Crystal Ball: Forecasting Five-Year Supply, Demand, and Shortfall of Agricultural Educators in the Western Region

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Introduction/Theoretical Framework

A substantial shortfall of traditionally trained agricultural teachers currently exists (Lawver et al., 2024), creating a need to predict future teacher demand and supply for effective program planning. Meeting demand with traditionally trained teachers requires long-term planning to increase supply. Increasing capacity means recruiting more teacher candidates, expanding the capacity to prepare teachers, and retaining candidates. By developing a reliable tool to predict future needs, planners of recruitment and preparation programs can justify needed resources. When traditionally trained teachers are in short supply, positions are filled by alternatively licensed teachers, unlicensed teachers, or remain vacant.

The conceptual framework for the National Supply and Demand (NSD) study (Lawver et al., 2024) identifies factors contributing to school-based agricultural education (SBAE) teacher supply and demand. Program completers represent one component of the supply side of the model attributed to traditionally trained teachers; for this component, only program completers taking jobs in SBAE are considered. Demand accounts for teachers leaving teaching, positions lost, and new positions, calculated as demand = teachers leaving + new positions - lost positions. The difference between demand and supply is described as the shortfall.

Purpose/Objectives

The study sought to answer the following research questions:
RQ1: What is the likely demand for teachers in the next five years?
RQ2: What is the likely supply of program completers taking jobs in SBAE in the next five years?
RQ3: What is the unmet need (shortfall) for traditionally trained teachers in the next five years?
RQ4: Are there significant state differences in the predicted supply and demand?

Methods/Procedures

The National Agricultural Teacher Supply and Demand (NSD) study has collected data on teacher supply and demand since 1965. The current study used data collected from 2014 to 2025 (Foster et al., 2026). The data are variable and sometimes inconsistent; nevertheless, they can be used to predict future demand and supply. On average, 75% of demand comes from teachers leaving. Only valid data for teachers leaving (as determined by the NSD project) were used. When valid data for new positions and lost positions were missing, zero was assumed. The net shortfall was determined by subtracting supply from demand. Several methods may be used in this type of study, including unweighted linear regression (ordinary least squares; OLS), weighted linear regression, autoregressive integrated moving average (ARIMA), simple moving average, and exponential smoothing. Actual and predicted values were tested by calculating the root mean square error (RMSE), as suggested by Ogbogu and Mancilla-David (2021). RMSE was compared across all methods and all states. OLS was selected because it produced the lowest RMSE for 45 of 49 states and the lowest overall regional error. Western Region data were extracted at the state level for the 12 years of study; 230 supply reports and 132 demand reports were used for analysis. OLS was used to predict five years into the future (2026 to 2030) using

all 12 years of actual data. Initial method comparisons were made using a common data set with ChatGPT, and final data were analyzed using Microsoft Access and Excel.

Results/Findings

At least two years of data are required to generate a prediction. Eleven states reported valid supply data (not all states have teacher preparation programs), and 12 states reported valid demand data. Table 1 presents actual and predicted data. The regional prediction showed a steady increase in demand, supply, and shortfall across the five years, consistent with the trend in the actual data. However, supply is not growing as quickly as demand; as a result, the shortfall increases by approximately 39% over the five-year prediction period, rising from 137 in 2026 to 190 in 2030. Significant variation by state was found in both predicted supply and demand. Table 2 reports the number of states predicted to decline or increase over the five predicted years.

Table 1

Western Region Actual (Selected Years) and Predicted Demand, Supply, and Shortfall

Year	2014	2017	2020	2023	2025	2026	2027	2028	2029	2030
Demand	74	86	155	252	236	273	287	302	316	334
Net Supply	62	79	98	107	123	136	136	139	143	144
Shortfall	16	13	64	149	119	137	151	163	173	190

Note. Years 2014, 2017, 2020, 2023, and 2025 are actual; years 2026 to 2030 are predicted.

Table 2

Predicted Change Over Five Years

	Predicted Supply		Predicted Demand	
Change	Decline/No Change	Increase	Decline/No Change	Increase
# of States	4	7	3	9

Note. Alaska and Hawaii have no teacher preparation programs. Hawaii does not report demand.

Conclusions, Implications, and Recommendations

Forecasts indicate demand for agricultural educators will continue to outpace the supply of traditionally trained teachers, increasing the projected shortfall by 39% between 2026 and 2030. Addressing this gap will require a combination of strategies, including strengthening recruitment, improving student retention in teacher preparation programs, increasing the yield of program completers, and expanding program capacity. Additional supply may be generated by recruiting certificated teachers who have left the profession or never entered teaching. Reducing teacher attrition would also decrease demand and help narrow the shortfall. As shortages grow, schools will likely rely more heavily on alternatively licensed and unlicensed teachers, increasing the need for targeted professional development and support. Given substantial variation among states, state-specific strategies are recommended.

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