JOURNAL OF THE NACAA

ISSN 2158-9429

VOLUME 16, ISSUE 2 – DECEMBER, 2023

Editor: Linda Chalker-Scott

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Agricultural Courses and Clubs Impact on Utah Extension Educator's Agricultural Literacy

Abstract

This study assessed the agricultural literacy proficiency of Utah Cooperative Extension professionals and volunteers. Using a validated Judd-Murray Agricultural Literacy Instrument (JMALI), the majority demonstrated factual literacy (*M* = 57%, 42%) or applicably proficient understanding (*M* = 42%, 39%) of the National Agricultural Literacy Outcomes (NALOs). Individuals achieving proficiency can recognize, articulate, and explain complex concepts for real-world applications. The study revealed that most lacked prior participation in agricultural courses or clubs. A significant finding was that volunteers with previous club engagement showed significantly higher proficiency scores, emphasizing the influential role of experiences like 4-H and FFA in enhancing agricultural literacy. Study implications suggest the need for professional development support to increase the educators' agricultural literacy and multistate replication of the study to strengthen Extension program impacts within communities.

Keywords: agricultural literacy, Utah, volunteer, agricultural exposure, community education

Introduction

The extension model is known for being one of the world's most successful for transferring technology and innovation and has helped move agricultural and consumer research from the university into practical use (Scott et al., 2018). Extension professionals and volunteers are change agents at the community level (Bloir and King, 2010; Rogers, 1963) because they provide knowledge to help people improve their quality of life (Morse et al., 2006). Their role as community educators depends on their ability to convey up-to-date agricultural information and draw support from key stakeholders (Bowie, 2020). Correspondingly, agricultural literacy is the ability of an individual to effectively communicate the purpose and value of agriculture in everyday life (National Center for Agricultural Literacy (NCAL), 2017). Improving agricultural literacy within a community is generally associated with Cooperative Extension (CE) efforts related to youth 4-H programming, consumer decision-making, and collaboration with K-12 school-based projects or events (e.g., Agriculture in the Classroom). It is rarely, if ever, a component of internal professional development efforts for the organization. A review of prior literature revealed no previous research that determined the agricultural literacy proficiency levels of Cooperative Extension professionals or volunteers in the Intermountain West states. Furthermore, a web-based search of annual professional development conference presentations for this region in 2022-2023 offered fewer than five sessions directly dedicated to agricultural content knowledge improvement. While it is reasonable to suggest that CE professionals and volunteers were hired, recruited, and retained for their knowledge and expertise, there may be definite assumptions regarding the depth, breadth, and scope of their understanding of agricultural information.

The NALOs are K-12 benchmarks and indicators that define what students should know about agriculture as they progress through the U.S. education system (National Agriculture in the Classroom, 2014). They are categorized into five themes: 1) Agriculture and the environment, 2) Plants and animals for food, fiber, and energy, 3) Food, health, and lifestyle, 4) Science, technology, engineering, and mathematics (STEM), and 5) Culture, society, economy, and geography. In order to improve

agricultural literacy programs and educational efforts and to meet established research goals (AAAE, 2023; NCAL, 2017; Utah State University (USU), 2019),428 Judd-Murray (2019) and Longhurst et al. (2020) recognized the need to develop uniform agricultural literacy assessments based on the NALOs to determine a baseline of proficiency. The 15-item JMALI is the only valid and reliable assessment that uses the NALOs and can be used to determine a summative baseline assessment for post-high school adults. It assesses content knowledge and understanding at three levels (i.e., exposure, factual literacy, and applicable proficiency) using a sliding scale approach to assessment rather than an all-or-nothing pass-or-fail outcome. The agricultural literacy assessments are available for free download on the NCAL website. The use of these tools can assist in identifying what a participant knows across the five NALO themes and three proficiency levels (Longhurst et al., 2020).

