

# Voices from the Field: Agriculture Educators' Insights on Equity in Agricultural Education

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## Abstract

*We examined how an agricultural literacy professional development enhanced equity in seven secondary agriculture classrooms in a southeastern state. Utilizing the Equity Framework in Career and Technical Education and exploratory case study methodology, we examined the equitable barriers that seven secondary agriculture education teachers faced in their school sites and how targeted professional development may have alleviated some of those challenges. Our findings revealed that all seven teachers faced barriers in their schools from all three areas identified in the theoretical framework: educational adequacy, equal treatment, and equal educational opportunity however, the professional development helped alleviate the educational adequacy barrier. More research is needed to elicit the role of professional development programs in counteracting equity barriers.*

## Introduction

According to the EdWeek Research Center (2021), Mississippi ranks 35<sup>th</sup> in the nation in K-12 student achievement, which equates to a “C-” letter grade, similar to the national average of a “C” letter grade. For the past decade, a national nonprofit has ranked Mississippi with a priority ranking of one, which indicates that improvements need to be made in teacher salaries, student achievement, and school funding, among other things (Johnson et al., 2014; Showalter et al., 2017; Showalter et al., 2019; Showalter et al., 2023). According to EdBuild (2023), for the fiscal year 2021, the per-student base amount provided by the state was \$5,829, with the expectation that the school districts also contribute to the funding of the public schools; however, this amount is based on property values and can vary according to each district. The lack of resources that accompany Mississippi's rural schools, compounded with low educational spending, exacerbates the inequalities related to education that Career and Technical Education (CTE) teachers in Mississippi face, including the lack of adequate professional development (PD), resources, and funding (Kim et al., 2021; Showalter et al., 2023).

Over the past decade, a renewed interest in secondary CTE in the United States (Abamu, 2017; Kreamer, 2017) has spawned new policies and CTE programs (Dougherty, 2016; Kreamer & Reyna, 2018). However, CTE was originally a part of vocational education, which research indicated often limited the achievement of marginalized student populations in the past (e.g., Alexander & McDill, 1976; Oakes et al., 1992). With this history in mind, we must examine the current effects of CTE on educational equity. To this end, during a professional development (PD) program that took place in the Northeastern region of

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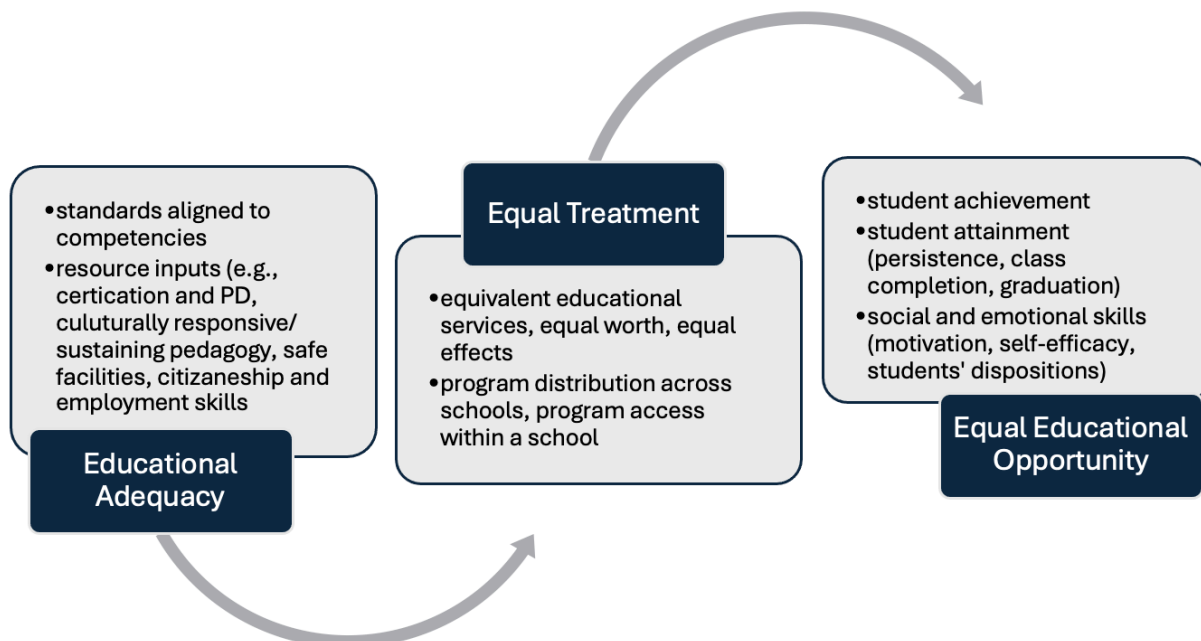
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Mississippi, we investigated CTE teachers' (N=7) perceptions of equitable adequacy, treatment, and equal opportunities at their schools focused on integrating agricultural science and literacy strategy. We examined whether the PD program impacted teachers' observations and self-perceived advocacy. Thus, our goal was to give Mississippi high school agriculture educators a voice regarding equitable adequacy, treatment, and equal opportunities within their assigned schools.

The theoretical framework undergirding our work is the equity framework for CTE (see Figure 1 below), in which we utilize a "nuanced definition of equity in conjunction with indicators for assessing equity in the field of CTE" (Kim et al., 2021, p. 361).

