

More Than What They Know: Why Attitudes Matter in Teaching about Agriculture

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Introduction

Despite significant progress in agricultural literacy programs and research, concerns remain that we are still grappling with the same challenges, individuals lacking understanding, appreciation, and the ability to make informed agricultural decisions (Cosby et al., 2022). One contributing factor may be the field's emphasis on assessing agricultural knowledge in isolation (Cosby et al., 2022; Kovar & Ball, 2013). Researchers emphasize the need to include non-cognitive factors in evaluation efforts, as these are also essential to understanding and shaping behavior (NIMMS, 2024; Spielmaker et al., 2014).

Theoretical Framework

The Knowledge, Attitudes, and Practices (KAP) theory describes how an individual's ability to understand information, combined with their positive or negative emotions, leads to behavioral change or practice (Bandura, 1976; Rogers, 1995). Knowledge is the basis for attitudinal formation (Ajzen, 1991), which then drives behavioral intent for a person's practice (Liao et al., 2022). The practice then represents the direct embodiment of knowledge and attitude through the actions and reactions in specific contexts or situations (Kang & Bagaoisan, 2024). The KAP theory provides a valuable framework for agricultural literacy and education organizations, industries, and institutions to study how agricultural literacy-relevant practices/behaviors develop and take hold.

Methods

This study used a quantitative approach to analyze pre- and post-data from 48 school-based agricultural education students across Colorado, examining the impact of a semester-long curriculum intervention focused on livestock production and sustainability. Students completed a validated assessment measuring knowledge and attitudes (Bennett et al., 2025). A composite knowledge score was calculated from 12 binary-scored items (1 = correct, 0 = incorrect), while a composite mean attitude score was derived from 14 Likert-scale items (1.00–1.86 = very negative; 6.17–7.00 = very positive). Normality checks confirmed that statistical assumptions were met. Statistical analysis included paired-sample *t*-tests to assess the intervention's impact (Ross & Willson, 2017). Pearson product-moment correlation and regression analysis examined relationships between the outcome variables of interest (Prematunga, 2012).

Findings

Participants' knowledge scores increased significantly from pre-test ($M = 7.15$, $SD = 2.05$) to post-test ($M = 8.67$, $SD = 2.22$), $p < .001$, with a large effect size ($d = 0.93$; Cohen, 1988). Attitude scores also rose from 4.84 ($SD = 0.74$) to 5.35 ($SD = 0.86$), $p < .05$, reflecting a moderate effect ($d = 0.60$) and a shift from somewhat positive to clearly positive attitudes toward livestock production and sustainability.

Next, the relationships between the outcome variables of interest- attitudes and knowledge were examined. Correlational analysis revealed significant relationships between attitudes and knowledge scores. Pre- and post-knowledge scores were strongly correlated, $r = .71$, $p < .001$, while pre- and post-attitude scores showed a moderate positive correlation, $r = .73$, $p < .001$. Moderate correlations were also found between pre-knowledge and post-attitude ($r = .52$, $p <$

.001), and between post-knowledge and post-attitude ($r = .56, p < .001$). Five linear regression models were developed based on previously identified significant correlations. The strongest predictor was pre-intervention attitudes, which significantly predicted post-intervention attitudes, $F(1, 46) = 52.31, p < .001, \beta = .73$. Pre-intervention knowledge was also a significant predictor of post-intervention knowledge, $F(1, 46) = 46.28, p < .001, \beta = .71$. Post-intervention attitudes and post-intervention knowledge significantly predicted one another in separate models, each yielding $F(1, 46) = 21.23, p < .001, \beta = .56$. Finally, pre-intervention attitudes significantly predicted post-intervention knowledge, $F(1, 46) = 17.40, p < .001, \beta = .52$.

Conclusions

Results indicated a statistically significant increase in students' agricultural attitudes and knowledge from pre- to post-assessment. Additionally, relationships between attitudes and knowledge were examined. Several significant predictive relationships emerged between pre- and post-intervention measures. Specifically, pre-intervention knowledge significantly predicted post-intervention knowledge; similarly, pre-intervention attitudes predicted post-intervention attitudes. Additionally, pre-intervention knowledge was a significant predictor of post-intervention attitudes. The post-intervention outcomes, knowledge and attitudes, exhibited a reciprocal predictive relationship.

These findings align with the KAP model, which posits that knowledge is a precursor to attitude and behavior (Bandura, 1976; Rogers, 1995). Moreover, they reinforce the idea that the knowledge and attitudes cultivated during an intervention continue to influence how students process and apply subsequent cognitive and affective information (Koo et al., 2019). Behavioral decisions, such as what to eat, wear, vote for, or pursue as a career are rooted in both cognition and emotion (Ajzen, 2008). By prioritizing knowledge-building while intentionally supporting attitudinal growth, educators and program designers can cultivate individuals who both understand and value agricultural systems. If we care about long-term outcomes like behavioral change, we must recognize that attitudes matter in agricultural literacy.

Implications

In 1988, the National Research Council proclaimed that agriculture was “too important” to be left to a few, emphasizing the need to prioritize societal agricultural literacy. Significant strides have been made in understanding agricultural literacy, including developing programmatic frameworks like the NALLM, creating and evaluating instruments and assessments, and designing innovative educational programs to reach learners of all ages and backgrounds. However, there is still more work to be done, and one area is to design and evaluate programs centered around outcomes that are known to be drivers of human behavior (NIMMS, 2024). Future research should explore how other NALLM outcomes, such as skills, contribute to this theoretical structure and evaluate how behaviors and practices form. Since behavioral development is a multifaceted and complex process (Ajzen, 1991), additional research could also explore the influences of these building blocks of behavior, such as values, motivation beliefs, social norms, and prior experiences. Lastly, further research is needed to assess the long-term effects of this intervention on students' behaviors and practices related to sustainability in animal agriculture.

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