Multilingual Learners and Agricultural Education: A three-article dissertation exploring the needs of both instructor and learner

By

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Abstract

This study examined the instructional preparedness and professional development needs of high school agricultural education (SBAE) teachers in California's Central Region to support multilingual learners (MLs). Using culturally responsive teaching, the sheltered instruction observation protocol (SIOP), and andragogy as theoretical frameworks, the research explored SBAE teacher qualifications, language proficiency, and familiarity with strategies for MLs. Findings revealed that while teachers were confident in teaching fluent English speakers, they faced challenges in addressing the needs of beginning-level ML students, primarily due to limited professional development specifically tailored for MLs. Many educators recognized strategies like translation tools and scaffolding but struggled with consistent implementation. The predominantly White, monolingual teaching group highlighted barriers, including limited training and challenges in adapting to students' linguistic and cultural diversity. Recommendations emphasized the need for targeted professional development in culturally responsive teaching, SIOP, and academic vocabulary to strengthen instructional practices. Future research should assess the impact of ongoing training on teacher preparedness and the educational outcomes for MLs in agricultural programs.

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Introduction

The overarching purpose of this study is to examine the professional development needs and instructional practices of high school agricultural teachers who teach multilingual learners (MLs) in California's Central Region. With an increasing number of MLs in schools across the United States (National Center for Education Statistics, 2023), it is crucial to evaluate teacher qualifications, instructional strategies, and the availability of professional development opportunities tailored to support these students. The study consists of three interrelated research papers, each with a specific focus on teachers, students, and instructional delivery methods. Collectively, these papers aim to provide insights into improving educational outcomes for MLs in agricultural education through better-prepared educators and effective teaching strategies.

Background and Significance

The increasing presence of multilingual learners (MLs) in U.S. classrooms presents significant challenges and opportunities for educators, particularly in specialized fields like agricultural education. In California's Central Region, where agricultural education is a prominent feature of high school curricula, the need for qualified teachers who can effectively support the language development of MLs while teaching complex technical content is particularly acute. According to recent statistics, over 10% of K-12 students nationwide are classified as multilingual learners, and this percentage is even higher in California's Central Region, where the agricultural community attracts a diverse student population with varied linguistic backgrounds (National Center for Education Statistics, 2023).

Multilingual learners often face distinct challenges in accessing curriculum content, particularly when the language of instruction differs from their home language. In agricultural education, the challenge is twofold: MLs must not only develop proficiency in English but also

learn highly specialized agricultural terminology, much of which is not part of everyday English usage. Studies have shown that without targeted support, MLs tend to perform significantly lower than their English-speaking peers in academic areas, particularly in subjects requiring technical vocabulary and hands-on skills (Echevarría, Vogt, & Short, 2024; Zacarian, 2023).

This study aimed to address these challenges by exploring the specific professional development needs of high school agricultural educators in California's Central Region who teach MLs. The research builds on the foundation of two key theoretical frameworks: *culturally responsive teaching and andragogy*. Both frameworks offer essential insights into how educators can be better prepared to teach linguistically diverse students.

Theoretical Frameworks

Culturally responsive teaching, as outlined by Gay (2018), emphasizes the importance of integrating students' cultural backgrounds into the educational process. Culturally responsive teaching recognizes that cultural competence on the part of the educator can lead to greater student engagement, better academic outcomes, and a more inclusive learning environment. In the context of agricultural education, where technical content is highly specialized, culturally responsive teaching becomes particularly relevant as it helps teachers connect students' cultural knowledge and experiences to the curriculum. For MLs, culturally responsive pedagogy ensures that their cultural and linguistic backgrounds are seen as assets rather than barriers to learning, which can significantly improve their academic success and sense of belonging in the classroom (Gay, 2018).

Andragogy, a theory developed by Knowles (1980), provides another critical lens for this study. Andragogy, a term coined by German high school teacher, Alexander Kapp in the 1830s (Henschke, 2016), highlights the ways in which adults, learn best through practical,

problem-centered approaches that relate directly to their professional roles. Knowles' theory emphasizes the importance of self-directed learning and the accumulation of experiences as valuable resources for adult learners. In this study, andragogy helps explain the need for professional development programs that are tailored to the specific challenges faced by agricultural educators working with MLs. By addressing these educators' needs through relevant, ongoing training, Andragogy ensures that teachers are not only learning new content but also applying it effectively in their classrooms (Knowles, 1980).

Taken together, culturally responsive teaching and andragogy provide a robust framework for understanding the professional development needs of agricultural educators in this region. The combination of these two frameworks allows this study to focus both on how teachers can become more culturally responsive in their instruction and how professional development programs can be better designed to meet their learning needs as adult professionals. This theoretical foundation informs the objectives of the study, which aim to improve instructional practices for MLs and, in turn, enhance their academic success in agricultural education settings.

Paper 1: Assessing the Readiness of Central California Agricultural Educators to Teach Multilingual Learners

Target Journal: *Advancements in Agricultural Development (AAD)*

The first paper focuses on the qualifications and professional development experiences of high school agricultural teachers in the Central Region of California. This quantitative study seeks to identify the proportion of teachers who have received training specific to working with MLs, their perceived competence in teaching students at various levels of English proficiency, and the professional development opportunities they have accessed. Findings from this paper highlight a gap between general agricultural training and the specialized skills required to

support MLs. Teachers reported feeling most confident in teaching fluent English speakers but expressed significant challenges when addressing the needs of beginning-level MLs

By identifying these gaps, this paper emphasizes the importance of ongoing and targeted professional development. Recommendations include offering more training in culturally responsive teaching, academic vocabulary development, and teaching strategies that cater to diverse language abilities. This paper contributes to a broader understanding of how agricultural educators' preparedness can directly impact the educational experiences of MLs.

Paper 2: Advancing Multilingual Learner Success in Agricultural Education: Analyzing English Proficiency, Instructional Practices, and Culturally Responsive Teaching

Target Journal: *Journal of Agricultural Education (JAE)*

The second paper shifts the focus to the students, exploring their English proficiency levels and the instructional practices that are currently being employed to support them. This study investigates the characteristics of both teachers and students, aiming to understand how the English proficiency of students in high school agricultural classes shapes the instructional practices used by teachers. It also examines how well teachers are equipped to meet the needs of these students, including the use of effective strategies like realia, translation tools, and cooperative learning.

The findings reveal a disconnect between teacher awareness and the consistent implementation of strategies proven to support MLs. While teachers are aware of techniques such as scaffolding and peer-assisted learning, there is a gap in their practical application. This paper calls for professional development programs that focus not only on raising awareness but also on supporting teachers in integrating these methods into their daily instruction, ultimately improving the learning environment for MLs.

Paper 3: Enhancing Instruction for Multilingual Learners in Agricultural Education: Barriers, Gateways, and Effective Pedagogical Strategies

Target Journal: *North American Colleges and Teachers of Agriculture (NACTA)*

The third paper addresses the broader pedagogical needs of agricultural educators by exploring the barriers and gateways to effective instruction for MLs. This paper investigates which teaching methods are most recognized as effective for supporting MLs, including culturally responsive teaching, universal design for learning (UDL), and the sheltered instruction observation protocol (SIOP). It further examines the characteristics of agricultural educators in the region to assess how their professional backgrounds influence their instructional approaches.

One of the central findings is that agricultural educators often face dual challenges: mastering technical content while also addressing the language development needs of MLs. The paper identifies the need for strategic, ongoing professional development that focuses on overcoming these barriers by equipping teachers with tools and methodologies that integrate both content and language instruction. Additionally, peer-assisted learning and professional learning communities are suggested as effective ways to foster collaboration and build capacity among educators.

Together, these three papers offer an analysis of the current state of professional development for agricultural educators in California's Central Region. The findings underscore the urgent need for more specialized training and resources that address both the linguistic and academic needs of MLs. By focusing on teachers, students, and instructional strategies, this study provides a roadmap for improving educational outcomes for MLs in agricultural education

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Assessing the Readiness of Central California Agricultural Educators to Teach Multilingual Learners

Abstract

This study investigated the pedagogical readiness of United States secondary school-based agricultural education (SBAE) teachers to educate multilingual learners (MLs) in California's Central Region. The focus of this study addressed SBAE teacher qualifications, language proficiency, professional development experiences, and perceived competence to teach MLs. The theoretical frameworks for this study included culturally responsive teaching culturally responsive teaching and andragogy as the lens when assessing SBAE teacher preparedness. The participants were licensed to teach SBAE with ML, but most needed more specific training and experience. Participants reported limited professional development related to multilingual learners. Findings also indicated that teachers feel most confident addressing the needs of fluent English speakers but need help with beginning-level ML students. Increasing the professional development related to culturally responsive teaching, academic vocabulary development, and ongoing training for SBAE teachers would help improve SBAE teachers' classroom pedagogy and enhance learning opportunities for MLs. Future research should explore the effectiveness of specific professional development programs and the impact of teacher preparedness on student outcomes for MLs.

Keywords: multilingual learners, culturally responsive teaching, language proficiency, quality education, reduced inequalities

Introduction and Problem Statement

Academic achievement disparities exist in U.S. classrooms between multilingual learners (MLs) and students proficient in English (Echevarria et al., 2024). Addressing inequalities in educational achievement will require tailored instructional approaches that support MLs' language development and access to quality curriculum (Echevarria et al., 2024; Zacarian, 2023). Effective pedagogical methods engage students in active participation in their learning, moving away from predominantly teacher-centered, direct instruction formats and fostering a more interactive, student-centered approach. Researchers have reported concerns (Crunkilton, 1976; Vommi & LaVergne, 2016) from pre-service secondary school-based agricultural education (SBAE) teacher educators regarding their readiness to employ active teaching methods effectively when instructing students with diverse learning requirements. Barajas et al. (2020) and Heineke and Vera (2022) reported that most teachers in the United States have worked with ML students, and fewer than 30% feel adequately trained to meet their needs. The disparity is significant when teachers are expected to integrate active learning methods into their everyday practice (Salem et al., 2023). Teachers' confidence in their abilities impacts effectiveness with the student needs (Hendrix et al., 2024), especially when considering the diverse needs of MLs. Teachers lacking this confidence are less likely to effectively meet students' needs (Hansen-Thomas et al., 2014).

Failure to address the needs of ML learners can exacerbate achievement gaps and result in decreased academic performance and limited post-secondary opportunities (García & Kleifgen, 2018; Zacarian, 2023). ML students experience diminished engagement and motivation, higher dropout rates, and hindered educational success (Hammond, 2015).

Recognizing the unique needs of individual students is essential for achieving educational equity (Gay, 2018). Understanding these needs is crucial for designing effective educational programs.

Theoretical Frameworks

The theoretical frameworks for this study were based on culturally responsive teaching by Gay (2018) and andragogy by Knowles (1980). This study explored the readiness of secondary SBAE teachers to educate students who are not fully proficient in English. To effectively meet the needs of ML students, teachers must acquire specific instructional skills and strategies. Grounded in the principles and concepts of culturally responsive teaching and framed by andragogy, this research emphasizes the importance of incorporating students' cultural backgrounds and experiences into the educational process. By recognizing and valuing the cultural assets of multilingual learners (MLs), educators can develop pedagogical practices that promote academic success and affirm students' cultural identities.

In alignment with culturally responsive teaching, the framework of andragogy addresses the professional development needs of secondary SBAE teachers instructing multilingual learners (MLs), ensuring educators are equipped to adapt their practices. The term “andragogy” was first coined by Kapp in 1833 (Henschke, 2016) and later expanded upon by Lindeman (1926), who introduced it to the United States from Germany, emphasizing adult learners’ unique characteristics and motivations. In 1968, Knowles introduced “andragogy” to distinguish educational approaches for adult learners from those for children, underscoring the importance of tailored, learner-centered strategies. Knowles (1980) proposed four assumptions related to andragogy: a) As individuals mature, they shift from being dependent learners to becoming more self-directed; b) They draw from their growing reservoir of experiences, which becomes a valuable resource for learning; c) Their readiness to learn increasingly aligns with their social

roles; and d) Their perspective on learning shifts from a future-oriented, subject-centered approach to one focused on immediate, problem-centered application. Knowles later included a fifth assumption stating that the motivation to learn in adults becomes internally driven. In 1984, Knowles' four principles of adult learning emphasized: a) The need for adults to be actively involved in the planning and evaluation of their instruction; b) The importance of experience (including mistakes) as the foundation for learning activities; c) The preference for learning subjects that have direct relevance and impact on their jobs or personal lives; d) Adult learning is predominantly problem-centered rather than content-oriented, focusing on practical applications rather than theoretical knowledge.