**Figure 1**

*Equity Framework for CTE*



This framework encompasses the definition coined by Cook-Harvey et al. (2016, p. 1): "Equitable educational practices give every student access to an education focused on meaningful learning- one that teaches the deeper learning skills contemporary society requires in ways that empower students to learn independently throughout their lives." This definition includes three overarching standards that encompass equity, described by Fiske and Ladd (2004): educational adequacy, equal treatment, and equal educational opportunity in CTE. Within each of these standards exist dimensions that all CTE programs should address. For example, the educational adequacy standard identifies two dimensions: (1) learning standards aligned to national standards, which include minimum competencies students who complete the CTE program must meet, and (2) resource inputs, which are related to certification and PD of CTE teachers, culturally responsive and sustaining pedagogy, safe facilities, and the cultivation of citizenship and employment skills. Ultimately, this framework serves as the exemplar for equity in the CTE classroom and is discussed in more detail below.

### **Educational Adequacy**

Educational adequacy ensures that all students receive the instruction they need to develop essential competencies as future citizens, ensuring their ability to compete productively in today's economy (Rebell, 2009). According to Moyer et al. (2017), CTE programs should include academic and CTE subject matter

while providing authentic opportunities and real-world experiences within a project-based format to ensure quality. Unfortunately, previous research identified few CTE programs citing state or national standards, and few studies mentioned safety or funding adequacy; instead, research focused on teacher quality (Kim et al., 2021).

CTE programs must prepare students to successfully reach their full potential to compete in today's economy via either postsecondary education or employment in labor market positions that students can acquire upon high school graduation, ensuring they can live productive lives. School districts have the means today to provide essential resources (e.g., schools, teachers, funding) to support CTE programs that can cultivate 21<sup>st</sup>-century skills. However, they must provide students access to CTE coursework, culminating in various certificates or endorsement options leading to postsecondary opportunities (Rebell, 2009).

### **Equal Treatment**

Equal treatment ensures that all students receive equivalent educational services regardless of their background. Equitable treatment, however, is often misunderstood as synonymous with identical treatment; the connotation being that the treatment offered must be the same. Though equal treatment does not need to be identical, it should be of "equal worth," which means having "equal effects" (Meuret, 2001, p. 93). For example, students with disabilities or those living in poverty may require a more significant resource allocation than upper-middle-class students with access to more significant resources since equal treatment may require unequal means to ensure equal effect (D. Stone, 2011).

We describe equal treatment in CTE program offerings using two features: program distribution across schools, and program access within a school. Across schools, equal treatment in CTE concerns the number and variety of CTE courses provided and the quality of said courses, including facilities, materials, and quality of instruction. Distribution should not be aligned with student demographic or community composition in any way. The number of CTE programs and the features of each program available should not equate with race, ethnicity, socioeconomic status, gender, etcetera. Any deviation between schools regarding CTE program offerings should only reflect the local community's needs, independent of school characteristics (Kim et al., 2021).

### **Equal Educational Opportunities**

Equal educational opportunities signify "independence of scholastic output from background variables" (Benadusi, 2001, p. 54). Equal educational opportunities (EEO) look beyond the minimal required resources, such as access to equitable school facilities, good teachers, and adequate funding, focusing on students' ability to achieve instead. These resources are vital to minimize unremitting outcome disparities noted in previous research (Saunders et al., 2017). To explain how school districts could ensure students' outcomes were independent of their background variables, Kim et al. (2021) separated these outcomes into three categories: achievement, attainment, and social and emotional skills. Achievement outcomes focus on students' academic performance documented by test scores and report card grades. Attainment outcomes focus on students' persistence, their ability to persevere and achieve various benchmarks, such as class completion, high school graduation, and postsecondary education completion. Social and emotional skills, such as motivation and self-efficacy, focus on students' dispositions that support their academic success.

These three overarching standards (i.e., educational adequacy, equal treatment, and equal educational opportunity) encompass equity CTE as defined in the equity framework.

### **Historical Overview of CTE in the United States**

Few research studies address equity in CTE programs within the United States, especially concerning those programs that serve the needs of at-risk students, including those with disabilities and those who live in poverty. However, many state accountability systems depend on CTE programs to meet the needs of at-risk students' college and career readiness, presenting an opportunity for CTE programs to reduce educational inequalities significantly. This exploration of equity is essential because we must create a system where educational opportunity and access to resources are an educational right. We must break down barriers and disrupt systematic inequality in education, which will then deepen student learning and help students thrive in the 21st century.

CTE in the United States began as vocational education, adapted from the German industrial education system (Brewer, 2009). Originally, vocational education existed to groom students for careers in agriculture and industrial trades, those not requiring a college education. The Smith-Hughes Vocational Education Act (V.E.A.), 1917, established federal funds for vocational education – Congress's first act (Alexander et al., 2014). Smith-Hughes used social efficiency, training some students for lower-level employment while providing opportunities for others to follow pathways toward leadership positions (Labaree, 1997), which led to what today is known as tracking at-risk students into low-paying jobs with few opportunities for career advancement. Educational philosopher John Dewey condemned this outcome, believing vocational education reinforced class- and race-based inequalities (Lewis & Cheng, 2006; DeFalco, 2016). Vocational education continued along this trajectory throughout most of the 20<sup>th</sup> century (Oakes et al., 1992). The V.E.A. allocated additional funding for work-study and vocational research opportunities focusing on less-capable students in the 1960s, supporting the belief that vocational coursework was a pathway for students who would not pursue college (Thompson, 1973).

In 1984 the V.E.A. was renamed the Carl D. Perkins Vocational and Technical Education Act. During the 1980s, labor market changes also created a demand for workers with a more highly developed skill set, including higher literacy and cognitive skills (Lewis & Cheng, 2006), which caused a need for changes to vocational education programs (Goodlad, 1984). Further, national concerns about an underprepared workforce led to various modifications, ensuring more opportunities for girls (Castellano et al., 2003). The Perkins Act of 1990, Perkins II, shared a new conceptualization for vocational education (Lewis & Cheng, 2006), introducing a new alignment between high school and postsecondary career options and creating CTE program models that are still in use today (J. R. Stone, 2014; Lewis & Cheng, 2006). In 1998, Perkins II was again renamed the Carl D. Perkins Career and Technical Education Act (Perkins III) to fit this changing landscape.

