



# I Do Not Think I Can Teach “How To Use a Framing Hammer?”

*Pre-service Agriculture Teachers Perceived Self-Efficacy in Teaching Agriculture Mechanics at California State University, Fresno*

**Dr. Samuel Rodriguez & Daniella Garcia**  
California State University, Fresno



Jordan College of  
Agricultural Sciences  
and Technology

## Introduction



Fresno State student Darlene Cordero (Agricultural Education) setting up the lathe. Photo by Daniella Garcia, April 11, 2025.



Fresno State student Pedro Carranza (Agricultural Education) using the table saw to cut a piece of wood. Photo by Daniella Garcia, April 11, 2025.

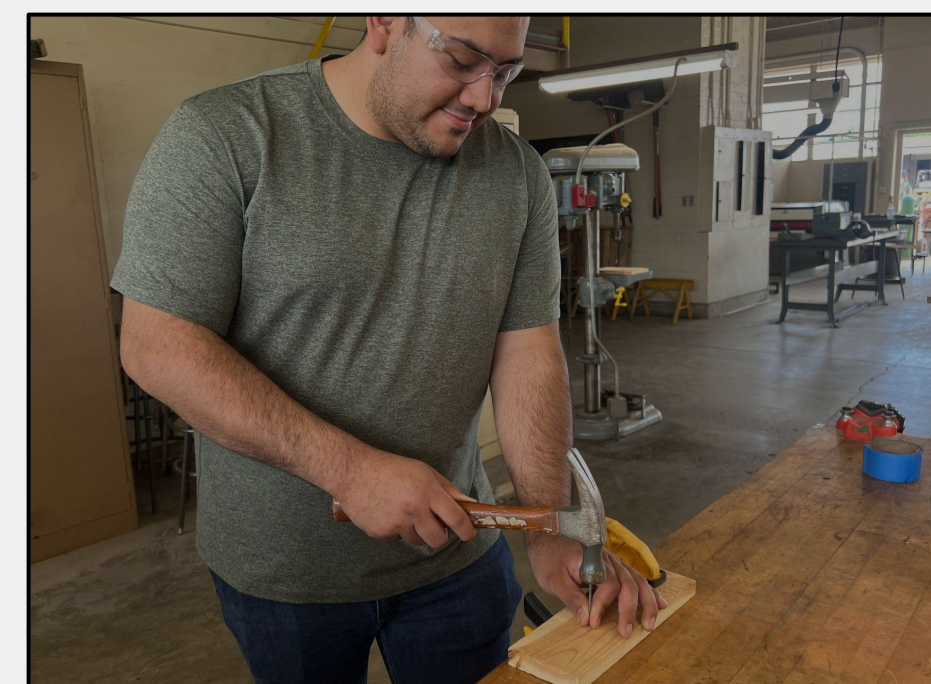
## Background

The agricultural mechanics pathway is the largest pathway in school-based agricultural education programs in California (Hainline & Wells, 2024; Valdez & Johnson, 2020; Tummons et al., 2017). To provide quality instruction, preservice agricultural education teacher candidates must have the content knowledge and technical skills to meet their students' needs. While several self-efficacy studies have been conducted on school-based agricultural mechanics teachers across the Midwest, very little research has been conducted in California.

The four major agricultural teacher preparation programs in California all have different required agricultural mechanics courses that preservice agricultural education teacher candidates must take to complete their credential requirements. Preservice agricultural teachers tend to shy away from teaching agricultural mechanics because they lack the self-efficacy to do so.



Fresno State student Ava Flores (Agricultural Education) operating the drill press. Photo by Daniella Garcia, April 11, 2025.



Fresno State student Makoa Melina (Agricultural Education) operating the drill press. Photo by Daniella Garcia, April 11, 2025.

## Purpose

The objectives of this study are fourfold. First, to identify the differences in the required number of agricultural mechanics classes preservice agricultural education teacher candidates must take to complete their credential requirements. Second, to identify why preservice agricultural education teacher candidates do not take more than the required agricultural mechanics courses. Third, to measure their perceived self-efficacy in teaching agricultural mechanics during their student teaching experiences. Finally, to inform the agricultural teacher preparation program at Fresno State on how to meet the agricultural mechanics needs of preservice agricultural education teacher candidates before and during student teaching.