Integrating culturally responsive teaching with andragogy, this research underscores the importance of culturally responsive professional development that acknowledges students' cultural diversity and leverages educators' experiential learning and self-directed growth. Together, culturally responsive teaching and andragogy offer a comprehensive lens to assess the readiness of secondary SBAE teachers to educate multilingual learners (MLs) (Gay, 2018; Knowles, 1980).

Purpose and Objectives

Teachers require specific preparation and ongoing professional development to effectively educate MLs (Echevarria et al., 2024; Hansen-Thomas et al., 2014). Documented disparities exist between White students and students of color, whether they are ML or not (Bushnell, 2021). The predominance of a White, English-speaking educator workforce and a lack of tailored professional development programs leave many educators underprepared (NCES, 2023). Nine states mandate specific training for teachers to initially instruct multilingual learners (MLs): Arizona, California, Colorado, Florida, Illinois, Massachusetts, Nevada, New York, and

Texas. However, only four states (Colorado, Massachusetts, Minnesota, and New York) require additional training for teachers to recertify their content specialty area (SupportEd, n.d.). The gap in ongoing professional development exacerbates educators' challenges in effectively supporting MLs (Gándara et al., 2005; Hansen-Thomas et al., 2016). The 16% gap in graduation rates between MLs and their peers (U.S. Department of Education, 2023) underscores the urgent need for all educators to develop specialized skills to serve ML populations, a challenge reflected across all settings, including school-based agricultural education (SBAE).

While SBAE emphasizes hands-on learning and student-centered teaching, concerns persist regarding teachers' readiness for active teaching methods and their ability to meet the needs of all students (Crunkilton, 1976; Barajas et al., 2020). These concerns highlight the importance of targeted professional development to address the needs of diverse learners, including multilingual learners (Coleman et al., 2020). This study investigated the qualifications, language proficiency, professional development experiences, and future needs of California's Central Region agricultural educators, offering insights into their specific challenges in serving MLs. These findings are essential for informing the development of effective support systems for SBAE teachers nationwide, ensuring teachers will meet the needs of an increasingly diverse student population. The ability to manage these diverse student needs may significantly influence a teacher's decision to remain in the profession (Clemons & Lindner, 2019).

To better understand the educational disparities between MLs and improve the pedagogical preparation of SBAE teachers, researchers used four research objectives: a) Identify the proportion of high school agricultural teachers with specific qualifications or training to teach students who are not fully proficient in English, b) Identify participant characteristics for teachers and students. c) Identify and describe the professional development in which

agricultural educators in the Central Region of California are engaged, and d) Describe the perceived level of instructor competence to teach students at various English proficiency levels. By addressing these objectives, this research contributes to a better understanding the current state of professional development and readiness among SBAE teachers in serving multilingual learners.

Methods

We used a cross-sectional research design to address the study's objectives as defined by de Vaus (2013): not incorporating an element of time or longitude, dependence on pre-existing characteristic differences rather than implementing an intervention, and utilizing standing groups based on those pre-existing characteristics. The researchers developed a new instrument based on published peer-reviewed research addressing professional development needs and multilingual learners.

The study addressed the objectives by providing participants with a series of positively worded statements asking if they [SBAE teachers] were prepared to meet the instructional needs of various ML students. Participant responses were collected through a Likert-type five-point interval measurement scale including a) strongly disagree, b) disagree, c) neither agree or disagree, d) agree, and e) strongly agree (Lindner & Lindner, 2024).

Participants were asked about their personal characteristics, teaching experience, and professional development history. They also reported the percentage of students in their classes who speak languages other than English and those identified as multilingual learners (MLs). Since the survey was conducted in the spring of 2024, assuming teachers would be familiar with these students' characteristics. Teachers typically access this information through school records,

enrollment forms, English language proficiency assessments, direct communication with students and families, and classroom observations.

Content and face validity were assessed (Creswell, 2014), and content validity was evaluated by SBAE and Special Education faculty at Auburn University, leading to minor revisions in the instrument's wording and formatting. These changes included grouping similar questions and aligning response options with standard practices. Researchers conducted a pilot study with SBAE teachers in Southern California (n = 15), and participants provided feedback through an open comment section at the end of the research instrument. Researchers made minor adjustments for clarity based on the pilot participant's feedback. Cronbach's alpha for internal consistency (α = .88) exceeded the minimum reliability threshold (Privitera, 2017), confirming the instrument's usability.

The instrument was electronically distributed using Qualtrics and followed the tailored design method to encourage participant responses (Dillman et al., 2014). The researchers provided a preannouncement email detailing the study's relevance to the potential participants. Three follow-up reminders were issued at seven- and ten-day intervals as response rates declined (Dillman et al., 2014). The survey was distributed to a sample of high school agricultural educators in the Central Region of California (n = 266), yielding 62 responses (23.3%). After excluding incomplete responses (n = 6), we retained 56 fully completed instruments (21%) for analysis. Due to the low response rate caution is warranted about generalizing the findings beyond the response sample (Lindner, et al., 2001; Lindner, 2002)

Findings

This study objectively analyzed SBAE teacher's qualifications, language proficiency, and professional development experiences in California's Central Region, focusing on their work

with multilingual learners (MLs) and understanding their insights aimed to inform the professional development needs and effective support systems for SBAE teachers nationwide. The instrument included 19 questions and statements organized into constructs based on the research objectives. These findings are explained in detail based on the data collected.

Objective One: Identify the proportion of high school agricultural teachers with specific qualifications or training to teach students who are not fully proficient in English.

Given their sizable ML population, California mandates additional certification for educators (California Department of Education, 2023), requiring that all ML services be provided by teachers authorized for such instruction until students are reclassified as fluent in English. Participants (f = 56) reported 100% hold credentials to teach SBAE courses in California. Because of this, all respondents have certification to teach MLs. The authorization requirements vary by year acquired and type of certification, meaning that the professional development and experience teaching MLs varies for each respondent.

Objective Two: Identify participant characteristics for teachers and students.

The second objective focused on the characteristics of SBAE educators and their students, as reported by the teachers who completed the survey. Respondents provided self-reported information on years of teaching, race, ethnicity, languages spoken, and fluency in those languages. They also shared the languages their students speak, the percentage of multilingual learners in their classes, and the percentage of students they teach who speak languages other than English. Among the 56 valid responses, all questions received a 100% response rate, except for the question about years of teaching and the languages their students speak, which had 54 responses each.

SBAE Teacher Characteristics

Participants self-reported their personal and professional characteristics (Table 1) when completing the research instrument. Most participants were relatively new to the teaching profession, though their years of experience ranged from one to 41 years, with an overall average of 11.8 years in teaching. Respondents also self-reported their racial identity, with most identifying as "White," comprising 78.6% (f = 44/56) of the sample. Another 7.1% (f = 4/56) identified as Latinx/Hispanic, while three respondents reported multiple racial identities, and three chose not to disclose their race. In addition to reporting their race, participants indicated their ethnicity from pre-defined options (not Hispanic/Latinx, Hispanic/Latinx, or prefer not to answer). Options for selecting race were using federal guidelines (Census Bureau, n.d.). Participants (83.93%) reported their race (f = 47/56) as not Hispanic/Latinx.

Regarding language abilities, most respondents (f = 42/56) reported that they do not speak any language other than English. Thirteen (f = 13) participants reported they could speak another language conversationally, with 12 speaking Spanish and one speaking Mien and Spanish. Only one respondent identified as fluent in a language other than English or Spanish.

Table 1

Secondary SBAE Teacher Characteristics

Description	*f*	%
Years Teaching		
0-5	19	35.18
6-10	12	22.22
11-20	15	27.78
>20	8	14.81
Teacher Race		
White	44	78.57
Hispanic/Latinx	4	7.14
Multiple	3	5.35
Asian	2	3.57
Prefer not to answer	3	5.35
Teacher Ethnicity		
Not Hispanic / Latinx	47	83.93
Hispanic / Latinx	5	8.92
Prefer not to answer	4	7.14
Teacher Languages Spoken		
English Only	42	75.00
Conversational Spanish	12	21.43
Fluent Spanish	1	1.79
Conversational Mien	1	1.79

SBAE Student Characteristics

In addition to reporting their characteristics, secondary SBAE teachers in California's Central Region reported (Table 2) language information about their students. Teachers were asked which language students in their secondary SBAE classes speak most often besides English. Fifty-two of the 56 teachers (92.86%) reported that Spanish is the most spoken language besides English in their classes, with two mentioning other languages. Two respondents did not answer this question. Participants also reported the percentage of students who qualify as multilingual learners (MLs) in their classes. All respondents indicated they have at least one ML

in their classes. Fifteen of the 56 participants (f = 15, 26.8%) respondents reported 10% or fewer MLs, and 7 (12.5%) of the respondents indicated that more than half of their students are MLs. Despite the variation in these figures, it is evident that MLs are present in every classroom.

Table 2

Percent of ML Students

Percent of MLs	*f*	%
1-10	15	26.76
11-20	14	25.00
21-30	12	21.40
31-40	6	10.70
41-50	2	3.60
51-60	1	1.80
61-70	4	7.10
71-80	2	3.60
81-90	0	0.00
91-100	0	0.00

Note. N = 56

Not all students who speak a language other than English (Table 3) are classified as multilingual learners (MLs). Some may have received language support earlier in their education, while others may have been designated fluent in English since primary school. Students who have been redesignated as “Fluent English Proficient” still need ongoing support in language development (Echevarria et al., 2024; Zacarian, 2023). When asked about the percentage of students in their classes who speak a language other than English, teachers reported a wide range of responses. However, all respondents indicated that they have students who speak another language. Notably, 50% (f = 23/56) of the teachers reported that about half of the students speak a language other than English.

Table 3

Percent of Secondary SBAE Students Who Speak a Language Other Than English

Students Speaking Other Language	*f*	%
1-20	10	17.88
21-40	16	28.57
41-60	19	33.93
61-80	6	10.71
81-100	5	8.93

Note. $N = 56$

Objective Three: Identify and describe the professional development in which agricultural educators in the Central Region of California are engaged.

Participants were asked to identify and report the most common types of content-based and pedagogical training (Table 4) in which they have participated: animal science, plant systems/horticulture, and agricultural mechanics. Participants reported their professional development experiences beyond content-based development, including instructional strategies, classroom management, and meeting the needs of multilingual learners (MLs) and students with disabilities. We categorized participant responses into SBAE-specific content and general pedagogical practices. The results indicate that SBAE teachers engage in various professional learning experiences. Notably, while much of the training focused on FFA ($f = 34/54$) and SAE ($f = 31/54$), an equal number of respondents reported participating in professional development related to pedagogical practices ($f = 34/54$) within the last five years.

Table 4

Professional Learning Participation of Secondary SBAE Teachers in Last 5 Years

PD Type	PD Specific	*f*	%
SBAE	FFA related	34	62.96
	SAE related	31	57.41
	Other tech skills related to SBAE	39	72.22
	Plant Systems/Horticulture	25	46.30
	Introduction to Agriculture	22	40.74
	Animal Science	20	37.04
	Agricultural Mechanics	22	40.74
	Environmental Sciences / Natural Resources	24	44.44
	Agribusiness	11	20.37
	Food Products	9	16.67
	Engineering	4	7.41
	Biotechnology	3	5.56
Pedagogical	Instructional practices	34	62.96
	Classroom management	28	51.85
	Meeting the needs of MLs	28	51.85
	Meeting the needs of students with disabilities	24	44.44

Note. $n = 54$, 2 participants did not complete the instrument

When we asked an open-ended question about participants' professional learning related to multilingual learners (MLs) throughout their entire careers, 16 out of 52 respondents reported engaging in any such training beyond their credentialing program. Additionally, fewer than half of the respondents recalled receiving any ML-specific training during their credentialing process. Despite the requirement for certification to teach MLs in the state, most participants did not recall receiving adequate preparation.