Unfortunately, the Perkins legislation always lacked the focus on equity necessary to ensure all students received equitable access to CTE programs, even though other federal legislation, like the No Child Left Behind Act (NCLB), represented a shift toward equity, requiring public schools to report on students' achievement by subgroup as well as overall student populations (Manna, 2010). Surprisingly, NCLB did not mention CTE programs. However, in 2015, the Every Student Succeeds Act (ESSA), NCLB's successor, incorporated college and career readiness language, including specifications that formally defined CTE as a part of a balanced education for the first time (U.S. Department of Education, 2015).

Today, Perkins V specifically incorporates language and accountability metrics for CTE and requires all states to report CTE program participation rates. More remarkably, Perkins V requires that data be broken down by subgroups, including program-level data that will allow stakeholders to detect gaps within and across CTE program distribution and access that will, in turn, support adjustment to coursework and programs. The equity implications for these potential adjustments are an exciting shift for CTE programming.

### **CTE in Mississippi Schools**

According to the Mississippi Department of Education (2024), CTE programming is widely available across the state in more than 500 schools and 15 community or junior colleges; students who enroll in CTE programming can select programming from 49 distinct areas including agriculture, food, and natural resources, health science, hospitality and tourism, and manufacturing. In the 2023-2024 school year, out of 892 high school teaching vacancies across Mississippi, there were 89 CTE vacancies (Vanderford & Van Cleve, 2024). This number is down slightly from the two previous years (102 vacancies in 2022-2023 and 101 vacancies in 2021-2022) (Vanderford & Van Cleve, 2024). According to the U.S. Department of Education Department of Career, Technical, and Adult Education (2024), in 2021-2022, the most recent year of data, there were a little over 25,000 secondary CTE students in Mississippi. The top four career clusters included health science (23.34%), agriculture, food, and natural resources (23.04%), architecture and construction (9.74%), and manufacturing (9.43%).

In the fiscal year 2022, approximately 30 curricula were revised by the Mississippi State University Research and Curriculum Unit and approved by the state board of education, to go into effect in the 2022-2023 school year (Mississippi State University Research & Curriculum Unit, 2024). These revisions included updates to CTE curriculum such as diversified agriculture-animals core, diversified agriculture-plants core, and principals of agriscience to name a few. Further, in the fiscal year 2022, Mississippi CTE high school students earned over 5,000 national certifications (Mississippi State University Research & Curriculum Unit, 2024). According to Arbuckle (2024, January 31), the state, through the Mississippi K-12 Workforce Development grant program, has allocated \$1.4 million dollars to “modernize, replace, or enhance priority sector career and technical high school programs. (p. 1). This includes agriculture programs in two schools in the state.

### **High-Quality Professional Development**

Twenty-first-century learning requires educators to deliver high-level instruction that supports comprehensive student achievement through the investigation of challenging content using research-based strategies that support a student’s ability to think critically, use complex problem-solving methods, effectively collaborate in teams, and be self-directed (Darling-Hammond et al., 2017). However, teachers need effective PD to refine their content and pedagogical knowledge to provide this instruction. Previous research indicated that PD could be instrumental in helping teachers acquire new knowledge and skills to support student achievement and develop scientific and research-based beliefs and attitudes with instructional practices, strategies, and resources. Darling-Hammond et al. (2017) completed a systematic review of 35 studies, demonstrating a link between teacher PD, teacher practices, and student achievement. As part of this review, they identified seven features of effective PD shared across the studies: the PD was (1) focused on content, (2) included active learning, (3) encouraged collaboration, (4) incorporated models of effective practice, (5) provided coaching and expert support, (6) offered feedback and reflection, and (7) was of sustained duration. This model of effective PD positively impacted instructional practice and student outcomes.

Misconceptions, particularly in science, can hamper students' abilities to make sense of content (Yates & Marek, 2014), and teacher knowledge is related to classroom outcomes (Hill & Chin, 2018). Thus, teacher PD that is intensive and content-focused can also support changes in teacher knowledge and practice, which can correct misconceptions (National Center on Education and the Economy (NCEE, 2016). NCEE's findings indicated that PD that supported professional learning included both academic year and summer learning for teachers, focused on content knowledge and methods specific to the curriculum, and included coaching by trained mentors to support learning.

### **Professional Development in Rural Mississippi Schools**

National standards (e.g., Next Generation Science Standards, Common Core State Standards in English/Language Arts, and Literacy in Technical Subjects) include expectations for students to become more proficient in reading, writing, and speaking about individual disciplines. However, the standards do not specify how to teach such practices and processes. Thus, educational systems are challenged to provide teachers with adequate resources and PD to meet the goals prescribed in the standards successfully.

This challenge is especially evident in Mississippi, where, in 2022-2023, the overall percentage of students who scored proficient or advanced on the state science test (59.4%) was considered an all-time high (Mississippi Department of Education Office of Student Assessment, 2023). Prior to 2022-2023, the percentage of proficiency (which is a proficiency level of 4 or 5 on the exam) was 55.9% in 2022 and 50.5% in 2021, respectively (Mississippi Department of Education Office of Student Assessment, 2023). Added to this challenge is the issue of rurality in the state; 79% (65 of 82 counties) of the counties in the state are classified as rural (U.S. Department of Health and Human Services, 2021). Due to geographic location and lack of resources, many of the rural schools in Mississippi lack PD opportunities for teachers, particularly ongoing, long-term PD.