## Research Questions

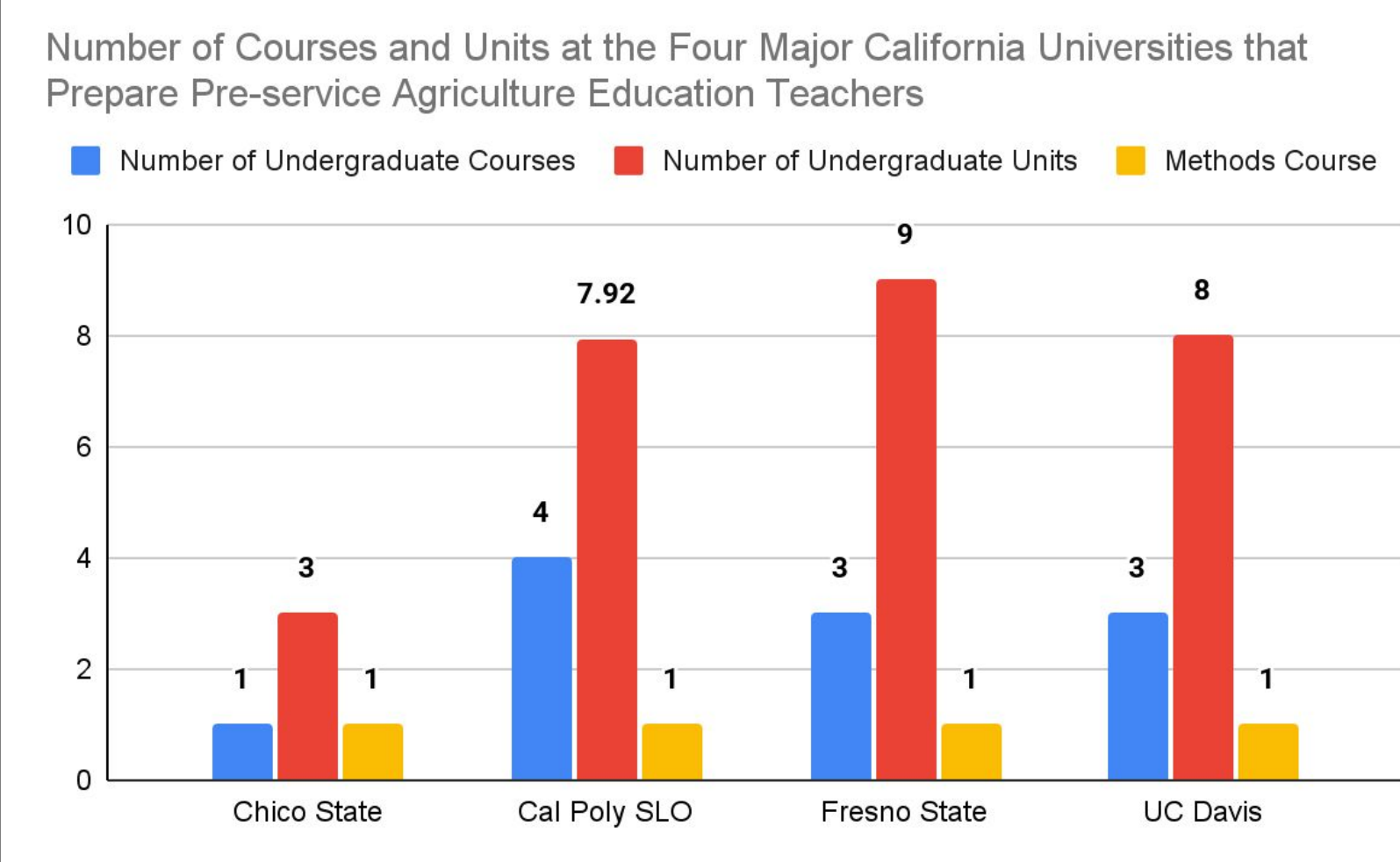
- What are the differences in the number of required agricultural mechanics courses teachers must complete at the four major California universities that prepare preservice agricultural education teachers to complete their single-subject credential requirements?
- What barriers prevent preservice agricultural education teachers from being fully equipped to teach agricultural mechanics during their student teaching experiences?
- How does the perceived self-efficacy of preservice agricultural education teachers affect their feelings of being equipped to teach agricultural mechanics?