Objective Four: Describe the perceived level of instructor competence to teach students at various English proficiency levels.

Of the 56 respondents, 52 rated their confidence in meeting students' instructional needs at different levels of English proficiency (Table 5). Secondary SBAE teachers feel most confident addressing the needs of students with higher English proficiency. Specifically, 50 out

of 52 teachers "Strongly Agree" (Lindner & Lindner, 2024) that they feel prepared to meet the needs of fluent English speakers (*M* = 4.88, *SD* = 0.43) and the students who were recently redesignated *(M* = 4.58, *SD* = 0.73). The same teachers report "Neither Agree nor Disagree" when asked about their confidence in meeting the instructional needs of beginning-level students. (*M* = 3.08, *SD* = 1.33). The “beginning level” ML students have the least fluency and require the most assistance.

Table 5

ML Levels and Teacher Confidence

	M	*SD*	Qualifier
Beginning	3.08	1.33	Neither Agree nor Disagree
Intermediate	3.65	1.01	Agree
Advanced	4.25	0.88	Agree
Recently Redesignated	4.58	0.73	Strongly Agree
Fluent English Speakers	4.88	0.43	Strongly Agree

Conclusions, Discussions, and Recommendations

This study underscores the critical need for ongoing and targeted professional development for school-based agricultural education (SBAE) teachers, particularly in their efforts to support multilingual learners (MLs). Many SBAE teachers actively seek professional learning opportunities to enhance their practices; however, gaps remain in the specialized training necessary to meet the growing diversity in student populations. As the demographics of U.S. classrooms continue to shift, all teachers must be equipped with the skills and confidence needed to support MLs effectively (Coleman et al., 2020; Hansen-Thomas et al., 2014).

One significant finding of this study is that there is no strong correlation between teacher confidence in addressing the needs of MLs and years of teaching experience. Instead, it appears more closely tied to the availability and quality of professional development opportunities. This

finding suggests that professional learning is pivotal in preparing teachers to work with MLs, regardless of their teaching tenure (Hansen-Thomas et al., 2014). Inconsistent access to professional development exacerbates the challenges many educators face in meeting the needs of MLs, particularly those with lower levels of English proficiency. Thus, providing structured, ongoing training that focuses on the specific needs of MLs is crucial for building teacher confidence and competence.

Based on the findings of this study, several recommendations for improving secondary SBAE pedagogy and training are evident. Professional development initiatives for SBAE teachers must include culturally responsive teaching practices, which integrate students' cultural and linguistic backgrounds into classroom instruction (Gay, 2018). This finding is significant given that most teachers were White and monolingual English speakers, while student populations are becoming increasingly diverse in language and culture (NCES, 2023). Culturally responsive teaching helps bridge this cultural gap by equipping teachers with the tools to recognize and value the myriad experiences that multilingual learners (MLs) bring to the classroom. By doing so, teachers can create more inclusive learning environments where students feel understood and supported, ultimately improving student engagement and academic success.

In addition, professional development should strongly emphasize strategies for developing academic vocabulary. Academic vocabulary is essential for making subject-specific content accessible to MLs, particularly in specialized areas like agricultural education, where technical language is prevalent (Echevarria et al., 2024). For many MLs, academic vocabulary presents a significant barrier to understanding both the content and broader academic concepts. Identifying and eliminating or minimizing barriers is key to adoption of new strategies (Lindner

et al., 2016). Teachers must use strategies to help students acquire this specialized language and integrate it into meaningful classroom activities. By fostering vocabulary development, educators can help MLs better navigate complex texts and discussions, making content more relevant and improving overall comprehension (Hansen-Thomas et al., 2014). Developing literacy skills in MLs will help prepare them for future academic success and closing achievement gaps. To develop literacy skills it may be necessary to use basic words and terms that teachers are already familiar with, thus facilitating more meaningful professional development (Clemons, et al., 2018).

Districts and educational institutions should prioritize ongoing professional development opportunities rather than isolated or one-time events. Training programs should be problem-centered, as advocated by andragogy, and directly applicable to teachers' instructional practices (Knowles, 1980). Such programs will help teachers build pedagogical expertise and understand MLs' unique needs.

Finally, educational policymakers should consider revising state recertification requirements to mandate periodic training for teachers working with MLs. As noted, only a few states currently require additional training for recertification in this area (SupportEd, n.d.), and expanding these requirements could improve teacher preparedness and student outcomes.

This study opens several avenues for future research. Longitudinal studies should track the impact of professional development on teacher confidence and competence over time. Such research clarifies the long-term benefits of ongoing professional development in supporting MLs. Additionally, future research should explore the specific types of professional development that are most effective in building teacher capacity to serve MLs. Comparative studies across

different states or regions could shed light on best practices and help guide the development of more effective professional learning programs.

Finally, there is a need for further research into how the intersection of race, ethnicity, and language proficiency impacts teacher preparedness and student outcomes. Given that many teachers working with MLs are monolingual and may lack personal experience with the challenges they face with MLs, studies investigating these dynamics could provide valuable insights for enhancing teacher training and support.

By addressing these gaps in research and practice, the education system can better prepare teachers to meet the needs of all students, regardless of linguistic background. Investing in such continuous efforts is essential for cultivating a more equitable and prosperous educational landscape for educators and learners (Zacarian, 2023).

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Advancing Multilingual Learner Success in Agricultural Education: Analyzing English Proficiency, Instructional Practices, and Culturally Responsive Teaching

Abstract

This study examined the instructional preparedness of high school agricultural education (SBAE) teachers in California's Central Region to support multilingual learners (MLs). Using culturally responsive teaching and the sheltered instruction observation protocol (SIOP) as frameworks, researchers surveyed teachers to assess their familiarity with instructional strategies for MLs. Although many teachers reported awareness of strategies like translation tools, scaffolding, and cooperative learning, they often struggled to implement these methods consistently. The predominantly White and monolingual group of teachers faced challenges in addressing the linguistic and cultural diversity of their students. Participants also highlighted a lack of systematic professional development specifically focused on teaching MLs, which further limited their ability to support beginning-level MLs effectively. While teachers expressed confidence in teaching fluent English speakers, they found it more difficult to meet the needs of MLs. The findings underscore the importance of ongoing, targeted professional development in culturally responsive teaching and SIOP to enhance instructional practices and improve outcomes for MLs. Future research should explore the long-term effects of targeted professional development on teacher preparedness and student success in multilingual education.

Keywords: multilingual learners, culturally responsive teaching, language proficiency, quality education, reduced inequalities

Introduction

In recent years, the United States K-12 student population has undergone a significant transformation, with the number of English language learners (ELs) reaching 5.3 million in 2021, representing 10.6% of the K-12 student body (U.S. Department of Education, National Center for Education Statistics, 2023). This marks a notable increase from a decade earlier when 4.5 million ELs made up 9.2% of the total population. Under the Elementary and Secondary Education Act (ESSA), EL students are defined as those whose primary language is not English, which can hinder their ability to engage with an English-based curriculum. In this study, we used the term multilingual learners (MLs) instead of ELs to promote inclusivity and a positive stance on multilingualism, aiming to create a more empowering learning environment that values students' diverse linguistic backgrounds.

The evolution of multilingual education in the United States reflects an increasing awareness of the importance of linguistic diversity in fostering academic success. Historically, U.S. education mirrored the linguistic diversity of its regions (Kloss, 1977). However, as the nation’s identity solidified, English became dominant, often sidelining other languages. This was especially true for Native Americans and immigrants, who were frequently forced to assimilate into an English-speaking system (Crawford, 1998). The 20th century brought a shift to this country characterized by a growing recognition of the rights of linguistic minorities and the need for educational equity and influenced by rising immigration and the Civil Rights Movement. Landmark decisions such as Brown v. Board of Education (1954) and the Civil Rights Act of 1964 laid the groundwork for protecting the rights of multilingual learners (Banks & Banks, 2010). The Bilingual Education Act of 1968 and the Lau v. Nichols case (1974) further solidified the rights of MLs, ensuring instruction that supports both language development and academic

success (Crawford, 1989, 2004). The reauthorization of ESSA in 2015 continued to prioritize support for MLs, with Title III addressing the needs of these students and immigrant learners.

Building on this foundation, our research focused on teachers and students in high school agricultural education classes in California's Central Region. We examined students' English proficiency levels and educational needs, teachers' characteristics, and the instructional materials used in their classes. These factors are essential for understanding the persistent achievement gap between multilingual learners (MLs) and their English-proficient peers in the United States. On average, MLs score 20 points lower in math and 30 points lower in reading than their English-proficient counterparts (NAEP, 1996-2022). They also graduate at a lower rate (72%) compared to all students (87%), which includes multilingual learners (U.S. Department of Education, National Center for Education Statistics, 2023). By exploring these disparities and evaluating instructional resources, this study aimed to provide insights into improving educational outcomes for MLs.

With its rich linguistic and cultural diversity, California's Central Region mirrors the broader agricultural communities across the United States. Understanding the English proficiency levels and needs of students in this region is essential for developing instructional practices that effectively support multilingual learners (MLs). Best practices emphasize creating inclusive, culturally responsive classrooms that view multilingualism as a strength (Echevarría et al., 2024). Incorporating students' native languages into instruction not only validates their cultural identities but also enhances their comprehension of academic content (Hammond, 2015). Culturally responsive materials—such as texts, art, and historical content from various cultures—help ML students connect their experiences to the curriculum, thereby strengthening their engagement with the learning process.

Supporting MLs in the classroom requires a multifaceted approach that incorporates both short-term and long-term strategies to ensure their academic success and language development (Echevarría et al., 2024; Hammond, 2015; Zacarian, 2023). Immediate interventions, such as the use of language translation software and scaffolding techniques, play a crucial role in providing necessary support for MLs, allowing them to access content and participate meaningfully in lessons (Bavendiek, 2022; Kelly & Hou, 2022). Translation tools bridge language gaps, enabling students to engage with instructional materials and communicate effectively. Research indicates that when teachers strategically implement translation software, MLs experience enhanced comprehension and increased participation in class activities (Zacarian, 2023). Scaffolding techniques provide structured support tailored to the diverse language proficiency levels of students, helping them navigate complex content.

In addition to these immediate supports, long-term strategies are vital for fostering sustainable academic growth. The sheltered instruction observation protocol (SIOP) model, developed by Echevarría, Vogt, and Short (2024), offers a comprehensive framework designed to make academic content accessible to MLs while simultaneously promoting their language skills. This model integrates language objectives with content objectives, ensuring that teachers focus on both subject matter and language development. By embedding language support within academic lessons, the SIOP model enables MLs to grasp complex concepts more effectively and improve their English proficiency over time.

Key components of the SIOP model include: (a) lesson preparation, (b) building background, (c) comprehensible input, (d) strategies, (e) interaction, (f) practice and application, (g) lesson delivery, and (h) review and assessment. Lesson preparation emphasizes the importance of setting clear language and content objectives, selecting appropriate materials, and

implementing scaffolding to meet students' language needs. Building background connects students' prior knowledge and experiences to new content, which is particularly beneficial for MLs who may have varying educational backgrounds. Comprehensible input focuses on strategies like visuals, gestures, and modeling to present content in ways that are understandable to MLs. Together, these elements create a supportive learning environment that fosters both language acquisition and content mastery.