### **Materials and Methods**

For this study, we chose an exploratory case study (Yin, 2014) to explore secondary agriculture teachers' thoughts on equity in their school sites. The following research questions informed this study: (1) What are secondary agriculture teachers' understandings regarding equity within their CTE program? (2) What specific barriers related to equity do secondary agriculture teachers face in their specific schools? (3) How does participation in an agricultural literacy PD program influence equity in agriculture classes?

#### **Context: The Professional Development Program**

To support more equitable CTE education for secondary agriculture in Mississippi, we developed and executed a PD program for teachers of grades 6-12 science and agricultural classes. This work was supported through a USDA/NIFA grant on professional development in agricultural literacy. The overarching objective of this program was to positively impact student outcomes related to agriculture content in classrooms by promoting research-based practices supporting the successful integration of animal science, meat science, and plant science content in rigorous, authentic ways. To create the PD program, we relied on our knowledge of high-quality PD and needs assessments from previous summer institutes that we had hosted with teachers statewide. Previous research indicated that high-quality PD focused on specific content knowledge development, aligned with teachers' pedagogical practices, involved active, collaborative learning among participants, and was extended in duration (Desimone, 2009; Lemley, Hart, et al., 2019, Lemley & Hart, 2019).

In previous summer institutes (2010-2016) led by the leadership team targeting multiple content areas and grade levels ranging from upper elementary to high school, we followed the model described by Desimone (2009). Our previous results indicated that the teachers were successful integrating the content learned in the summer institutes and academic year sessions in their curriculum because of intensive, content-focused PD, which was extended in duration and included both content-knowledge and pedagogical content knowledge development (Clary, et al., 2015; Clary, et al., 2017; Clary, et al., 2018; Lemley, Ivy, et al., 2019). Further, we found that science teachers repeatedly stated on final reflections and needs assessments that they required additional instructional support to integrate agricultural literacy into their curricula successfully.

We held this PD during the 2021-2022 school year at a very high research university in Mississippi, considered an R-1 university (American Council on Education, 2024). It was a no-cost PD for the teachers; we paid teachers a stipend to attend the PD. They received Continuing Education Units (C.E.U.s) and a box

of materials to return to their classroom. If they did not have a place to stay locally, we covered their room and board with the grant funding for the two weeks of the PD.

The PD was held at the local middle school on the university campus each day for two weeks. The animal science content followed the undergraduate program curriculum in Animal and Dairy Science and contained the following topics: 1) introduction to animal agriculture, 2) anatomy and physiology, 3) reproduction, 4) genetics, 5) nutrition, and 6) animal production with a dairy and meat lab focus. Typically, the teachers participated in lectures on the content and then hands-on learning through either laboratory investigations or field excursions to the local university farms. Further, they received plant science content across the two weeks, including a tour of the plant and soil sciences research farm. The teachers also learned about how to be teacher leaders in their grade level and school site. Finally, the teachers learned how to incorporate literacy strategies into their classrooms. Table 1 explains how we designed the PD, guided by the literature and feedback from former PD participants.

**Table 1**

*Professional Development Design*

Effective Professional Development	PD
Content Driven	Animal Science, Plant Science, and Meat Science focus.
Coherent with teacher practice	PD was related to the content they taught, and they implemented practices from the institute into their instruction in the fall and spring semesters.
Active learning	Hands-on, lab-based activities throughout PD; field trips to university farms and meat lab.
Lengthy in duration	Two-week summer PD and follow-up days in fall and spring the following year.
Disciplinary cohorts	Worked with other in-service teachers who were also Ag Ed teachers or science teachers in the state.
Unpacked discipline	PD sessions focused on agricultural science content knowledge (e.g., anatomy and physiology, reproductive physiology, genetics, nutrition) through production (e.g., dairy and meat science) for animal science; plant science content also covered in smaller segments.
Collaborated with disciplinary experts	Content taught by Animal and Dairy Sciences, Plant Science, and Meat Science experts.

(Lemley & Hart, 2019; Desimone, 2009; Draper, et al., 2010; Goldman, et al., 2016; Moje, 2008)

### Participants

We conducted this study with a subset of the PD participants (N = 12), precisely seven secondary agriculture teachers in Mississippi who were certified to teach agriculture. They taught a variety of agriculture classes depending on what school they were at. Their teaching experience ranged from one year to over 20 years in the classroom. The teachers taught in different regions of the state. All school districts were classified as rural (United States Department of Agriculture Economic Research Service, 2021). One of the teachers worked in a school district under state conservatorship (see Table 2). We utilized

convenience sampling (Merriam, 2009), indicating that the teachers were participating in the PD for this research project, and they agreed to participate in research related to the PD.

**Table 2**

*Agriculture Teacher Participants*

Pseudonym	Race	Gender	Years Teaching	Geographic Location in MS
Fred	African American	Male	4	East Central
Kevin	White	Male	5	Central
Ashley	White	Female	9	West Central
Wesley	White	Male	26	East Central
Bennett	White	Male	1	North Central
Alex	African American	Male	8	West
Walker	White	Male	1	East Central

\*Race and gender were self-identified

### Data Sources and Analysis

Data included participant application forms, a checklist on equitable practices (Great Lakes Equity Center, 2015), a questionnaire based on Kim et al. (2021) Equity Framework in CTE, pre- and post-summer institute interviews, and delayed post-interviews after the academic year. Data analysis was completed continuously, with each analysis level identifying the next step for data collection (Rubin & Rubin, 2012; Yin, 2014). We used Saldaña's (2021) recursive levels of coding, our first coding based off our research questions that we next organized into concepts related to the Equity Framework to share findings.