This study aimed to assess the agricultural literacy proficiency of Utah Cooperative Extension professionals and volunteers. Two objectives guided this study: 1) Determine the agricultural literacy proficiency levels of participants, and 2) Ascertain if participation in agricultural courses or clubs in secondary or post-secondary education influenced the agricultural literacy score.

Methods

A small grant through USU Cooperative Extension funded the survey incentives and the student worker wages for coding the survey data. JMALI Instrument Two was used for all survey participants. It was conducted via Qualtrics using Dillman's (2000) practices for data collection. Beyond the assessment questions, data were collected regarding basic demographics, employment status, years of employment or volunteering, educational efforts related to their role, and prior experience in agricultural coursework and clubs. The survey was administered for three weeks, with a weekly follow-up email from regional administrators to encourage greater participation from both population groups.

Participants

Two populations were targeted for this quantitative study. Group 1: USU Cooperative Extension Professionals (P) that were faculty members and other employees (i.e., program coordinators and paraprofessionals) who may or may not engage their communities in topics directly related to agriculture but likely could (at minimum) be associated with an indirect connection to agriculture (*N* = 428). It is important to note that this group encompassed more than agriculture and natural resources agents and workers. Employees from across all knowledge domains of extension, including Family and Consumer Sciences (FCS) and Supplemental Nutrition Assistance Program Education (SNAP-ED), were included because agricultural literacy extends to consumer education, not just essential production. Employee listserv emails were used to recruit participants for the 10-minute survey that offered $50 and $100 randomly drawn gift package prizes to those participating in the assessment. A 21% survey response rate yielded n = 88 participants. Group 2: Consisted of USU Extension primary volunteers (V), individuals who repeatedly participated as either youth or adult program leaders/instructors. Regional administrators or county directors determined which volunteers qualified for recruitment or participation (i.e., to be added to a recruitment email) (*N* = 1,579). The directed email offered the same incentives and JMALI items, but the demographics section contained modified language that better addressed their role as a volunteer. A 16% response rate yielded *n* = 245 participants.

Data collection and analyses

Data were collected from Qualtrics and coded in an Excel spreadsheet; the statistical analysis was conducted in SPSS (v. 28). The JMALI assessments were evaluated using a group mean (*M*) of the total correct answers and by examining individual scores. A participant's proficiency score was determined by the number of correct answers in the assessment (out of 15 total items)—participants with applicable proficiency answered ≥ 12 questions correctly, factually literate answered ≥ 8–11 questions correctly, and exposure answered ≤ 7 correctly (Judd-Murray, 2019). Participants cannot pass or fail

the assessment; instead, they exist along a scale of understanding. Relationships between variables were analyzed using independent sample *t*-tests and Cohen's *d* for effect size.

Results and Discussion

Demographic data showed that survey participants were primarily White/Caucasian females, with most professionals stating they were under 40 years of age (see Table 1).

Table 1. Survey demographic information

Group Name	*n*	Age	Gender %
Professionals (P)	88	≤ 40: 47% 41-50: 27% 51-66+: 26%	Male: 27% Female: 72% Non-conforming: 1%
Volunteers (V)	245	≤ 40: 32% 41-50: 27% 51-66+: 41%	Male: 22% Female: 78% Did not identify: .4%

Objective 1: Determine the agricultural literacy proficiency of participants.

Most professionals were *factually literate* (*n* = 50, 57%) or *applicably proficient* (*n* = 37, 42%). Most volunteers were *factually literate* (*n* = 132, 54%) or *applicably proficient* (*n* = 96, 39%) in their benchmark understanding. The percentages of participants at the *exposure* level were significantly lower than the other two levels: Professionals (*n* = 1, 1%) and Volunteers (*n* = 17, 7%).

Determining that 99% of professionals and 93% of volunteers surveyed were at or above a standard threshold of understanding is an encouraging measure. According to Judd-Murray (2019), individuals who score at the exposure level should be able to recognize terms, recall facts (especially ones that draw upon personal experience) and recognize simple relationships. Scoring at the factually literate level indicates that participants can analyze and transfer knowledge (of agriculture) from one application

area to another, draw upon moderately complex facts, and put points in context. Individuals who score at the highest level (applicable proficiency) can recognize, articulate, and explain complex areas to internalize real-world applications.