The SIOP model also emphasizes the importance of interaction and practice. Strategies within the model encourage teachers to employ learning techniques that promote higher-order thinking, while interaction fosters collaborative learning among students. Collaborative opportunities are crucial for MLs, as they allow for the use of language in authentic contexts, reinforcing both language skills and content knowledge. Moreover, the practice and application component provides students with opportunities to apply their new knowledge in meaningful ways, solidifying both their understanding of the content and their language proficiency. By pacing the lesson appropriately and ensuring that the content is engaging, the SIOP model addresses the diverse needs of all learners in the classroom (Echevarría et al., 2024; Zacarian, 2023).

Culturally responsive teaching enhances the effectiveness of these strategies by integrating students' cultural and linguistic backgrounds into the educational process. Culturally responsive teaching makes learning more meaningful and relevant, fostering engagement and academic success among MLs (Gay, 2018). When teachers recognize and value the cultural experiences that students bring to the classroom, they create a more inclusive environment that encourages participation. By developing strong relationships with students and their families,

educators can better understand their backgrounds and needs, tailoring instruction to support their growth.

To further support MLs, effective instruction involves the strategic use of machine translation software to bridge language gaps (Bavendiek, 2022; Kelly & Hou, 2022). Real-time translations of instructional materials and spoken language can significantly enhance communication and comprehension. While many educators are aware of these tools, their usage often remains limited. Providing training on the effective use of translation software can improve MLs' access to content, enabling them to engage more fully in classroom activities and discussions. This supports their immediate learning needs while fostering a sense of belonging and empowerment.

Despite the emphasis on hands-on, student-centered teaching in school-based agricultural education (SBAE), concerns persist about educators' preparedness to engage with the growing ML population effectively (Hansen-Thomas et al., 2016). The predominantly White, English-speaking teaching workforce, coupled with limited professional development tailored to ML instruction, leaves many educators unprepared to meet these students' needs (Darling-Hammond, et al., 2017; U.S. Department of Education, 2020-2021). While MLs are increasingly represented in agricultural education, they remain underrepresented in Career and Technical Education (CTE) programs (Emerick, 2022). Fewer than 30% of teachers feel confident in their ability to teach MLs (Barajas et al., 2020; Heineke & Vera, 2022), and this lack of confidence often leads to unmet student needs (Hansen-Thomas et al., 2016; Hendrix et al., 2024).

This issue is compounded by the fact that few states require specific training for teachers working with MLs, leaving many unprepared to address their unique challenges (Gándara et al.,

2005; Coady et al., 2011). Professional development in culturally responsive teaching and language acquisition methodologies is essential for improving teacher preparedness (Gay, 2018). Moreover, engaging families in the educational process strengthens support for ML students, ensuring their linguistic and cultural assets are recognized both at school and at home (Hammond, 2015). Establishing strong connections with families and leveraging community resources creates a more holistic learning experience, empowering ML students to succeed academically and socially.

The implications of this study extend beyond California, offering valuable guidance for educators, policymakers, and curriculum developers across the country. As the ML population continues to grow, particularly in diverse regions like California's Central Region, it becomes increasingly important for educators to receive the training and resources necessary to support these students. Strengthening teacher preparedness through professional development and improving access to instructional materials tailored to ML needs will be essential in bridging the achievement gap between MLs and their peers. By focusing on the challenges MLs face in agricultural education, this study's goal was to inform future practices that promote inclusive, student-centered learning environments where all students can thrive.

Purpose and Objectives

This research sought to examine the English proficiency of students enrolled in high school agricultural classes in the Central Region of California, explore best practices to meet their needs, and assess the instructional materials and strategies currently used to teach them. To achieve these goals, the study was guided by three main objectives. First, it sought to identify participant characteristics, including both the English proficiency of teachers and students in these agricultural classes. Second, it aimed to assess the instructional strategies and materials that

school-based agricultural education (SBAE) teachers are aware of and actively use to support multilingual learners (MLs). Lastly, the study's goal was to determine the portion of respondents who possess attributes conducive to effectively meeting the needs of MLs, as well as to compare the confidence levels of those who possess these attributes with those who do not in teaching multilingual learners. Researchers hope that the insights gained from this study will inform future professional development initiatives and instructional practices, ultimately improving educational outcomes for multilingual learners in agricultural education.

Theoretical Framework

This paper examines the English proficiency of secondary high school agricultural students in California's Central Region, along with teacher characteristics and the instructional materials used for teaching multilingual learners (MLs). The research was anchored in Gay's (2018) framework of culturally responsive teaching, which advocates for integrating students' cultural backgrounds and experiences into the educational process to create inclusive and effective learning environments. Gay emphasizes that culturally responsive teaching not only fosters academic success but also affirms students' cultural identities by recognizing their heritage as an asset rather than a barrier.

This study applied Gay's culturally responsive teaching framework to explore how educators can adjust their teaching practices to reflect the cultural diversity of multilingual learners (MLs). Culturally responsive teaching advocates for pedagogical approaches that acknowledge and integrate students' cultural knowledge, language, and life experiences, thereby enhancing engagement and learning. For instance, by incorporating agricultural examples that are relevant to students' communities, educators can make lessons more meaningful and relatable, fostering a stronger connection to the material.

The framework emphasizes the significance of culturally relevant instructional materials that reflect the diverse experiences of students. By aligning educational resources with students' cultural contexts, teachers can design learning experiences that are both academically challenging and personally validating. Gay's focus on differentiation within culturally responsive teaching aligns with the need to accommodate the varying language proficiencies and educational backgrounds of multilingual learners (MLs). She advocates for instructional strategies such as scaffolding, collaborative learning, and incorporating students' native languages to support their academic success (Gay, 2018).

Ultimately, the use of culturally responsive teaching in this study provided a lens through which the cultural dynamics between teachers and students could be examined, offering insights into how culturally responsive teaching can lead to more equitable educational outcomes for MLs in agricultural education. By promoting practices that honor linguistic and cultural diversity, the research aimed to contribute to the ongoing discourse on inclusive education and the preparation of teachers to meet the needs of a rapidly diversifying student population.

Methodology

The study focused on a sample of school-based agricultural educators ($N = 266$) from California's Central Region who taught grades 9-12 during the 2023-2024 academic year. To achieve the study's objectives, researchers used a cross-sectional research design as outlined by de Vaus (2013). The design is defined by three criteria: it excludes elements of time or longitudinal analysis, relies on pre-existing characteristic differences rather than introducing an intervention, and utilizes groups based on these pre-existing characteristics (de Vaus, 2013).

The instrument used in this study was developed following a comprehensive review of peer-reviewed research on professional development needs and multilingual learners (Salem et

al., 2023). Researchers asked participants about their awareness and use of instructional strategies and materials, based on a series of positively worded statements derived from prior research, to assess their preparedness to meet the instructional needs of ML students across various levels. Researchers recorded responses using a five-point Likert scale ranging from "not aware" to "very aware" and from "always use" to "never use" (Lindner & Lindner, 2024). Participants also provided information on their own and their students' characteristics, including personal details, teaching experience, and professional development history.

Before launching the instrument, researchers carefully evaluated its content and face validity (Creswell, 2014). SBAE faculty at Auburn University reviewed the content validity, which led to minor adjustments in wording and format. Institutional Review Board (IRB) approval from Auburn University before launching the survey. A pilot study was conducted with a comparable group of 15 California SBAE teachers from the Southern region, who were not included in the final survey. Feedback from these participants, collected through an open comment section, led to minor revisions for clarity. These changes involved grouping similar questions together and aligning response options. To ensure internal consistency, researchers calculated Cronbach's alpha ($\alpha = .88$), which exceeded the minimum reliability threshold (Privitera, 2017), confirming the instrument's appropriateness.

Researchers used the tailored design method to encourage participation (Dillman et al., 2014). They sent an initial email to the sample, emphasizing the study's importance and encouraging participation. This was followed by three reminder emails at seven and ten-day intervals in response to declining participation rates (Dillman et al., 2014). The survey was distributed to $N = 266$ high school agricultural educators in California's Central Region, with 62 responses recorded ($n = 23.3\%$). To maintain data integrity, incomplete responses were excluded

from the analysis, resulting in a final sample of 56 fully completed responses (n = 21%). Due to the low response rate caution is warranted about generalizing the findings beyond the response sample (Lindner, et al., 2001; Lindner, 2002)

Findings

This study provided a focused analysis of the English proficiency levels of students enrolled in high school agriculture classes within California's Central Region, along with an examination of teacher and student characteristics and the instructional materials used for ML instruction. By gaining insights into these areas, the study aimed to inform the professional development needs and identify effective support systems for SBAE teachers across the nation. The instrument utilized in this research comprised 19 questions and statements, organized into constructs aligned with the study's objectives. The detailed findings, based on the collected data, are discussed below.

Objective One: Identify teacher and student characteristics, including languages spoken and English proficiency of students in high school agriculture classes in the Central Region of California.

Data analysis was conducted on responses from (n = 56) participants, focusing on characteristics such as the languages spoken by their students, the educators' years of teaching experience, race, ethnicity, the languages they speak, and their fluency in those languages. This objective's goal was to capture information beyond the typical years of teaching, focusing on factors that impact multilingual learner (ML) education, such as the languages spoken by both teachers and students and their respective fluency levels.

Students Identified as Multilingual Learners

All respondents indicated they have at least one multilingual learner (ML) in their classes (Table 1). Fifteen (26.79%) of the 56 respondents reported 10% or fewer MLs, and 7 (12.50%) of the respondents indicated that more than half of their students are MLs.

Table 1

Secondary SBAE Teachers Reported Percent of ML Students

Percent of MLs	*f*	*%*
1-10	15	26.76
11-20	14	25.00
21-30	12	21.40
31-40	6	10.70
41-50	2	3.60
51-60	1	1.80
61-70	4	7.10
71-80	2	3.60
81-90	0	0.00
91-100	0	0.00

Students Who Speak a Language Other than English

Not all students who speak a language other than English are officially classified as MLs. Some may have received language support earlier in their education, while others might have been designated fluent in English since enrollment in public school. Even students who have been redesignated as Fluent English Proficient require continued support, particularly in developing academic language (Echevarria et al., 2024, p. 6; Zacarian, 2023). When asked about the percentage of students in their classes who speak a language other than English, teachers reported a wide range of responses (Table 2). All respondents indicated they have students who speak another language. Notably, 50.00% of the teachers reported that approximately half of

their students speak a language other than English. This number is higher than the number of students identified as multilingual learners, reflecting the broader diversity of language backgrounds present in classrooms.

Table 2

Secondary SBAE Students Who Speak a Language Other Than English

Percent of Students	*f*	%
1-20	10	17.88
21-40	16	28.57
41-60	19	33.93
61-80	6	10.71
81-100	5	8.93

Note. $N = 56$

Student Languages

The survey also asked about the languages students most frequently speak besides English. Of the 56 respondents, 92.86% ($f = 52/56$) indicated that Spanish is the predominant language spoken other than English, with only two mentioning other languages. Two respondents did not answer this question.

Teacher Characteristics

The data collected from 56 teachers revealed notable trends in teaching experience, racial and ethnic composition, and language proficiency (Table 3). Among the 56 valid responses, all questions received a 100% response rate, except for the question about years of teaching, which had 54 responses. Respondents' teaching experience varied significantly, ranging from one to 41 years, with an overall average of 11.8 years. The largest number of respondents were new to the profession, with 35.19% ($f = 19/54$) teaching five or fewer years. Participants were asked to self-identify their race without being provided with predefined options. Based on their responses,

78.6% (44/56) identified as "White," followed by 7.14% (*f* = 4/56) identifying as Latinx/Hispanic. Three respondents identified with multiple races, and three respondents chose not to disclose their race. For ethnicity, respondents were given three options and asked to select one. Most notably, 83.93% (*f* = 47/56) of the educators reported that they are not Hispanic or Latinx. Seventy-five percent (*f* = 42/56) of survey participants reported that they do not speak any language other than English. Thirteen of the respondents (23.21%) indicated they speak another language conversationally, with 12 reporting Spanish and one reporting both Mien and Spanish. Only one respondent reported being fluent in another language besides English, which was Spanish. Overall, the data highlights a predominantly White and monolingual teaching population with many newer educators and limited linguistic diversity.