First, we coded individually for all agriculture teachers' understanding of equity in CTE (e.g., does equity exist at your school site; what barriers are present; how did the PD help alleviate those barriers? We then coded by using the Equity Framework in CTE (Kim et al., 2021) when completing a second level of analysis. Thus, our second level of coding, used to help us decide which teachers we wanted to select for the cases, included codes for (1) educational adequacy in CTE, (2) equal treatment in CTE, and (3) equal educational opportunity in CTE. In our analysis, we used Kim et al.'s (2021) definition for each code (see descriptions in literature review). In this second level of analysis, we conducted the first iteration of the equity framework coding individually, where we recorded data points related to the equity categories for each teacher. These codes helped us identify instances where the teachers' discussed examples/experiences related to (1) educational adequacy in CTE, (2) equal treatment in CTE, and (3) equal educational opportunity in CTE. Once we identified these instances, we were able to craft individual cases of three of our teachers to share more detailed findings for research questions two and three.

We conducted interrater reliability (Patton, 2014) checks to confirm our analysis process after coding the first teacher individually in the first round of coding, and then coded data sources from the rest



of the agriculture teachers. Through this process, we engaged in multiple types of triangulation. Specifically, we engaged in data triangulation to support trustworthiness because we used multiple types of data (e.g., interviews, documents, and questionnaires (Stahl & King, 2020). Further, we used methodological triangulation because we used more than one method of analyzing the data (e.g., individually and collaboratively). Finally, we used investigator triangulation, where multiple researchers coded individually and then we met to discuss our individual findings and come to a consensus (Stahl & King, 2020). We used within-subject analysis to compare data sources for the seven agriculture teachers. We used pseudonyms for each participant, and the university's Institutional Review Board (IRB) office approved our research.

## **Results**

To answer all three research questions, we first looked at all seven of the agriculture teachers, specifically their understandings of their own CTE programs regarding equitable practices, the barriers they specifically faced, and how the PD could help alleviate those barriers. We describe below the findings we identified across all seven teachers.

### **Equitable Classroom Practices**

Specifically, we found the data demonstrated our seven teachers viewed their teaching practices as equitable. Because of the nature of agriculture programs where the students worked closely with the teachers on classroom and laboratory learning and experimental learning (e.g., Supervised Agricultural Experiences, S.A.E.), all the teachers reported they had positive, well-developed relationships with most of their students, especially those in F.F.A. (formerly known as Future Farmers of America). In her pre-institute interview, Ashley explained, "I am a firm believer that every child should be treated fairly and made to feel like they belong." She expanded on this by explaining that she tries to make all the students feel welcome in her classroom, regardless of previous agricultural knowledge.

On the checklist, the seven teachers checked that they all "provide individual help to all students," "welcome students by name as they enter the classroom," and "acknowledge all students' comments, responses, questions, and contributions." In addition, all the teachers marked using "cooperative learning" and "team building activities to enhance and promote peer support" on the checklist. During his pre-institute interview, Alex described the team-building experiences he implemented in his classroom. He noted, "I do campus cleanups. I do flower beds. I do garden sites for the community. I do certain things like that to show leadership, and I also have all my students doing stuff like that." These opportunities allowed the students to work together and build their knowledge of plant science.

### **Expansion of Equitable Experiences and Barriers to Educational Adequacy**

Although teachers felt they used equitable practices in their classes, they all wanted to enhance equitable experiences in their agriculture classrooms. Specifically, they hoped the PD would help enhance their content knowledge, and they could, in turn, bring that information back to their students. Bennett explained, "[Because I was a Forester for ten years, I am] well versed in natural resources; I find myself somewhat lacking in the animal side of my agriculture curriculum." Wesley added, "As an agricultural science teacher, I am desperately seeking new skills and strategies to put in my teacher toolbox. The biggest benefit will be the implementation of what I learn into my classroom."

Additionally, when surveyed, all teachers expressed frustration with the lack of educational adequacy in CTE from the Mississippi Department of Education and the local districts. For example, Walker noted that the PD offered at the district level did not address agricultural education, and the state offerings "[do] not cover the typical things or issues that I face in agricultural education." Further, four of the teachers expressed frustration with the PD offered by state organizations and associations, explaining that "it is

focused on the F.F.A. side of ag[ricultural] ed[ucation] instead of the actual classroom part" (Walker), "travel [makes it restrictive]" (Fred), "it's not relevant or applicable" (Ashley), or "it's cost prohibitive" (Kevin).

### **Barriers to Equal Treatment and Equal Educational Opportunities**

Five teachers believed they faced barriers regarding equal treatment in CTE from the administration and other school faculty and staff. For example, Wesley noted that the administration and other faculty and staff viewed his class as "not as important as tested classes and only for students who aren't going to college." Alex's school "does not have a CTE director" therefore, he believed that others at school did not understand his content very well. In contrast, two teachers did not believe they faced barriers regarding equal treatment in CTE by others at their school site. Bennett noted that he could "teach as he sees fit." Walker explained that his "principal is the former ag teacher," so he thought the principal understood his content area.

Finally, three teachers (Fred, Kevin, and Walker) expressed concern about the need for equal educational opportunities in CTE regarding the possible job outlook for local agricultural jobs and training provided at their school sites. For example, Walker noted:

There are not as many agriculturally related programs at the local level, and the resources to reach these outcomes (e.g., attainment of jobs by earning credentials and experiences that position CTE students for employment in a field that supports full-time labor at a thriving wage after graduation) can be somewhat limited.

Fred reiterated this statement. He noted that it was a challenge in his area of the state to "find employers for graduating students." Kevin emphasized it further, stating that he believed this limited opportunity was because "most high school CTE programs are not accredited or recognized as legitimate training by many employers. Employers do not value these programs due to the lack of industry standards in the curriculum."