## Research

### Methodology

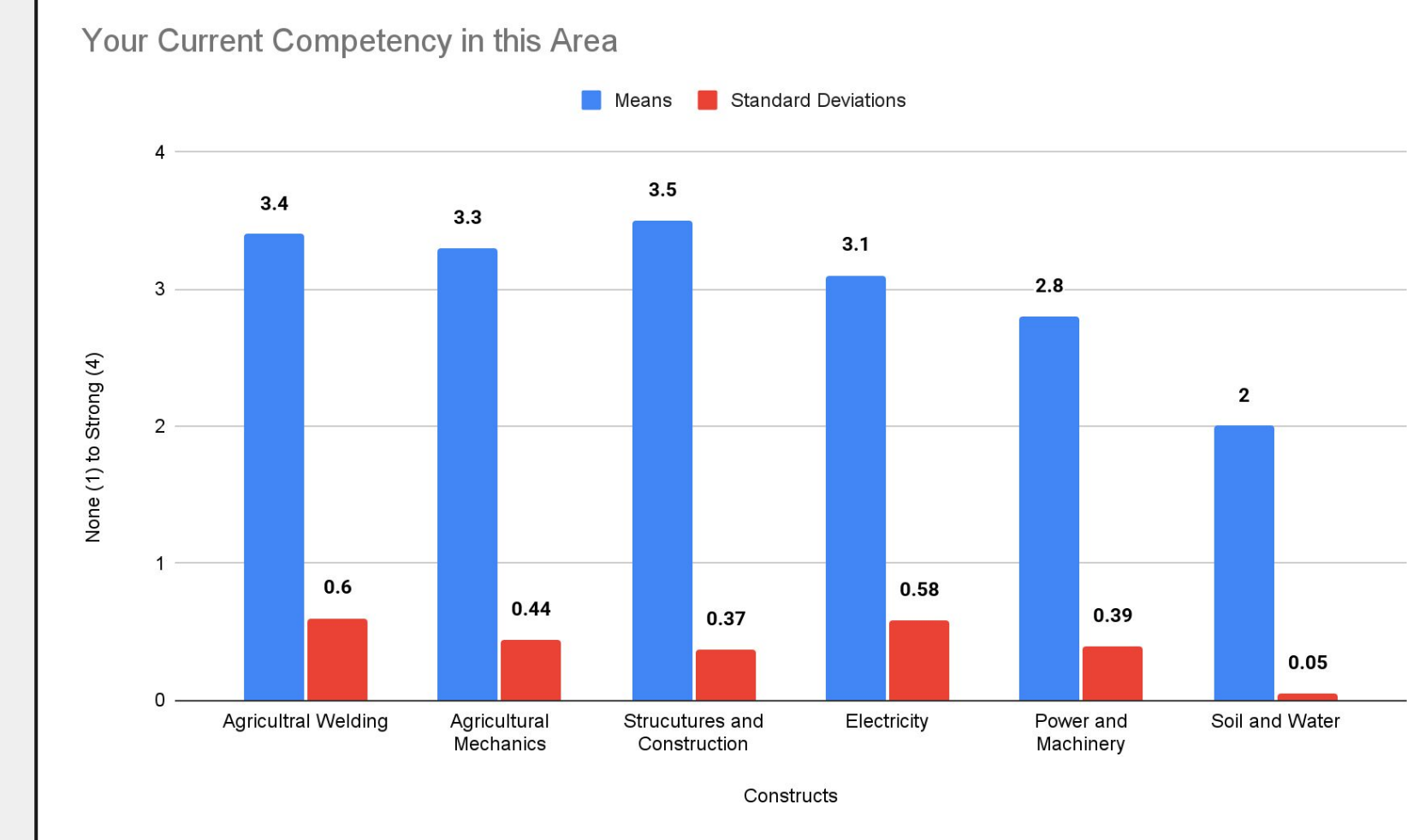
A digital survey instrument and observational rubric were developed and administered via Qualtrics® to 27 preservice teachers at Fresno State. The Agricultural Mechanics Laboratory Needs Assessment (Clark et al., 2021) questionnaire consisted of 54 skills measured using a five-point Likert-type scale, where respondents rated their confidence levels from None (1) – No training received, Some (2) – Minimal training received, Moderate (3) – Adequate training received, Strong (4) – Sufficient training received, and Very Strong (5) – Fully confident in teaching the skill. A Very Strong rating indicated that respondents felt they had received sufficient training to confidently teach the skill, whereas a None rating indicated little to no training.