Table 3

Secondary SBAE Teacher Characteristics

Description	*f*	%
Years Teaching		
0-5	19	35.18
6-10	12	22.22
11-20	15	27.78
>20	8	14.81
Teacher Race		
White	44	78.57
Hispanic/Latinx	4	7.14
Multiple	3	5.35
Asian	2	3.57
Prefer not to answer	3	5.35
Teacher Ethnicity		
Not Hispanic / Latinx	47	83.93
Hispanic / Latinx	5	8.92
Prefer not to answer	4	7.14
Teacher Languages Spoken		

English Only	42	75.00
Conversational Spanish	12	21.43
Fluent Spanish	1	1.79
Conversational Mien	1	1.79

Objective Two: Identify the instructional strategies and materials SBAE teachers are aware of and use to support multilingual learners.

Study participants were asked to assess their awareness and use of seven instructional materials and strategies related to ML instruction. Of the 56 respondents who completed the rest of the survey, 43 indicated their awareness of specific instructional strategies. Awareness was measured on a five-point scale from “very aware” to “not at all aware” (Lindner and Lindner, 2024).

Small group discussions had the highest level of awareness among the strategies, with 74.4% (*f* = 32/43) of teachers indicating they were either "very aware" or "aware" of this method. Translation software followed closely, with 69.8% (*f* = 30/43) of teachers reporting they were familiar with its use. Realia, which involves using tangible objects for instruction, was similarly well recognized, with 69.8% (*f* = 30/43) of respondents expressing awareness.

Other strategies, such as cooperative learning (67.4%, *f* = 29/43) and sentence frames (55.8%, *f* = 24/43), also showed significant levels of awareness. Meanwhile, language objectives and explicit vocabulary instruction were moderately recognized, with 62.8% (*f* = 27/43) and 51.1% (*f* = 22/43) of teachers, respectively, indicating awareness.

Notably, explicit vocabulary instruction had the highest rating for "no awareness," with 14.0% (*f* = 6/43) of respondents indicating that they were unfamiliar with this strategy. These results suggest that while many teachers are familiar with various instructional strategies for

MLs, the degree of awareness varies by specific strategy, and explicit vocabulary instruction may need more emphasis in professional development efforts.

Table 4

Respondents Awareness of Instructional Strategies and Materials

Material / Strategy	Very Aware *f* (%)	Aware *f* (%)	Somewhat Aware *f* (%)	Not Aware *f* (%)	Not at all Aware *f* (%)
Realia	15 (34.9%)	15 (34.9%)	5 (11.6%)	6 (14.0%)	2 (4.7%)
Small Group Discussion	19 (44.2%)	13 (30.2%)	7 (16.3%)	3 (7.0%)	0 (0.00%)
Language Objectives	9 (20.9%)	18 (41.9%)	11 (25.6%)	5 (11.6%)	0 (0.00%)
Cooperative Learning	11 (25.6%)	18 (41.9%)	9 (2.1%)	3 (7.0%)	1 (2.3%)
Explicit Vocabulary Instruction	6 (13.9%)	16 (37.2%)	12 (27.9%)	6 (14.0%)	3 (7.0%)
Sentence Frames	9 (20.9%)	15/43 (34.9%)	13 (30.2%)	5 (11.6%)	1 (2.3%)
Translation Software	20 (46.5%)	10 (23.3%)	11 (25.6%)	1 (2.3%)	1 (2.3%)

Note. $n = 43$ respondents, 13 participants did not complete the instrument.

After responding to questions about their awareness of instructional materials and strategies, SBAE teachers were asked to indicate their frequency of use. Usage was measured on a five-point scale ranging from "always" to "never" (Lindner & Lindner, 2024). Realia had the highest usage, with 78.6% ($f = 33/42$) of teachers reporting that they use it “always” or “most of the time.” Small group discussions were also widely used, with 66.7% ($f = 28/42$) of teachers indicating regular use.

In contrast, despite high levels of awareness for translation software, only 40.5% ($f = 17/42$) of teachers reported using it “always” or “most of the time.” Additionally, 54.8% ($f = 23/42$) of respondents indicated that they use translation software either “sometimes” (33.3%) or “never” (21.4%), making it one of the least frequently used strategies. Sentence frames and cooperative learning strategies showed similarly lower frequencies of use, with 40.5% ($f = 17/42$) and 50.0% ($f = 21/42$) of teachers, respectively, reporting consistent use.

Explicit vocabulary instruction was consistently used by 47.6% (*f* = 20/42) of respondents. These findings highlight varying levels of implementation of instructional strategies, with some tools like translation software seeing lower usage despite their availability.

Table 5

Respondents Use of Instructional Strategies and Materials

Material / Strategy	Always *f* (%)	Most of the Time *f* (%)	Half the Time *f* (%)	Sometimes *f* (%)	Never *f* (%)
Realia	18 (42.9%)	15 (35.7%)	2 (4.8%)	4 (9.5%)	3 (7.1%)
Small Group Discussion	8 (19.1%)	20 (47.6%)	6 (14.3%)	6 (14.3%)	2 (4.8%)
Language Objectives	9 (21.4%)	15 (35.7%)	7 (16.7%)	8 (19.1%)	3 (7.1%)
Cooperative Learning	7 (16.7%)	14 (33.3%)	10 (23.8%)	8 (19.1%)	2 (4.8%)
Explicit Vocabulary Instruction	5 (11.9%)	15 (35.7%)	6 (14.3%)	11 (26.2%)	5 (11.9%)
Sentence Frames	6 (14.3%)	11 (26.2%)	12 (28.6%)	10 (23.8%)	3 (7.1%)
Translation Software	8 (19.1%)	9 (21.4%)	2 (4.8%)	14 (33.3%)	9 (21.4%)

Note. *n* = 42 respondents, 14 participants did not complete the instrument.

When comparing the findings, clear discrepancies emerge between teachers' awareness of instructional strategies and their actual use in the classroom. Realia, for instance, had both high levels of awareness (*f* = 30/43, 69.8%) and frequent use, with 78.6% (*f* = 33/2) of teachers reporting that they use it “always” or “most of the time.” Similarly, small group discussions were widely recognized and used regularly by 76.2% (*f* = 32/42) of respondents.

However, other strategies, such as translation software and sentence frames, show a significant gap between awareness and usage. Despite 69.8% (*f* = 30/43) of teachers reporting awareness of translation software, only 40.5% (*f* = 17/42) used it consistently, with more than half of respondents indicating they use it either “sometimes” or “never.” Sentence frames and cooperative learning followed a similar pattern, with relatively high awareness (55.8% and 67.4%, respectively), but only 40.5% and 50.0% of teachers consistently used them.

These results suggest that while SBAE teachers are generally aware of a variety of strategies to support multilingual learners (MLs), actual implementation of some of these tools remains limited.

Objective Three: Identify the portion of the respondents that possess attributes conducive to meeting the needs of MLs, identify their confidence in teaching these students compared to respondents that do not possess these attributes.

Researchers conducted an analysis of respondent data to explore factors that may influence teachers' confidence in effectively supporting multilingual learners (MLs). These factors included racial and cultural diversity, the ability to speak languages other than English, and years of teaching experience. According to the National Center for Education Statistics (2020-2021), 80% of U.S. public-school teachers are White, with many being monolingual English speakers. White, monolingual English-speaking teachers often have limited awareness of the advantages of multilingualism, the complexities of second language acquisition, and the connection between language and identity (Lucas & Villegas, 2013; Pennington et al., 2023). In our study, most respondents were White (78.6%) and monolingual English speakers (75%). Due to the relatively small sample size, no statistically significant differences were identified between White, monolingual teachers and those from other racial or linguistic backgrounds.

When comparing years of teaching experience to teachers' perceived ability to instruct different levels of ML students, no significant main effects were found, and effect sizes were small to negligible (Field, 2013). This was true for beginning ML students ($F(3,46) = 0.772$, $p = 0.516$, $\eta 2 = 0.048$), intermediate ML students ($F(3,46) = 0.734$, $p = 0.537$, $\eta 2 = 0.046$), advanced ML students ($F(3,46) = 1.576$, $p = 0.208$, $\eta 2 = 0.227$), students who no longer qualify for services ($F(3,46) = 0.325$, $p = 0.807$, $\eta 2 = 0.091$), and fluent English speakers ($F(3,46) = 0.038$, p

= 0.990, η2 = 0.048). The sample size limited the comparison of other characteristics, as most participants were White, English-speaking teachers.

Findings revealed no significant measurable characteristics with a statistically significant impact on teachers' confidence in teaching multilingual learners. Confidence levels did not vary significantly based on years of experience, race, ethnicity, or language proficiency. Due to the homogeneity of the sample, further analyses were not feasible, as there was insufficient variability in participant characteristics to conduct more comprehensive statistical tests. Consequently, the group appeared to be relatively homogeneous, restricting the scope of the analysis.

Conclusions and Recommendations

The findings of this study underscore the complexities involved in teaching multilingual learners (MLs) in agricultural education, with a focus on California's Central Region. (Lucas & Villegas, 2013; Pennington et al., 2023). This mismatch creates significant barriers to delivering effective instruction that supports both language acquisition and content mastery for MLs. If barriers cannot be addressed then adoption is inhibited (Lindner et al., 2016).

Although many teachers are aware of some instructional strategies to support multilingual learners (MLs), there is a considerable gap in the consistent application of these best practices in the classroom. Awareness alone does not translate into effective implementation, as seen in the discrepancy between teachers' familiarity with tools like translation software or scaffolding techniques and their actual usage. For instance, while a significant percentage of educators reported being aware of strategies such as sentence frames and cooperative learning, far fewer consistently incorporated these methods into their teaching. This gap highlights the need for more targeted, strategic professional development that not only introduces these

practices but also provides teachers with the resources, training, and ongoing support required to integrate them into their daily instructional routines (Clemons & Lindner, 2019; Darling-Hammond et al., 2017).

The homogeneity of the study sample revealed no statistically significant differences in teachers' confidence in teaching MLs based on race, ethnicity, or language proficiency. Additionally, years of teaching experience did not correlate with increased confidence in supporting MLs, suggesting that experience alone does not equip educators with the tools needed to meet the unique challenges these learners face. These findings highlight the need for targeted, comprehensive professional development for all teachers, regardless of background or experience. More professional development is not necessarily better; rather, it should be strategic and ongoing, tailored to educators' specific needs and contexts. Many recommended strategies align with the sheltered instruction observation protocol (SIOP), a model proven effective in supporting MLs (Echevarría et al., 2024). Schools should prioritize training teachers in the culturally responsive teaching and SIOP frameworks, ensuring they can apply its comprehensive features, such as proactively planning lessons with scaffolding and cooperative learning and integrating student cultures and linguistic backgrounds to improve student outcomes.

Recommendations for Practice

Professional development in culturally responsive teaching should be prioritized to address the gaps identified in this study. Given that many teachers are White and monolingual, it is essential to equip educators with knowledge of the benefits of multilingualism, the process of second language acquisition, and the relationship between language and identity (Gay, 2018). By fostering an understanding of these concepts, educators can better support MLs in an inclusive and validating environment.

In addition to culturally responsive teaching, educators should receive training on the effective use of translation tools, which can be an invaluable resource for bridging communication gaps in the classroom (Bavendiek, 2022; Kelly & Hou, 2022). Translation software allows students with limited English proficiency to engage with instructional content more fully. These tools can be used for real-time translation of both written and verbal instructions, ensuring that MLs can follow lessons and participate in class activities. Furthermore, studies have shown that the use of translation software, when strategically integrated into classroom activities, enhances MLs' comprehension and engagement. However, teachers need training to utilize these tools effectively and ensure that they complement rather than replace human instruction, supporting both language development and content understanding.