The survey also showed that most professionals were in the youngest age group, under 40, which may reflect more positively on the levels of agricultural literacy than if more participants had greater life experience. The JMALI is designed to measure agricultural literacy at the end of the 12th grade, so one may posit that agricultural literacy may increase over an individual's lifespan. Coincidentally, however, there were more older volunteers than younger volunteers, and when both groups were analyzed for age and gender, neither held significant relationships to the proficiency score.

Objective 2: Determine if participation in agricultural courses or clubs (i.e., FFA or 4-H) in secondary or post-secondary education influenced the agricultural literacy score.

Most professionals (n = 50, 57%) and volunteers (n = 154, 63%) self-reported "no participation" in an agricultural course. An independent sample t-test compared the means of participation with their JMALI scores at the $p < 0.05$ level. For professionals, there was no significant effect on the proficiency level, $t(86) = 1.43$, $p = .08$. However, those who had participated (M = 11.45, SD = 1.5) had a slightly higher mean score than those who did not participate in a previous agricultural course (M = 11.0, SD = 1.4). Similarly, for the volunteer group, there was no significant effect for course participation on the proficiency level, $t(243) = .41$, $p = .34$. This group, however, had nearly identical mean scores. Effect sizes were small for these groups (P, $d = .31$ and V, $d = .05$), most certainly influenced by the small sample sizes.

A majority of professionals (n = 64, 73%) and volunteers (n = 176, 72%) self-reported "no participation" in an agricultural club like FFA or 4-H in a secondary or post-secondary experience. The independent sample t-test for the professional group, compared at the $p < 0.05$ level, indicated no significant relationship to the proficiency level, $t(83) = .59$, $p = .28$. The mean scores nearly matched those that did and did not

participate in club experiences. Conversely, the volunteer group showed that there was a relationship effect on the proficiency level $t(234) = 1.8$, $p = .04$, ($p < 0.05$), where those that had participated in a club experience did have a significantly higher mean score ($M = 11.1$, $SD = 2.0$) than those that did not participate in a club experience ($M = 10.6$, $SD = 1.8$). Effect sizes remained small for these data (P, $d = .27$ and V, $d = .15$). Figure 1 highlights the Objective 2 findings.