### Results



The number of undergraduate agricultural mechanics courses and units varies between universities. All four require an agricultural mechanics teaching methods course for credential students.

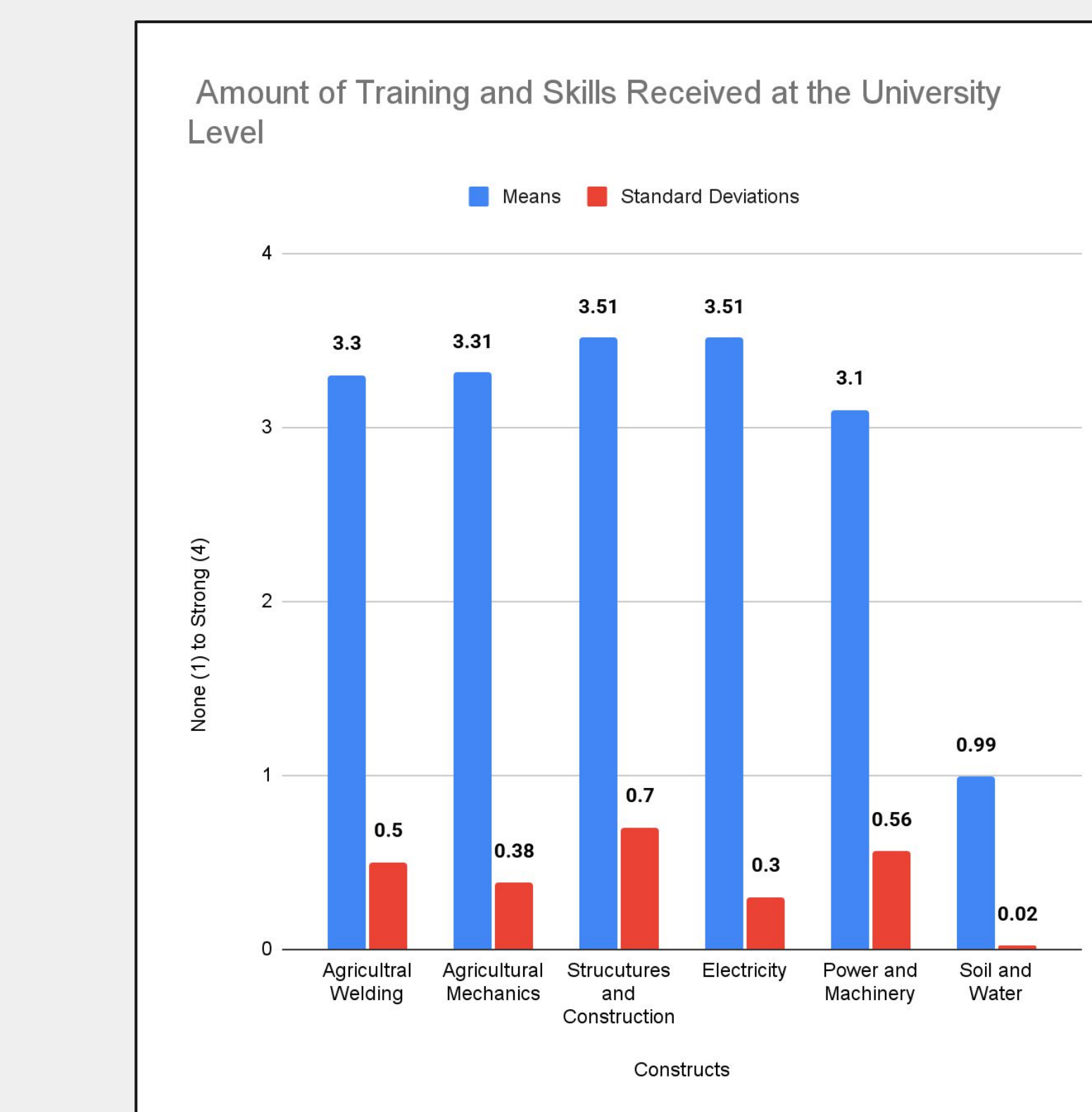
Note. Cal Poly's units are converted from quarter to semester units.