Equally important is the implementation of scaffolding techniques, particularly within the framework of the sheltered instruction observation protocol (SIOP) model. The SIOP model provides a structured approach to making content comprehensible for MLs while promoting their language development (Echevarría et al., 2024). This model emphasizes integrating language and content objectives, ensuring that MLs not only grasp subject matter but also improve their English proficiency. Key strategies within the SIOP model, such as comprehensible input, scaffolding, and cooperative learning, offer MLs the support they need to navigate complex material. Teachers must be trained to consistently apply these strategies, ensuring that lessons are accessible to students with varying levels of language proficiency. This requires careful lesson preparation, the use of visual aids and realia, and regular assessment of both content knowledge and language progress.

The use of the SIOP model can significantly enhance instructional effectiveness for MLs. By focusing on comprehensible input—using visuals, gestures, and modeling to explain complex concepts—teachers can ensure that even students with limited English proficiency are able to grasp the material. Scaffolding techniques, such as sentence frames or structured group work, provide additional support, allowing MLs to engage with the content at their current language level while progressively advancing their language skills. Collaborative learning, another core aspect of the SIOP model, allows MLs to practice language in authentic, meaningful ways while interacting with their peers. Research has shown that classrooms using the SIOP model see marked improvements in ML academic performance and language acquisition over time (Echevarría et al., 2024).

In support of culturally responsive teaching, schools should also focus on developing strong connections with ML students' families and communities. Building relationships with families can provide valuable insights into students' linguistic and cultural backgrounds, enabling teachers to tailor their instruction to better meet the diverse needs of their students. Schools should also prioritize the use of instructional materials that reflect students' cultural backgrounds, making learning more meaningful and relevant for MLs (Hammond, 2015). These efforts should be supported by ongoing, strategically designed professional development that enables educators to continuously refine their skills and stay informed about best practices for teaching diverse learners. Regular opportunities for coaching, peer collaboration, and access to resources will be essential for maintaining sustained success in addressing the needs of multilingual students (Darling-Hammond et al., 2017).

Schools should also focus on addressing barriers that hinder the consistent application of these instructional strategies. Teachers often face challenges such as limited time and inadequate

resources to fully implement culturally responsive teaching and SIOP strategies. Providing on-site instructional coaches or mentors, along with the necessary tools and resources, would enable teachers to more effectively integrate these strategies into their classrooms. Continuous professional development opportunities that include coaching, peer collaboration, and access to updated resources will be essential for maintaining sustained success in addressing the needs of MLs.

Recommendations for Future Research

Future research should focus on diversifying the sample population to include a broader range of educators from various racial, ethnic, and linguistic backgrounds. A more diverse sample would provide clearer insights into how teacher characteristics—such as race, ethnicity, and multilingual proficiency—affect confidence and effectiveness in teaching MLs. Additionally, longitudinal studies should be conducted to evaluate the long-term impact of professional development in culturally responsive teaching, SIOP, and related strategies on both teacher preparedness and student outcomes. These studies would help identify whether sustained professional learning interventions lead to meaningful improvements in instructional practices and the educational success of MLs.

Further research should also incorporate the perspectives of ML students themselves, as their experiences can provide critical insights into the effectiveness of current teaching practices and highlight areas for improvement. Understanding the challenges faced by MLs in agricultural education can inform the development of more tailored instructional strategies that better meet their specific needs. Additionally, future studies should explore the role of technology, such as translation apps and language learning tools, in supporting ML education (Bavendiek, 2022; Kelly & Hou, 2022). This research would help determine the most effective ways to integrate

these tools into classroom instruction and enhance both language acquisition and academic achievement for multilingual learners.

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Enhancing Instruction for Multilingual Learners in Agricultural Education: Barriers, Gateways, and Effective Pedagogical Strategies

Abstract

This study explored the professional development needs of high school agricultural educators teaching multilingual learners (MLs) in California's Central Region. It identified students' English proficiency levels, assessed effective teaching strategies, and examined the barriers educators face. The findings highlight the need for training in culturally responsive teaching and universal design for learning (UDL) strategies. Barriers such as limited teacher training and language proficiency challenges were identified, while gateways, including professional development and peer-assisted learning, were discussed as solutions.

Keywords: multilingual learners, universal design for learning, culturally responsive teaching, agricultural education, professional development

Introduction

High school agricultural educators in California's Central Region face the significant challenge of teaching subject-specific content while simultaneously supporting the language development of students classified as multilingual learners (MLs). Agricultural education, which involves specialized technical language and hands-on activities, creates additional challenges for multilingual learners (MLs) who are still developing their English proficiency. Many teachers report feeling unprepared to address these students' linguistic and academic needs (Barajas et al., 2020; Heineke & Vera, 2022), The need to address the educational disparities between MLs and their English-proficient peers has become increasingly urgent in U.S. classrooms.

As of 2020, approximately 10.3% of K-12 students were classified as MLs, a population that continues to grow (National Center for Education Statistics, 2023). Historically, these students have consistently performed lower on standardized assessments in subjects such as reading and math, with achievement gaps often exceeding 20 points compared to their English-speaking peers (NAEP, 2022). Building upon this foundation, our research focuses on high school agricultural classes in California's Central Region. By looking into these gaps and evaluating the instructional resources and practices, this study's goal was to offer practical insights into how we can improve educational outcomes for MLs across the United States.

Theoretical Framework

This study is grounded in two theoretical frameworks: Culturally responsive teaching and universal design for learning (UDL). Culturally responsive teaching emphasizes the importance of recognizing and incorporating students' cultural backgrounds to foster engagement and academic success (Gay, 2018). UDL complements culturally responsive teaching by offering a flexible instructional framework that accommodates diverse learning needs through multiple

means of engagement, representation, and expression (Burgstahler & Cory, 2008; Meyer et al., 2014). Together, these frameworks guide the study's focus on identifying effective teaching strategies that support both language development and curricular mastery for MLs in agricultural education.

Overview

Culturally responsive teaching has been identified as a crucial framework for addressing educational disparities, particularly for multilingual learners (MLs) (Gay, 2018). Culturally responsive teaching encourages educators to recognize and incorporate students' cultural and linguistic backgrounds into their lessons, thereby enhancing student engagement and academic success. Research shows that MLs benefit from culturally relevant pedagogy because it validates their cultural identities and fosters meaningful connections between their lived experiences and academic content (Hammond, 2015). In agricultural education, Culturally responsive teaching is especially effective when educators integrate examples from students' home cultures into their instruction, fostering a more inclusive learning environment (Salem et al., 2023).

While culturally responsive teaching addresses the need to honor students' diverse backgrounds, universal design for learning (UDL) offers a flexible framework for removing barriers to learning. UDL promotes creating adaptable learning environments that cater to all students by offering multiple ways of engagement and expression (Burgstahler & Cory, 2008; Meyer et al., 2014). In agricultural education, UDL can be implemented using real-world tools (realia), visual aids, and technology such as translation software, which help scaffold learning for MLs (Kelly & Hou, 2022). By integrating culturally responsive teaching and UDL, agricultural educators not only connect content to students' cultures but also ensure that instruction is

accessible and supportive of MLs' varied learning needs, promoting both content mastery and language development.

Complementing culturally responsive teaching and UDL, the sheltered instruction observation protocol (SIOP) offers a more targeted approach to language development within content instruction. The SIOP model emphasizes explicit strategies for teaching MLs, such as lesson preparation, building background knowledge, and providing comprehensible input through visuals, peer collaboration, and structured academic conversations (Echevarría et al., 2024). When agricultural educators utilize SIOP, they can further support MLs by making complex agricultural concepts accessible while simultaneously developing their language skills. SIOP, UDL, and culturally responsive teaching together provide a robust framework for addressing both the linguistic and cultural needs of MLs in agricultural education, ensuring that they can fully engage in learning and succeed academically.

Despite the demonstrated effectiveness of these instructional models, many teachers report inadequate training (Song, 2016). Fewer than 30% of teachers across the United States feel fully prepared to teach MLs (Barajas et al., 2020), and this gap in teacher preparedness is particularly concerning in specialized fields such as agricultural education, where the integration of technical vocabulary and hands-on learning necessitates additional instructional support for MLs (Hansen-Thomas et al., 2016). As the population of MLs continues to grow, particularly in areas like California’s Central Region, the need for strategic, ongoing professional development that equips teachers with the tools to address both the academic and linguistic needs of their students is more important than ever.

Effective professional learning plays a critical role in addressing these gaps (Darling-Hammond et al., 2017). High-quality professional development is characterized by its

focus on content, active learning, collaboration, and alignment with teachers' professional needs. Ongoing, collaborative professional learning communities (PLCs) allow educators to engage in reflective practices and improve their instructional strategies. In agricultural education, high-quality professional learning that integrates culturally responsive teaching, UDL, and SIOP frameworks enhance teachers' ability to meet the diverse needs of multilingual learners (MLs). These frameworks ensure that MLs receive both content-specific and language support, creating more inclusive and effective classroom environments. Through this targeted professional development, teachers are better equipped to foster academic success and inclusivity for all students, including MLs.

Objectives

This study aimed to understand the professional development needs of high school agricultural educators teaching multilingual learners (MLs) in California's Central Region. To achieve this, the study focused on four primary objectives. First, it sought to identify the English proficiency levels of students enrolled in high school agricultural classes in the region. Second, the study aimed to determine the teaching methods most recognized as effective for supporting MLs, including strategies like culturally responsive teaching and universal design for learning (UDL). Additionally, it examined the characteristics of school-based agricultural education (SBAE) teachers to understand how their backgrounds influence instructional practices. Lastly, the study aimed to identify both the barriers, such as limited teacher training and language proficiency challenges, and gateways, including professional development and peer-assisted learning, to effective instruction for MLs. Identifying and removing barriers is key to adoption of instructional innovations (Lindner et al., 2016). These objectives collectively help provide

insight into the areas where educators need additional support and training to improve outcomes for multilingual learners.

Methods

To achieve the objectives of this study, researchers employed a cross-sectional research design as described by de Vaus (2013). This design is defined by three specific criteria: it excludes elements of time or longitudinal analysis, relies on pre-existing characteristic differences rather than introducing an intervention, and utilizes groups based on these pre-existing characteristics (de Vaus, 2013). The study surveyed high school agricultural education teachers in California's Central Region, gathering data on their characteristics, their students' English proficiency levels, the instructional strategies the teachers use, and their professional development experiences. The study was approved by the Institutional Review Board (IRB) at Auburn University, ensuring ethical research practices.

The survey was distributed to the 266 high school agricultural educators in California's Central Region, with 62 responses recorded (23.31%). Due to the low response rate caution is warranted about generalizing the findings beyond the response sample (Lindner, et al., 2001; Lindner, 2002). The instrument used in this study was developed following a review of peer-reviewed research on professional development needs in school based agricultural education (SBAE) and multilingual learners (Salem et al., 2023). Participants were asked about their familiarity with and use of instructional strategies and materials, based on a series of positively worded statements derived from prior research, to assess their preparedness to meet the instructional needs of ML students across various levels. Responses were recorded using a five-point Likert scale ranging from "not aware" to "very aware" and "always use" to "never use" (Lindner & Lindner, 2024). Additionally, participants provided information about their own and

their students' characteristics, including personal details, teaching experience, and professional development history.

Prior to the instrument's launch, content and face validity were carefully evaluated (Creswell, 2014). Content validity was reviewed by SBAE faculty at Auburn University, leading to minor adjustments in wording and format. Questions were grouped together, and response choices were aligned to help with the instrument's flow. A pilot study was conducted with a comparable group of 15 SBAE teachers from California's Southern Region, who were not included in the final survey. Feedback from these participants, collected through an open comment section, resulted in slight revisions for clarity. To ensure internal consistency, Cronbach's Alpha was calculated, and the reliability coefficient ($\alpha = .88$) exceeded the minimum reliability threshold, indicating a reliable instrument (Privitera, 2017).

To promote participation, the Tailored Design Method was implemented (Dillman et al., 2014). An initial email was sent to the sample, emphasizing the study's importance and encouraging participation. This was followed by three reminder emails at seven- and ten-day intervals in response to declining participation rates (Dillman et al., 2014). The survey was distributed to 266 high school agricultural educators in California's Central Region, with 62 responses recorded (23.31%). Incomplete responses were excluded from the analysis, resulting in a final sample of 56 fully completed responses (21.05%).