By the conclusion of the PD, at the spring follow up, all seven of the agriculture teachers expressed that their participation in the PD had increased their students' educational opportunities in the classroom because they now had abundant free resources and additional content knowledge and strategies to share with students. For example, in his delayed post survey, Wesley wrote that his students really enjoyed "[the carousel] where they write about what you know on a poster board and move around to different topics and then discuss what you know." Alex appreciated all the "hands-on" materials provided. As a result of the institute, Bennett said he has "obtained new equipment and is teaching students to think differently."

Additionally, teachers noted that this experience enhanced their educational adequacy because our PD program was one of the few high-quality agricultural educational PD offered to them. Kevin said in his delayed post-interview, "I just wanted to commend you for your efforts on the program this year, as it has been the most beneficial and content-related PD opportunity that I participated in thus far."

### **Three Teacher Cases**

Below, we discuss three participant cases that further illustrate in more detail the answers to research questions two (What specific barriers related to equity do secondary agriculture teachers face in their specific schools?) and three (How does participation in an agricultural literacy PD program influence equity in agriculture classes?). We chose these three participants as cases because they represented a variety of different contexts and had different life experiences that influenced their teaching and how and why they became secondary agriculture teachers. In these case studies, we detail how teachers perceived equity within their CTE programs, barriers they experienced related to equity, and ways the PD program may enhance equity in their agriculture classes in the future.

***Fred: Resources to Support Engaged Learning***

Fred was an African American male finishing his fourth year of teaching in a school district that the Mississippi Department of Education had taken over. He taught an Introduction to Agriculture course to 9<sup>th</sup> and 10<sup>th</sup> graders at the district's single high school. This comprehensive, traditional high school offered agriculture education courses as part of the elective options for students. His district was under state conservatorship, which meant that the governor had declared a state of emergency in the school district, and the State Board of Education assigned an interim conservator to lead the district (State of Mississippi, 2023).

Fred explained how he became a high school agriculture teacher. His dad was the agriculture teacher at the local high school for a long time. Fred said he initially did not want to be an Agriculture teacher and was "forced into the job." Before taking over, Fred noted the "agriculture class was on the decline" because the current teacher had retired, and a substitute was teaching the course. While he was hesitant to become an Agriculture teacher at first, over time, Fred felt like the "F.F.A. Motto [has] summed up [his] experiences - Learning to Do, Doing to Learn, Earning to Live, and Living to Serve" (National F.F.A. Organization, 2023). In his class, students do a lot of outside work, including landscaping and gardening.

Fred described how securing resources to complete hands-on lab investigations with his students was hard. In his PD application, Fred described how he wanted his students to engage in more hands-on learning in the classroom. He wrote,

Over the last four years, I have offered a lot of hands-on activities outside the classroom, but I also want to create the same experiences inside the classroom, including lab-based activities. This program will give me new resources for my classroom to create a new and exciting learning experience.

In his pre-interview, Fred reiterated the desire to have his students engage in lab activities. Fred's aspiration to have his classes be more educationally adequate concerning resources was something he often vocalized during the summer institute. He frequently noted how hard it was to secure lab resources in his school district and that being part of the PD allowed him to return lab experiences to his students. He said, "I do want to be able to introduce the lab part to them on the inside of the building versus the lab part on the outside of the building."

Concerning equitable treatment, Fred wrote in his application that he struggled "in balancing the needs of diverse learners" because "as an elective teacher, I have a lot of special service student [*sic*] to enroll in my class." Fred provided more details regarding many of the students as the institute continued. He explained that the "counselor thinks it [my course] is a dump group for students with behavioral problems," which frustrated him because some of the students that end up in his class do not want to be in an agriculture class.

While Fred was frustrated with the lack of supplies and how others viewed his course as a 'dumping ground' for behavior problems, he expressed hope that "the program could help him build a network of people that I can connect with to solve these problems." In his post-interview, Fred talked excitedly about the upcoming school year and noted,

I'm ready to get into the lab this year. I know my students; every year, I try to add a new aspect to the class, so this year this class we'll get the animal science layout versus the last four years, and we know the animal science labs. So, I'm ready to get into the lab.

At the end of the school year, Fred wrote in his delayed post-survey that the "tour of the meat lab" was the most beneficial part of the PD. While there, he was able to take photographs and movies of the lab, which allowed him to have another way to "introduce agriculture to his intro class." While in his post-interview, Fred noted how excited he was to implement lab activities in his classroom. In his delayed post-survey, he

indicated he only occasionally implemented hands-on laboratory learning with his students. The only lab he implemented with his students from the PD was the activity on milk spoilage.

Fred also talked about how hard it was to find employers for graduating students in his local area, which was his concern regarding equal educational opportunities in CTE. He readily admitted that he was unsure how to overcome this barrier; however, Fred was grateful for the experience because it allowed him to learn about other agriculture opportunities across the state that he could share with his students.

### ***Kevin: Meeting the Needs of My Students***

Kevin was a white male, finishing his fifth year of teaching, who taught multiple agriculture classes, including Animal Science, Plant Science, Concepts of Agriscience, and Agricultural Mechanics, to 9<sup>th</sup>-12<sup>th</sup> graders at his comprehensive, traditional high school that offered agriculture education courses as part of the elective options for students. He also was the F.F.A. sponsor. He explained that he wanted to be an Agriculture teacher because "I had several teachers, including my high school agriculture teacher, who inspired and left an impact on me, and I wanted to do the same for others." In his courses, Kevin shared that he focused on "hands-on learning and real-world application." He summed up his classes by saying, "When students finish my program, they come out here with some skills, some things they can apply in the real world."