Mean scores (blue) indicate high perceived competency in Structures and Construction (M = 3.5, SD = 0.37), Agricultural Welding (M = 3.4, SD = 0.60), and Agricultural Mechanics (M = 3.3, SD = 0.44), with lower competency in Soil and Water (M = 2.0, SD = 0.05). Electricity (M = 3.1, SD = 0.58) and Power and Machinery (M = 2.8, SD = 0.39) fall in the moderate range. Standard deviations (red) reflect the variability of responses among participants.



Participants reported the highest levels of training in Structures and Construction (M = 3.51, SD = 0.70) and Electricity (M = 3.51, SD = 0.30), followed by Agricultural Welding (M = 3.31, SD = 0.38) and Agricultural Mechanics (M = 3.3, SD = 0.50). Training in Soil and Water was perceived as the lowest (M = 0.99, SD = 0.02). Standard deviations (red) indicate the variability of perceived training among respondents.



Participants reported the highest training levels in Structures (M = 3.5, SD = 0.37), Agricultural Welding (M = 3.4, SD = 0.60), and Agricultural Mechanics (M = 3.3, SD = 0.44). Electricity (M = 3.1, SD = 0.58) and Power and Machinery (M = 2.8, SD = 0.39) followed, while Soil and Water showed the lowest perceived training (M = 2.0, SD = 0.05). Standard deviations (red) indicate the variability of perceived training among respondents.

## Conclusion



Fresno State student Daniela Romero (Agricultural Education) operating a lathe. Photo by Daniella Garcia, April 9, 2025.



Fresno State student Justin Butler (Agricultural Education) operating the table saw to cut a piece of wood. Photo by Daniella Garcia, April 9, 2025.

## Discussion

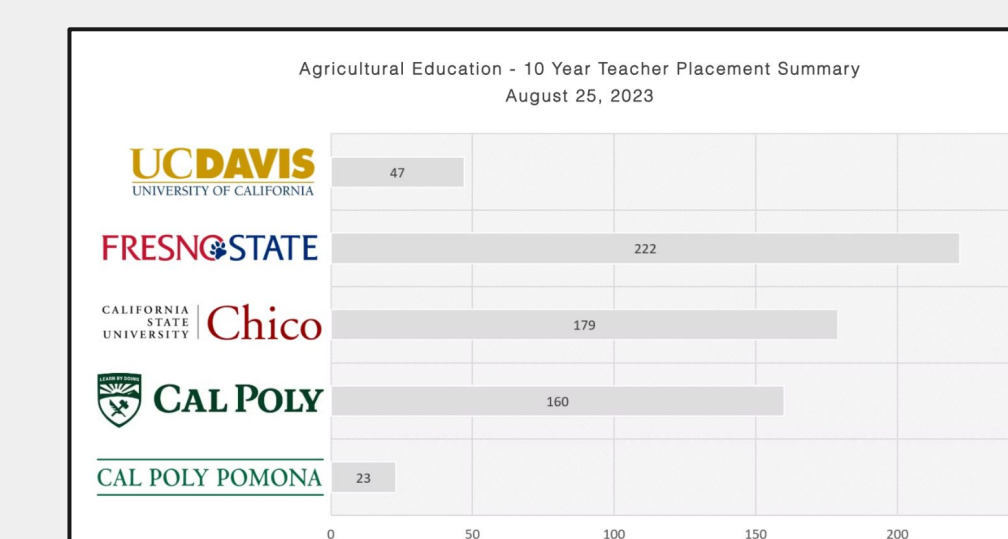
The results of this small-scale study are influencing how we structure our agricultural mechanics curriculum. We are using these findings to assess our instructional approach, ensuring that our teaching strategies support preservice teachers in integrating skill-based knowledge with effective teaching methods in their teacher preparation programs. Postsecondary instruction should be of high quality, ensuring that preservice teachers are well-trained in safety procedures, technology, and both technical and instructional strategies to enhance their competency and confidence. Well-structured training is essential for strengthening School-Based Agricultural Education (SBAE) teachers' self-efficacy, which directly influences their perception of agricultural mechanics' importance in the curriculum and ultimately enhances student learning and development.