Descriptive statistics were used to analyze the data, identifying trends in instructional practices, participant demographics, and the barriers and gateways to success for MLs. The results are presented in tables and charts for clarity and ease of interpretation.

Results and Discussion

Objective One: Identify the English proficiency levels of students enrolled in high school agricultural classes in California's Central Region.

Of the 56 responses to this question, fifteen respondents (26.8%) reported that 10% or fewer of their students are MLs, while seven respondents (12.5%) noted that more than half of their students are MLs. Despite this variation, MLs are present in every classroom. Additionally, over 30% of the teachers reported that more than 40% of their students are MLs, highlighting the significant presence of multilingual learners in many SBAE classrooms.

Table 1

Percent of ML Students in Agricultural Classes

Percent of MLs	*f*	%
1-10	15	26.8
11-20	14	25.00
21-30	12	21.40
31-40	6	10.70
41-50	2	3.60
51-60	1	1.80
61-70	4	7.10
71-80	2	3.60
81-90	0	0.00
91-100	0	0.00

Objective Two: Identify the teaching strategies that SBAE teachers are aware of and use for MLs, as well as the methods most recognized as effective for multilingual learners.

SBAE teachers responded to questions regarding their awareness of various instructional strategies and materials used to support multilingual learners (MLs). Awareness was measured on a five-point Likert scale ranging from "very aware" to "not at all aware" (Lindner & Lindner, 2024). Among the strategies listed, translation software garnered the highest level of awareness, with 69.8% (f = 30/43) of teachers reporting that they were either "very aware" or "aware" of its

use. Realia, which involves using tangible objects to aid instruction, was also widely recognized, with 69.8% (f = 30/43) of respondents indicating awareness.

Small group discussions were another commonly recognized strategy, with 74.4% (*f* = 32/43) of teachers reporting awareness. Other strategies, such as cooperative learning (67.4%, *f* = 29/43) and sentence frames (55.8%, *f* = 24/43), also demonstrated significant levels of awareness. Language objectives and explicit vocabulary instruction had moderate recognition among respondents, with 62.8% (*f* = 27/43) and 51.1% (*f* = 22/43) of teachers indicating awareness, respectively. These findings suggest that while many teachers are aware of instructional strategies for MLs, awareness levels vary by strategy.

Table 2

Respondents Awareness of Instructional Strategies and Materials

Material / Strategy	Very Aware *f* (%)	Aware *f* (%)	Somewhat Aware *f* (%)	Not Aware *f* (%)	Not at all Aware *f* (%)
Realia	15 (34.9%)	15 (34.9%)	5 (11.6%)	6 (14.0%)	2 (4.7%)
Small Group Discussion	19 (44.2%)	13 (30.2%)	7 (16.3%)	3 (7.0%)	0 (0.00%)
Language Objectives	9 (20.9%)	18 (41.9%)	11 (25.6%)	5 (11.6%)	0 (0.00%)
Cooperative Learning	11 (25.6%)	18 (41.9%)	9 (2.1%)	3 (7.0%)	1 (2.3%)
Explicit Vocabulary Instruction	6 (13.9%)	16 (37.2%)	12 (27.9%)	6 (14.0%)	3 (7.0%)
Sentence Frames	9 (20.9%)	15/43 (34.9%)	13 (30.2%)	5 (11.6%)	1 (2.3%)
Translation Software	20 (46.5%)	10 (23.3%)	11 (25.6%)	1 (2.3%)	1 (2.3%)

Note. *n* = 43 respondents, 13 participants did not complete the instrument.

After answering questions about awareness of instructional materials and strategies, SBAE teachers were asked about their frequency of use. Use was measured on a five-point scale ranging from "always" to "never" (Lindner & Lindner, 2024). Realia, one of the most frequently recognized strategies in Table 4, also showed high usage, with 78.6% (*f* = 33/42) of teachers

indicating they use it “always” or “most of the time.” Small group discussions were similarly popular, with 66.7% (*f* = 28/42) of teachers reporting regular use.

Despite their high awareness of translation software, only 40.5% (*f* = 17/43) of teachers reported using it “always” or “most of the time.” Sentence frames and cooperative learning strategies were also used less frequently, with 40.5% (*f* = 17/42) and 50.0% (*f* = 21/42) of respondents, respectively, using them regularly. Although more than half of the teachers (*f* = 22/43, 51.2%) reported awareness of explicit vocabulary instruction, it was consistently used by only 47.6% (*f* = 20/42) of respondents.

Table 3

Respondents Use of Instructional Strategies and Materials

Material / Strategy	**Always**	**Most of the Time**	**Half the Time**	**Sometimes**	**Never**
	f (%)	*f* (%)	*f* (%)	*f* (%)	*f* (%)
Realia	18 (42.9%)	15 (35.7%)	2 (4.8%)	4 (9.5%)	3 (7.1%)
Small Group Discussion	8 (19.1%)	20 (47.6%)	6 (14.3%)	6 (14.3%)	2 (4.8%)
Language Objectives	9 (21.4%)	15 (35.7%)	7 (16.7%)	8 (19.1%)	3 (7.1%)
Cooperative Learning	7 (16.7%)	14 (33.3%)	10 (23.8%)	8 (19.1%)	2 (4.8%)
Explicit Vocabulary Instruction	5 (11.9%)	15 (35.7%)	6 (14.3%)	11 (26.2%)	5 (11.9%)
Sentence Frames	6 (14.3%)	11 (26.2%)	12 (28.6%)	10 (23.8%)	3 (7.1%)
Translation Software	8 (19.1%)	9 (21.4%)	2 (4.8%)	14 (33.3%)	9 (21.4%)

Note. *n* = 42 respondents, 14 participants did not complete the instrument.

Connecting Awareness and Use

Together, Tables 4 and 5 highlight a gap between teachers’ awareness of instructional strategies and their actual use in the classroom. While strategies like realia and small group discussions are both highly recognized and frequently used, other tools such as translation software and sentence frames, despite being well-known, are not consistently integrated into

classroom instruction. This discrepancy suggests that while teachers are familiar with these strategies, barriers such as insufficient training or lack of resources may limit their practical application (Salem et al., 2023).

Objective Three: Understand SBAE teacher characteristics.

The personal and professional characteristics of secondary school-based agricultural education (SBAE) teachers were assessed to better understand the diversity and experience levels within the group. Respondents' teaching experience varied widely, ranging from one to 41 years, with an average of 11.8 years for the 54 participants who provided responses. The largest portion of respondents were relatively new to the profession with 35.18% (f = 19/54) having 0-5 years of experience. In terms of race, most respondents (f = 44/56, 78.57%) identified as White, while 7.14% (f = 4/56) identified as Hispanic or Latinx, 5.35% (f = 3/56) identified as multiple races, 3.57% (f = 2/56) as Asian, and 5.35% (f = 3/56) did not to answer. Regarding ethnicity, 83.93% (f = 47/56) reported not being Hispanic or Latinx. Notably, 75% (f = 42/56) of respondents spoke only English, while 21.43% (f = 12/56) reported conversational proficiency in Spanish, 1.79% (f = 1/56) was fluent in Spanish and Mien.

Table 4

Secondary SBAE Teacher Characteristics

Description	*f*	%
Years Teaching		
0-5	19	35.18
6-10	12	22.22
11-20	15	27.78
>20	8	14.81
Teacher Race		
White	44	78.57
Hispanic/Latinx	4	7.14
Multiple	3	5.35
Asian	2	3.57
Prefer not to answer	3	5.35
Teacher Ethnicity		
Not Hispanic / Latinx	47	83.93
Hispanic / Latinx	5	8.92
Prefer not to answer	4	7.14
Teacher Languages Spoken		
English Only	42	75.00
Conversational Spanish	12	21.43
Fluent Spanish	1	1.79
Conversational Mien	1	1.79

Objective Four: Identify barriers and gateways to effective instruction for MLs.

Barriers to Success

The study identified several critical barriers that impede the academic success of multilingual learners (MLs) in school-based agricultural education (SBAE). One of the most significant barriers is inadequate teacher preparation, even though SBAE teachers often participate in professional development (Eck & Edwards, 2019). Supporting teachers through comprehensive professional development and addressing job satisfaction factors are essential for ensuring their retention and effectiveness, especially in fields as demanding as agricultural education (Clemons & Lindner, 2019). Fifty-six survey respondents provided information about

the professional learning activities they had engaged in over the past five years, covering both SBAE-specific and pedagogical topics (Table 4).

In the SBAE-specific category, the highest participation was in FFA-related professional development (66.10%, $f = 37$), followed by SAE-related activities (58.93%, $f = 33$) and other technical skills relevant to SBAE (53.57%, $f = 30$). While there was moderate participation in areas such as Plant Systems/Horticulture (44.64%, $f = 25$) and Animal Science (35.71%, $f = 20$), lower engagement was noted in Environmental Sciences/Natural Resources (23.21%, $f = 13$) and emerging fields like Engineering (7.14%, $f = 4$) and Biotechnology (5.36%, $f = 3$).

In terms of pedagogical training, teachers demonstrated strong engagement with instructional practices (57.14%, $f = 32$) and classroom management (53.57%, $f = 30$). Notably, 51.79% ($f = 29$) participated in professional development aimed at meeting the needs of multilingual learners, indicating some recognition of the importance of supporting diverse student populations. However, only 41.07% ($f = 23$) received training related to supporting students with disabilities, highlighting a potential gap in addressing the full spectrum of learner needs.

Table 5

Participation in Professional Learning Last 5 Years

Professional Development Participation		*f*	%
SBAE Specific	FFA related	37	66.10
	SAE related	33	58.93
	Other tech skills related to SBAE	30	53.57
	Plant Systems/Horticulture	25	44.64
	Introduction to Agriculture	22	39.29
	Animal Science	20	35.71
	Agricultural Mechanics	19	33.93
	Environmental Sciences / Natural Resources	13	23.21
	Agribusiness	11	19.64
	Food Products	9	16.07
	Engineering	4	7.14
	Biotechnology	3	5.36
Pedagogical	Instructional practices	32	57.14
	Classroom management	30	53.57
	Meeting needs of MLs	29	51.79
	Meeting needs of students with disabilities	23	41.07

Note. $N = 56$

The complexity of agricultural content also serves as a significant barrier for MLs. SBAE covers a wide range of subjects, including plant and animal science, agricultural mechanics, and agribusiness, all of which require technical knowledge and specialized language. For MLs, learning this highly technical content while simultaneously developing English proficiency can be overwhelming. The dual task of mastering both language and content places an added burden on MLs, often leading to lower academic performance and disengagement from the material (Echevarría et al., 2024). SBAE teachers may find it challenging to balance the delivery of specialized content with the need to scaffold language learning, particularly when they have not received adequate training in how to do so. This "double burden" of learning language and content simultaneously often results in academic setbacks for MLs (Zacarian, 2023).

The issue does not seem to be the quantity of professional development but rather its relevance and focus. Much of the professional development offered to SBAE teachers focuses on technical agricultural content or student organizations like Future Farmers of America (FFA), often neglecting pedagogical frameworks such as universal design for learning (UDL), which can help address diverse learning needs. Although UDL and culturally responsive teaching strategies are essential for supporting multilingual learners, many educators face barriers in implementing these approaches due to inadequate support and training (Dacus-Hare, 2023; Salem et al., 2023). Without strategic, ongoing professional development that targets the linguistic and cultural needs of MLs, many teachers feel unprepared to meet the challenges of teaching students still developing English proficiency. Nationwide, fewer than 30% of teachers report feeling confident in their ability to instruct English learners, a concern that is especially significant in highly technical, language-intensive fields like SBAE (Barajas et al., 2020). Teachers' confidence in their abilities impacts their effectiveness in meeting all student needs (Hendrix et al., 2024), including needs of MLs. Professional development initiatives aimed at building teachers' confidence, particularly in culturally responsive and linguistically inclusive strategies, are crucial for closing the achievement gap between MLs and their peers.

