

**Effective Teaching Practices According to Elementary Agriculture Educators:
A Modified Delphi Approach**

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Introduction

In today's ever changing and increasingly complicated world, we face constant and rapid global changes that create enormous pressure to solve the global challenges of food security, sustainable natural resources, and poverty reduction (National Research Council, 2012). These challenges lead many educational programs to focus on science, technology, engineering, and mathematics (STEM) to train students to apply knowledge and to solve environmental problems (Astuti et al., 2021). In the United States, few students are involved in STEM subjects (Maltese & Tai, 2011). From an agricultural education perspective, some suggest that teachers should select strategies that contextualize STEM in the world of agriculture to influence students' engagement in STEM education and career (Scherer et al., 2019). A more practical approach, such as agricultural education, has long been known to promote achievement in science, mathematics, technology, and other areas (Scherer et al., 2019; Stubbs & Myers, 2015). However, little is known about the ability of *elementary* agricultural educators to inspire similar outcomes and prompted this study. Teacher's understanding of how to lead immersive, project-based assignments and discussions could help students think critically (Dukkipati & Novak-Herzog, 2021). In Georgia, elementary agriculture education (EAE) was introduced in 2019 and much still remains unclear on the teaching practices viewed as most effective by elementary agriculture educators.

Theoretical Framework

The study of the characteristics of effective educators has been a subject of investigation for more than half a century (Rosenshine & Furst, 1971). However, teaching practices at the elementary-level are less well known. This study aims to address this gap by investigating an effective approach to integrating agricultural education at the elementary level. According to Piaget's (1950), theory of cognitive development, the third stage, which spans from ages 7 to 11, is the concrete operational stage, during which students learn how to think more abstractly and more logically about concrete things. In addition, these learners prefer inductive logic which involves going from a certain experience to a broad principle. During this stage, a student can begin thinking about others and use their experiences to gather information and make informed decisions. Constructivists believe that individuals construct what they learn, understand, and integrate the latest information into the framework of their previous knowledge to build understanding within their environment (Pritchard & Woodlark, 2010). Constructivist theory guided the questions posed of EAE teachers sampled in this study.

Methodology

Participants were selected from the Georgia agricultural education website and EAE teacher contact information acquired from a professor of agricultural education at the University of Georgia using convenience sampling. At the time of this study, there were 30 EAE teachers in Georgia. A recruitment email was sent that included information about the research and data collection methods to be used, time and place of data collection, responsibilities as a respondent

(online survey and in-person participation) and a \$350 gift card honorarium to compensate for their time. In order to reach a reliable consensus among the experts, the Delphi method, which includes three rounds, was used (Sourani & Sohail, 2015). In the first round, participants were asked to answer open-ended and some demographic questions via an online survey platform (Qualtrics). The second and third rounds were conducted in-person and lasted 180 minutes each. For the second round, the summarized list of answers from round one was shared via Qualtrics. The panel was asked to rate each statement using a 7-point Likert scale which, according to Taherdoost (2019), tends to reflect respondent's true subjective assessment of a usability questionnaire. Statements that received an average rating of five and above were moved to the third round. Finally, the third round was reached through panel discussions to arrive at a group consensus. In a study by Vernon (2009), a 70 percent agreement among panel members was considered the standard and was met in this study. Qualitative thematic analysis using MAXQDA 2022 was used to organize and summarize the data.

Results

Fifteen out of thirty EAE teachers participated in the first Delphi round. These statements were moved to the next round to answer the first research question on the components of effective teaching for EAE, while 16 statements were moved forward to answer the second question on teaching methods to be used in EAE. Six teachers personally took part in the second and third rounds of the Delphi. Three themes emerged as the panel discussed and brainstormed ideas to define the components of effective EAE teaching, including *affective personality, experiential learning, and reflective teaching*. Four themes emerged while the panel discussed effective methodologies in teaching EAE, including: *make it conversational, make it collaborative, make it meaningful, and reinforce values and soft skills*.

Conclusions and Recommendations

The panel's consensus on effective teaching practices for EAE highlighted the importance of positively impacting students' lives while promoting community awareness. This can be achieved through linking agriculture to other subjects that encouraging the development of problem-solving skills through inquiry, discovery and applications to one's own experiences. Furthermore, effective EAE teaching should always be an experiential learning endeavor and should involve continuous reflection for action for change and flexibility if something unexpected arise. The panel also underscored the significance of interactions and collaborations between and among students and teachers, reinforcing the importance of relational interactions in the classroom for different age groups. Based on these findings, the authors recommend (a) examining issues pertaining to teachers' beliefs that will enhance EAE teaching behaviors and (b) process and collect data on the relationship between EAE teaching techniques and students' self-efficacy and content knowledge in the classroom.

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