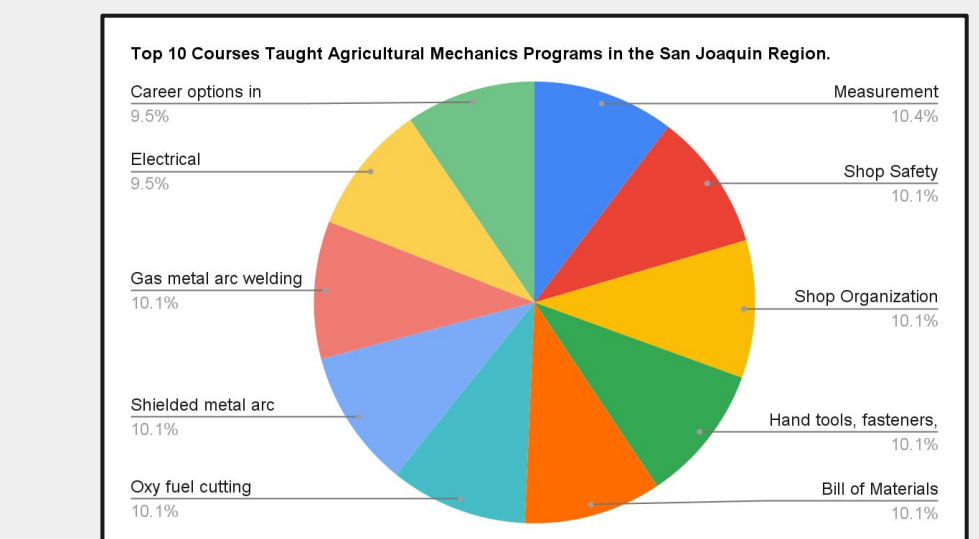
Fresno State student Daniella Garcia working with faculty member Chris McKenna to design a cabinet around a lathe for a final project in the Mechanical Ag Design and Fabrication class (MEAG 121). Photo by Geoff Thurner, December 17, 2024. © 2024.



Fresno State student Dale Fransen working with faculty member Chris McKenna to design a 16-foot trailer for a final project in the Mechanical Ag Design and Fabrication class (MEAG 121). Photo by Geoff Thurner, December 17, 2024. © 2024.



10-Year Teacher Placement Summary for Agricultural Education Programs in California (as of August 25, 2023). Fresno State ranked with 222 teacher placements, followed by Chico State (179), Cal Poly San Luis Obispo (160), UC Davis (61), and Cal Poly Pomona (52). Data source: Teaching Company.



Top 10 Courses Taught in Agricultural Mechanics Programs across the San Joaquin Region. Measurements: (15.1%), Shop Safety (10.1%), and various welding and cutting techniques such as OSHA, SMAW, and oxy-fuel cutting (each 10.1%) were among the most frequently taught topics, reflecting the core skills emphasized in regional agricultural mechanics education.

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## Contact Information

Daniella S. Garcia  
danielagarciasoled@gmail.com

Dr. Samuel Rodriguez  
smrodri@mail.fresnostate.edu