Kevin was eager to partake in PD because he noted that "it is seldom offered in my area," so he felt like being part of it would be "a valuable use of my time and opportunity." Kevin was grateful for this opportunity because he said that most PD he could attend from a national or state organization would have to be an out-of-pocket expense for him as his district and school do not cover costs. This lack of educational adequacy was something that he viewed as one of his main challenges as an agriculture teacher.

Another challenge related to educational adequacy that Ken faced dealt with resources. He noted that his shop and classroom have "various issues (electrical, no intercom, and roof leaks) [...] outdated tools and equipment." Additionally, he said that the low amount of funds available restricted the number of items he could purchase for his agriculture mechanics shop and greenhouse. Kevin took the initiative to overcome educational adequacy barriers in the past by "self-funding events and opportunities in the areas that interest me." He also maintained an active F.F.A. chapter and hosted fundraising opportunities to raise money for additional resources and funding to keep his greenhouse and shop open. Further, he overcame facility safety barriers by maintaining them himself. For example, Kevin joined the pre-institute interview from his school shop, where he maintained all the lawnmowers the students used to help learn about small engines in his Agricultural Mechanics class.

Regarding equal treatment in CTE, Kevin said that most administrators he has worked with have "no idea or understanding of my content area." Kevin posited that while it was a good thing because "he was left alone to conduct his classroom/lab as he saw fit," he also noted that this lack of understanding left him "excluded and seldom recognized for achievements" at the school site. Kevin shared that he believed there were challenges related to achievement and attainment outcomes he and his students faced every year. Specifically, while he had his students doing lots of hands-on learning in his classes, he believed they needed more to help better prepare them for work after graduation. He noted, "Students are not allotted enough class time and training during regular school hours to prepare them for in-field employment after graduation." Unfortunately, Kevin was unsure how to overcome these barriers related to equal educational opportunity in CTE.

### ***Ashley: Constantly Learning While Teaching***

Ashley was a white female, finishing her 9<sup>th</sup> year of teaching at a comprehensive high school that offered elective agriculture education courses. She taught 9<sup>th</sup>-12<sup>th</sup> grade, and her courses include Concepts of Agriculture Science, Animal Science, Environmental Science, and Plant Science. She was also the F.F.A. sponsor. Ashley wanted to be an agriculture teacher because "teaching ag lets me combine my love of teaching, agriculture, F.F.A., and helping kids." In her courses, Ashley strove for her students to learn that agriculture was "more than just 'plows and sows'; that is so much bigger than what most of them realize." She emphasized a lot of hands-on instruction in her classes, such as welding, maintaining a greenhouse, and caring for animals. She elaborated, "We have had more dogs, puppies, and kittens that I can count come through. We get strays, clean them up, feed them, and help them find a home." Ashley said she enjoys teaching Animal Science and Veterinary Medicine material and views the animals she has had in her classroom as a "good teaching experience for the kids."

Concerning educational adequacy, Ashley needed more relevant PD opportunities in her general area. She said that most of the PD provided by the state department of education and state associations was irrelevant or applicable to her field. She commented, "[It's] wasted time because I need my time to be in my room." Additionally, she needed to be more satisfied with the minimal funds and resources provided to her as a CTE teacher. She noted that her "E.E.F. [Educational Endowment Foundation] funds must be spent by Christmas," leaving her lacking funds to buy or replace supplies.

Further, there were no additional funds for upkeep. Ashley responded, "What is that?" when asked about other funding sources. "Ours was cut to zero in 2015." Ashley was incredibly excited to participate in the PD to combat these educational adequacy issues. She appreciated the "new science activities" provided to her by the institute, which she deemed "so far the best" regarding PD offerings.

Like Kevin, Ashley felt some tension related to equal treatment in CTE at the administration level at her school site. She noted that administrators, other faculty, and staff have the "old stigma that ag 'doesn't count' or we just play in the shop." Unlike some other agriculture teachers, Ashley did not see any challenges related to equal educational opportunity—her kids can readily find jobs locally. In her application, she explained that "agriculture is all around these young people. Due to our local area, agronomy is of great interest to them."

Ashley expressed that the most valuable part of the PD was the "hands-on activities, materials, collaborating with fellow teachers, and visiting sites." She routinely integrated hands-on learning into her classroom. She could integrate many of the materials provided, such as Strawberry D.N.A. (deoxyribonucleic acid) extraction, career posters, a soils lab, and a milk spoilage lab, into her curriculum at school to give her students additional, no-cost to her experiences.

### **Discussion**

While this study offers interesting findings regarding our CTE teachers' views of equity in their classrooms and school sites, it is important to remember that the experiences expressed are those of seven CTE teachers in one state. Further, these are their experiences at one school site. Such experiences might not be the same today as they were when the study was conducted. As such, these results cannot be generalized to other CTE teachers around the state, region, or country. Regardless of the lack of generalization to the broader population of CTE teachers or the teaching population in general, this study does add to the knowledge base on the topic of equity in CTE classrooms in the United States of America.

Today's most affirmative CTE programs provide "clearly articulated pathways from high school through postsecondary education, stackable credentials that pave the way for career advancement, and work-based learning experiences" (Rosen & Molina, 2019, p. 1). Minimally, they should provide students with adequate facilities and safe environments. However, all seven teachers shared frustration with inequity in educational adequacy; minimum needs were unmet to support successful instruction and meet students'

basic competencies. For example, the teachers expressed frustration related to many PD opportunities or lack thereof for their specific areas. Further, at the PD, Kevin explained, in his opinion, that the state Department of Education and the curriculum developer for the CTE curriculum used throughout the state did not seem to "be on the same page" regarding curriculum implementation. This type of discrepancy can lead to teacher frustration and confusion regarding the direction of the curriculum, which can cause students to lose opportunities to gain credentials for the workplace. Estes and McCain (2019) noted that state leaders must set high standards for CTE programs and ensure that each program is of quality so that students who enroll can work towards an industry-recognized credential.