Gateways to Success

Despite these challenges, several gateways emerged as promising strategies for enhancing the success of MLs in SBAE. While SBAE teachers participate in a great deal of professional development, there is a growing recognition that this training needs to be more strategic and ongoing, focusing specifically on integrating culturally responsive teaching and language acquisition strategies. Professional development programs that emphasize the use of the sheltered instruction observation protocol (SIOP) model and scaffolding techniques have been shown to

improve teacher confidence and effectiveness in supporting MLs (Song, 2016). Teachers who participated in targeted, ongoing professional development reported feeling better equipped to integrate language development with content instruction, particularly using scaffolding techniques, translation tools, and peer-assisted learning (Echevarría et al., 2024; Song, 2016). These professional development programs provide SBAE educators with structured frameworks that allow them to proactively modify their teaching methods to better support MLs, ensuring that content is accessible without sacrificing academic rigor (Darling-Hammond, 2017; Gay, 2018).

Culturally responsive teaching emerged as a key method for improving the engagement and academic performance of MLs. Teachers who incorporate students' cultural backgrounds into their lessons create a more inclusive learning environment, which fosters greater participation and a deeper understanding of the material (Gay, 2018). In SBAE, this might involve using agricultural practices from students' home countries as examples, making the content more relatable and meaningful. Teachers who apply culturally responsive teaching principles often see improved student engagement because their lessons are more relevant to students' lived experiences (Hammond, 2015).

Another effective gateway is peer-assisted learning, where MLs work alongside their English-proficient peers in collaborative settings. Teachers who utilized cooperative learning strategies, such as group projects or peer teaching, reported higher engagement and better academic outcomes for MLs (Heineke & Vera, 2022). These approaches not only help MLs develop both language and content knowledge, but they also foster a sense of community and collaboration within the classroom, mitigating the social isolation that many MLs experience in SBAE (Salem et al., 2023). By interacting with peers in low-pressure, authentic learning

environments, such as during hands-on agricultural projects, MLs are given the opportunity to practice English in context. This approach enhances both their language acquisition and their confidence in academic and technical settings (Vygotsky, 1978).

The universal design for learning (UDL) framework also emerged as an important teaching method that supports the success of MLs by promoting flexible and inclusive learning environments. However, challenges in UDL implementation persist, often linked to insufficient teacher training and support (Dacus-Hare, 2023). UDL encourages teachers to offer multiple means of engagement, representation, and expression, ensuring that students can access content in various ways that align with their individual learning styles (Burgstahler & Cory, 2008; Meyer et al., 2014). For instance, in SBAE, UDL principles might be applied by offering students options for hands-on learning, visual aids, and the use of realia to help explain technical concepts like plant and animal biology. These varied approaches enable MLs to engage with the material in ways that best suit their needs, making content more accessible and enhancing their overall learning experience.

SBAE educators can create a more inclusive and supportive environment for MLs by integrating strategic and ongoing professional development, culturally responsive teaching, peer-assisted learning, and UDL strategies. This comprehensive approach helps overcome linguistic barriers while fostering academic success and meaningful social connections. As a result, all students, including MLs, are better equipped to thrive academically and fully engage in the learning process.

Summary

This study provided insights into the professional development needs and instructional strategies required to support multilingual learners (MLs) in high school agricultural education

programs. The findings emphasize the growing diversity in California's Central Region, where a significant portion of students in agricultural classes are MLs who continue to require linguistic support, even after being redesignated as Fluent English Proficient (FEP). Despite this diversity, many teachers report feeling underprepared to meet the specific needs of these students, revealing a gap between their awareness of effective instructional strategies and their consistent application in the classroom.

Given the hands-on and technical nature of school-based agricultural education (SBAE), teachers must be equipped with the skills needed to address both the linguistic and academic needs of MLs. The survey results show that although many educators are familiar with effective strategies, such as realia and small group discussions, their consistent use remains limited. This gap highlights the need for targeted professional development that goes beyond raising awareness and focuses on building teachers' confidence and ability to apply these strategies consistently (Darling-Hammond et al., 2017).

The survey further revealed that most teachers (75%, $f = 42/56$) speak only English, with only one respondent fluent in a language other than English. This demographic profile suggests a critical need for professional development that enhances cultural competence and language acquisition strategies. Teachers who lack personal experience with learning another language may find it difficult to effectively scaffold instruction for MLs, making culturally responsive teaching and language acquisition training essential (Gay, 2018). Professional development programs should integrate these elements to help educators bridge the gap between their own backgrounds and the linguistic needs of their students.

The study also found that while strategies like peer-assisted learning and cooperative learning are recognized as effective, they remain underutilized. Only 21/43 (48.8%) teachers

surveyed reported using cooperative learning most or all of the time, even though it has been shown to support both language development and SBAE content mastery. This underuse points to a need for professional development that focuses not only on raising awareness of such strategies but also on practical, job-embedded training that allows teachers to practice and refine their use of these methods (Meyer et al., 2014).

One major barrier to effective instruction for MLs is the technical nature of agricultural subjects, which often require specialized language support. Teachers must balance the delivery of complex technical content, such as agricultural mechanics or animal science, with the need to scaffold language learning for MLs. The dual task of mastering both technical content and language can overwhelm MLs, leading to disengagement and lower academic performance (Echevarría et al., 2024; Zacarian, 2023). Teachers, in turn, face challenges in implementing differentiated strategies for these students without sufficient professional development focused on content and language integration.

Professional development programs that focus on culturally responsive teaching, UDL, and the sheltered instruction observation protocol (SIOP) model can significantly improve instructional outcomes for MLs in SBAE. When educators receive training in practical scaffolding techniques, such as using sentence frames and translation software, they are better equipped to bridge the language gap while delivering technical agricultural content. For instance, SIOP-based strategies like collaborative learning in hands-on agricultural settings enable MLs to practice English in low-pressure environments while mastering complex concepts. These methods support both language development and content mastery, ensuring MLs gain the technical skills needed for success in the agricultural field (Echevarría et al., 2024).

Darling-Hammond's (2017) research underscores the importance of ongoing coaching and collaborative professional development for sustained teacher improvement. Effective professional development should involve active learning, collaboration, and job-embedded support, such as coaching, which has been shown to improve both teacher practice and student outcomes (Darling-Hammond et al., 2017). Incorporating coaching into SBAE professional development programs would provide teachers with the continuous support necessary to apply culturally responsive teaching, UDL, and SIOP principles effectively, creating a more inclusive and supportive learning environment for MLs.

Professional development should also emphasize culturally responsive lesson planning and the creation of inclusive classroom environments. By integrating students' cultural backgrounds and prior agricultural knowledge into lessons, teachers can make learning more relevant and engaging for MLs. For example, incorporating agricultural practices from students' home countries helps make lessons more meaningful. This approach ensures that all students, regardless of language proficiency, have equitable access to high-quality agricultural education.

The study's findings indicate that while teachers are aware of many effective strategies, they require additional professional development to consistently apply them in the classroom. Ongoing, targeted professional development that incorporates culturally responsive teaching, UDL, and SIOP principles is crucial for SBAE educators to effectively support MLs. By equipping teachers with the necessary tools and strategies, educators can create inclusive learning environments that reflect the linguistic and cultural diversity of MLs, helping to close the achievement gap and ensure that all students have access to high-quality education. Future research should explore the long-term impact of such professional development on teacher preparedness and student outcomes in agricultural education programs.

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Overarching Study Conclusion

This study examines the professional development needs and instructional practices of high school agricultural educators who teach multilingual learners (MLs) in California's Central Region. Integrating quantitative data across three interconnected studies highlights critical gaps in teacher preparedness, instructional strategies, and professional development. The findings have implications for policy, theory, and practice in agricultural education, particularly as they relate to meeting the needs of an increasingly linguistically diverse student population.

Implications for Policy

The findings from this research underscore the urgent need for more targeted and sustained professional development initiatives that specifically address the challenges of teaching multilingual learners. Current professional development programs for agricultural educators are often insufficient in preparing teachers to effectively integrate language acquisition support with subject-specific content. Policymakers must prioritize the development and funding of programs that equip teachers with the skills necessary to address both the academic and linguistic needs of MLs. Such programs should be grounded in frameworks like culturally responsive teaching and universal design for learning (UDL), ensuring that all students—regardless of their language proficiency—can access and engage with agricultural education content (Gay, 2018; Meyer et al., 2014).

The research indicates a need for state-level mandates requiring ongoing professional development in linguistically responsive teaching strategies. While some states, such as California, mandate initial training for teachers to work with MLs, the lack of sustained professional development leaves many teachers ill-prepared as the needs of their classrooms evolve. Policymakers should consider implementing recurring training requirements that focus

on strategies like the sheltered instruction observation protocol (SIOP) and peer-assisted learning to ensure that teachers remain current in their ability to support MLs effectively (Echevarría et al., 2024).

Implications for Theory

This study reinforces the importance of culturally responsive teaching and andragogy as theoretical frameworks for understanding teacher development in the context of multilingual education. The integration of culturally responsive teaching into agricultural education provides a pathway for educators to connect technical content with the diverse cultural and linguistic experiences of their students. culturally responsive teaching's focus on validating and incorporating students' cultural backgrounds into instruction has shown promise in fostering engagement and academic success for MLs, aligning with the findings of this research (Gay, 2018). Future research should continue to explore the application of culturally responsive teaching in specialized fields like agricultural education, where the technical nature of the curriculum often necessitates unique pedagogical approaches.

This study also affirms the relevance of andragogy in the design of professional development programs for educators. Knowles' (1980) principles of adult learning—particularly the emphasis on problem-centered, experiential learning—offer a useful lens through which to assess the efficacy of teacher training programs. The findings suggest that professional development for agricultural educators should be highly practical, directly tied to the teachers' roles, and reflective of their experiences with MLs. Expanding research on how andragogy can be applied to professional development in other content areas could further enhance the effectiveness of teacher training across various educational settings.

Implications for Practice

For agricultural educators, this research highlights the importance of integrating both content-specific and language-support strategies into their daily instructional practices. The findings suggest that teachers who consistently use tools such as scaffolding, realia, and cooperative learning are more effective in supporting MLs' language development while ensuring that they also master technical agricultural content (Echevarría et al., 2024; Hammond, 2015). However, many teachers remain unaware of or struggle to implement these strategies consistently. To address this, schools and districts should establish opportunities for teachers to collaborate, share best practices, and receive ongoing support in implementing linguistically responsive instructional methods.

This research also calls for a shift in how teacher preparedness is assessed. School districts should develop more robust systems for evaluating teachers' competence in working with MLs, incorporating both self-assessment tools and peer observations that focus on the integration of language and content instruction. These systems should prioritize continuous improvement, providing educators with regular feedback and opportunities to refine their instructional strategies.

Avenues for Future Research

While this research provides insights into the professional development needs of agricultural educators, several areas warrant further exploration. Future research should investigate the long-term impacts of professional development programs that integrate culturally responsive teaching and andragogy on both teacher performance and student outcomes, specifically for multilingual learners (MLs). Longitudinal studies would provide valuable data on how sustained professional development influences teachers' confidence and competence in working with MLs over time.

Additionally, there is a need for research that examines the intersection of agricultural education and multilingualism in other regions of the United States. Comparative studies could provide insights into how regional differences in language diversity and agricultural practices shape the professional development needs of educators. Finally, future research should explore the specific challenges faced by MLs in accessing agricultural education content, particularly as it relates to the technical language used in this field. Investigating how various instructional strategies impact MLs' academic language acquisition in agricultural settings could lead to more targeted interventions and support mechanisms for these students.

Closing

This study contributes to the growing body of literature on multilingual education by focusing on the unique context of agricultural education. The findings highlight the critical role that culturally responsive, linguistically inclusive professional development plays in enhancing the instructional capacity of agricultural educators. By addressing the gaps identified in this study, policymakers, educators, and researchers can work together to create more inclusive, equitable learning environments for multilingual learners, ultimately improving their academic outcomes and future opportunities.

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