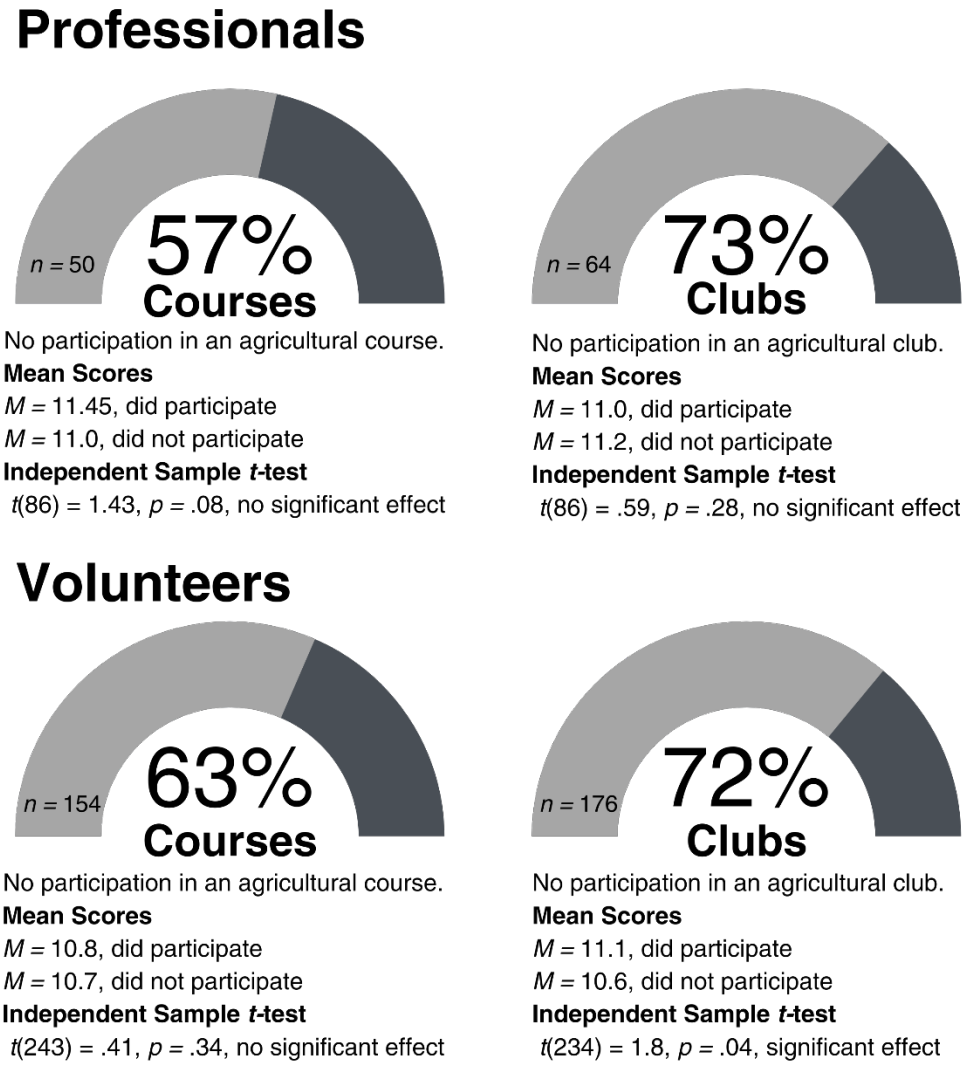

Figure 1. Mean scores and t-test relationships for assessment participants

Note: Dark gray indicates a “did participate” percentage, and lighter gray indicates a “did not participate” percentage.

Roberts et al. (2016) stated in the Agricultural Educator's National Research Agenda that agricultural education courses and club experiences should be at the "forefront in career competency for extension educators." Furthermore, due to common goals in positive youth development for both 4-H and FFA, there are often places of connection and collaboration for club members between organizations (Grage et al., 2004). Nationwide, land grant universities offer undergraduate and graduate degrees in agricultural education and extension as a primary career pathway for entering cooperative extension work. This vocational track has traditionally supplied extension with employees exposed to a high degree of agricultural education and experience. These results showed that professionals and volunteers participating in this assessment were agriculturally literate but were not "trained" through more customary agricultural education courses and club experiences. Moreover, for extension volunteers, club experiences had a greater impact on their ability to meet proficiency benchmarks. This sample population verified the theoretical framework that exposure and experience impact agricultural literacy proficiency. Not surprising since experiential learning and constructivist learning theories from Dewey (1938) and Kolb (1984) have long since stated the significance of higher-level thinking and learning when people link the "things they do" to understanding and application.

Limitations

The purpose of the study was to determine the influence of agricultural courses and clubs on agricultural literacy proficiency. We recognize, however, that several life experience factors may influence an adult's agricultural literacy. Participants were asked about 17 general life experiences in the demographic portion of the survey to determine if any of those experiences had a significant relationship to their agricultural literacy proficiency. Those life experiences included selection choices such as living or working on a farm, participation in hunting and fishing, touring or visiting a farm, attending a state or county fair, participation in gardening, volunteering at or attending an agricultural event, or listening to a guest speaker or podcast about agriculture. There was a selection where participants could state that they had no experience with any of

these options, and participants were asked to select all options that applied to them. In the end, none of these life experiences showed that they significantly influenced the proficiency score. We note that some of the selection options had very few responses, which would affect the examination of the means. We acknowledge the limitation of the sample size and recognize that life events have likely influenced the type, scope, and depth of each individual's knowledge and understanding of agricultural literacy, even though those factors are not significantly apparent in this study.

