take this opportunity to foster a new era of agricultural literacy that is grounded in science.

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