Novice High School Agricultural Science Teachers' Viewpoint on Being Equipped for Teaching Laboratory Settings.

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Introduction/ Need for Research

Agricultural education is experiential in nature and often uses specialized laboratory settings to offer students learning opportunities (Shoulders & Meyers, 2013). In a study done by Saucier et al. (2008) it was found that some teachers use up to 66% of their allotted instructional time in the laboratory for agricultural mechanics courses. Although agricultural programs are highly favored in high schools, they frequently mandate minimal hours of coursework in agricultural mechanics for preservice teachers to fulfill graduation criteria (Blackburn et al., 2015). McKibben et al. (2022) asserted that teacher preparation programs provide future educators with the essential knowledge and skills required to proficiently engage in the diverse realm of agricultural mechanics. This study aims to investigate the readiness of novice teachers for instructing in laboratory environments by answering the following research question: Are universities adequately equipping future educators with the essential skills and knowledge needed to excel in teaching within laboratory settings?

Theoretical Framework

The conceptual framework selected for this study is the Social Learning Theory for Learning Readiness (Maddox et. al., 2000). Within the broader framework of social learning theory, readiness for learning might exhibit similarities to individual self-efficacy within the learning environment, yet it's important to note that these are distinct concepts. While positive self-expectations and outcome expectancies can enhance the likelihood of success in learning, they are not synonymous with learning readiness. Although generalized and domain-specific expectations may influence learning readiness or serve as cognitive components of it, researchers distinguish between expectancies and readiness for learning. Self-efficacy primarily impacts the cognitive dimension within the social learning theory model, as it often intertwines with individuals' cognitive schemas and reinforces expectancies.

Methodology

This research utilized quantitative methodologies, primarily employing a descriptive survey to gather data. The survey comprised 10 Likert-scale statements ranging from 1 (Strongly Disagree) to 9 (Strongly Agree), along with five demographic inquiries. The statements were created by utilizing the learning readiness aspect of the framework mentioned above. The target demographic consisted of agricultural science teachers in Texas with up to three years of experience, excluding the current academic year. Data collection was conducted through a survey hosted on Qualtrics, distributed to Texas FFA Area Coordinators who then forwarded it to their respective teachers. Forty-one teachers responded to the survey by providing complete responses. The data was analyzed by IBM SPSS. Frequencies and percentages were calculated and reported for demographic data. Likert-scaled questions were reported using means and standard deviations.

Results/Findings

Participants in this study were primarily female (n = 28, 68.3%), attended college in Texas (n = 35; 85.4%) and were first year teachers (n =18, 43.9%). Thirty-five participants (85.4%) currently teach in a laboratory as a part of their contract and the most common types of courses they teach are agricultural mechanics (n =10, 24.4%), plant science (n =8, 19.5%),

animal science (*n*=6, 14.6%) and food science (*n* = 2, 4.9 %). Fifteen participants (36.6%) indicated they teach courses that fall in multiple pathways in a laboratory setting. Table 1 outlines the responses to the Likert scale statements.

Table 1

Novice Teacher Perceptions of Readiness for Laboratory Instruction (N=41)

Statement	*M*	*SD*
The institution I attended prepared me to teach in a lab setting	5.9	2.0
I found creative solutions or strategies to overcome challenges during lab time	5.9	2.2
I am confident in my knowledge/skills to use lab equipment/conduct experiments	5.8	2.2
When applying for jobs, I felt confident in my ability to teach students in the lab	5.7	2.1
I was most excited to teach in the lab right out of college	5.5	2.3
My biggest fear was not being able to properly facilitate the laboratory	4.9	2.5
I have had PD opportunities focused on laboratory teaching strategies	4.8	2.7
I regularly face challenges during lab instruction time	4.7	2.3
I do not have issues in the lab related to student engagement or behavior	4.6	2.5
I am satisfied with the current availability of equipment for my lab	4.1	2.6

When asked about their readiness for laboratory instruction, novice teachers indicated the highest means, which fell between neutral and slight agreement, with the statements "The institution I attended prepared me to teach in a lab setting" (*M* = 5.9, *SD* =2.0) and "I found creative solutions or strategies to overcome challenges during lab time" (*M* = 5.9, *SD* =2.2). The lowest mean, which fell between neutral and slightly disagree, was towards the statement "I am satisfied with the current availability of equipment for my lab" (*M*=4.1, *SD*= 2.6).

Conclusions/ Implications/ Recommendations

Based on the findings of this study, novice teachers only felt neutral to slightly positive about half of the statements related to their readiness. These statements fell within the attitudinal and behavioral readiness domains as discussed by Maddox, et al. (2000). Novice teachers also expressed that they felt neutrally or negatively about half of the statements about their preparation for teaching in a laboratory setting. A few of these statements were directly related to the current availability of professional development and equipment. These slightly negative perceptions could lead to more negative impacts (Maddox, et al, 2000) and these perceptions contradict the level of preparedness found by McKibben, et al. (2022).

Several implications arise from these conclusions. First, more opportunities to build self-efficacy in a laboratory setting need to be incorporated during teacher preparation programming to ensure readiness can be developed before beginning a career in agricultural education. Secondly, support during the novice stage to continue the building of that readiness in terms of professional development and resources for equipment attainment, such as grants, need to be provided to improve self-efficacy. Future research should explore the current preparation efforts for laboratory settings by universities utilizing a needs assessment format to determine opportunities for programing improvement.

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