Cooperative Extension programs are found nationwide. There are common elements between programs and populations, but users should be cautious about generalizing the results of this study due to the limitations of a small sample size.

Conclusions

Old-school or traditional paradigms of the typical "agricultural extension educator" may generate a perception of a homogenous group of late-career males. It may also lean toward the perception that professionals would have at least some exposure to agricultural education through clubs or coursework. The results of this study, however, indicated that professionals were younger and gaining their agricultural literacy from other sources of information and experience. Cooperative Extension administrators can improve their internal professional development by determining the "working level" of their employees' agricultural literacy by using the JMALI assessments. In this case, professionals could benefit from agricultural content that moves them from factually literate to the applicable proficiency level.

Remarkably, the study found that an impressive 99% of professionals demonstrated factual literacy or applicable proficiency, showcasing a moderate to high level of agricultural literacy. Similarly, 93% of volunteers exhibited comparable proficiency, reinforcing that professionals and volunteers possess a commendable grasp of agricultural knowledge. The high numbers should not deter the organization from improving areas of domain weakness. Trainings that scaffold beyond the basics and provide detailed content on complex topics such as precision agriculture, climate

change, or animal welfare regulation will maximize the employees' ability to provide a more profound scope of information to their community clientele. If extension is to provide future leadership and programs that impact community quality of life in food security, climate impacts, water conservation, food safety, and nutritional intake—it needs professionals that can address the complexities at a higher level of proficiency.

Most volunteers in this study trended older than the professionals, but prior club experience, not age, had a greater influence on their agricultural literacy proficiency. We noted that approximately 70% of participants had no previous experience with agricultural clubs like 4-H or FFA. However, those who did displayed significantly higher proficiency scores. This underscores the potential impact of active participation in agricultural clubs on individuals' overall agricultural literacy, suggesting these experiences contribute meaningfully to developing expertise in the field. Furthermore, it is not difficult to draw a connecting line to the value of volunteers' understanding their impact as a 4-H club leader or their role as a livestock show event coordinator to agricultural literacy improvement for the next generation of consumers. Recognizing the positive correlation between participation in 4-H and higher proficiency scores, Extension programs can strategically promote and integrate 4-H initiatives, harnessing the collective benefits of this club in enhancing the agricultural knowledge base of professionals and volunteers alike. By doing so, Extension educators can leverage existing frameworks further to elevate the overall agricultural literacy within their communities.

Extension administrators, volunteer coordinators, agents, and trainers must invest in messaging highlighting the significance of experiential learning, as this can lead to change and outcomes-driven results in agricultural literacy. Volunteers, too, can benefit from in-service training that assists them in moving beyond foundational information about agriculture. Investing in agricultural education that leans into higher-level thinking may improve volunteer-driven efforts across the organization.

Lastly, Extension must go beyond acknowledging the positive impacts of agricultural literacy observed in these adult professionals and volunteers. Researchers should now

seek to better identify the sources of information that have positively impacted the agricultural literacy of these two groups. These individuals are acquiring a nuanced comprehension of agriculture. It is crucial for Extension and other stakeholders to delve into how adults cultivate agricultural literacy through their life experiences, interests, and aspirations. Moreover, the significance of this study extends beyond its immediate context. Agricultural education stakeholders, particularly in the Intermountain West, can draw valuable insights highlighted in this Utah-based study. We recommend that other statewide programs consider replicating the study because our framework utilized the JMALI—a standardized tool that can provide consistency in agricultural literacy measurements. By doing so, a multistate approach could yield a more comprehensive understanding of how regional trends are affecting statewide programming and community impacts. Agricultural literacy data using a common instrument, but from diverse professional and volunteer groups is extremely limited and deeply needed for enabling the development of innovative approaches that can solve wicked human problems.

Acknowledgments

We have no conflicts of interest to disclose. Our work was funded through a 2021 Utah State University Extension Grant [EXT00098].

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