Some of our teacher participants also discussed a perceived lack of equitable treatment in CTE. For example, Kevin felt that the administration, faculty, and staff needed more understanding regarding agricultural education and all it involves. He explained, "In my teaching career, I have had very few administrators and colleagues understand my content area and all that it entails. This creates many challenges such as cultural stereotypes, excessive responsibilities, and lack of program support." Other teachers, such as Fred, Ashley, Alex, and Wesley, also commented on the fact that they felt like their administrators did not understand their program or area, which they believed was reflected in who was placed in their classes (Fred), or a stereotype on the content being taught/not as rigorous as tested areas (Ashley/Wesley), or there was a lack of understanding because there was not a CTE director at their school (Alex).

In Mississippi, CTE administrators are required to have CTE administrator certification (Zirkle & Jeffery, 2017; Conrad & Watkins, 2021; Mississippi State University Research & Curriculum Unit, 2022), which is required for those with a 486 endorsement (administrator, all three levels) who are hired as CTE Directors (D. Shea, personal communication, July 12, 2023). Most of our participants did not work at CTE Centers; they worked at traditional high schools with a CTE program embedded within them. As such, many of our participants believed that their administrators needed to understand the needs of their program. Previous research reflects this concern. Clark and Cole (2015) shared that this lack of understanding was deeply concerning. CTE administrators face additional challenges, such as program costs, funding, safety and liability, and industry partners' needs (Conrad & Watkins, 2021). As such, there is a need for the CTE community to decide what leadership credentials should be for those who want to lead CTE programs in the schools (Clark & Cole, 2015; Zirkle & Jeffery, 2017).

Not all agriculture programs in Mississippi are housed in CTE centers but are within traditional high schools; this may contribute to the lack of administrative understanding. Although 120 Mississippi high schools offer agricultural education programs, with over 7,000 students enrolled in agriculture, food science, and natural resource courses, which include courses in agriculture, environmental science, and technology (AEST), agriculture and natural resources, agriculture power and machinery, aquaculture, food products, forestry, horticulture, introduction to agriscience, and agriculture leadership and personal development courses (National Association of Agricultural Educators, n.d.), around 40 school districts house them within CTE centers (Mississippi State University Research & Curriculum Unit, 2023).

Mississippi's offerings mirror the national statistics as well. In the United States, traditional high schools house 83% of CTE programs, and part-time CTE centers house 43% (U.S. Department of Education, 2019). Further, research has shown that CTE may only be understood by some in the general public or by other teachers in different disciplines. In a study specific to Mississippi, Jordan et al. (2016) found that 45% of the general public surveyed (N= 403 adults) could not name a single CTE program housed in their local school district, and 55% did not realize that students in CTE could receive a college preparatory diploma upon graduation. Regarding the more than 2,000 surveyed educators (70% teachers; the rest were principals, district administrators, counselors, or librarians), 51% rated preparation for college and careers as *Average* and 33% as *Below Average* (Jordan et al., 2016). In addition, nearly 20% of the educators were *Unaware* that their district offered CTE coursework (Jordan et al., 2016).

Our teachers also stated that this lack of equal treatment extended to their students, who were sometimes stereotyped based on background characteristics, including social class and demographic groups. Fred noted that as an "electives teacher, I have a lot of special education students enrolled in my class" because it is considered vocational education and not as rigorous as academic coursework. Data from the Jordan et al. (2016) survey on CTE perceptions backs this sentiment: 91% of educators indicated that the students who would likely benefit from CTE were "at risk," and 97% indicated that those who were going to work after graduation, as opposed to college, would benefit the most from CTE coursework. Twelve percent of the educators noted that college-bound students were *Slightly* or *Not at All Likely* to benefit from CTE coursework in high school (Jordan et al., 2016). Similarly, 44% of the general public surveyed noted that CTE coursework benefited disadvantaged students, such as those with low grades, low socioeconomic status (S.E.S.), or who were not college-bound (Jordan et al., 2016).

Our teachers discussed equal educational opportunities beyond equivalent school environments, per pupil funding, and teacher quality, focusing on attainment and achievement. All shared that they felt there was inequitable access to resources, which negatively impacted their ability to provide the quality program they wanted for their students. Additionally, our teachers said this lack of resources compromised their students' ability to attain various certification benchmarks. Estes and McCain (2019) posited that state leadership needs to provide funding to create high-quality CTE programs. According to our teachers, social-emotional skills, including students' dispositions that support academic success, were evident from high-quality CTE programming. Thus, noncognitive competencies known as soft skills, which employers highly value, were supported through their CTE program to a certain extent.

Finally, our teachers all agreed that the PD program helped alleviate their educational adequacy barrier. They noted, in particular, that this PD contained relevant information they could use in their classroom, which differed from the typical offerings they received from their schools, districts, or even some professional organizations and associations. As CTE teachers prepare many students to enter careers and the workforce upon graduation, they must receive relevant training that encompasses their standards, curriculum, and teaching methods (Dobbins & Camp, 2000; Figland et al., 2019). Research indicated that agricultural teachers often sought PD related to their field (Easterly & Myers, 2017); however, some of our teacher participants (Kevin, Ashley, Alex, Wesley) reported that they were funneled to non-agricultural training opportunities that might not meet their needs in their local district; CTE teachers need PD opportunities that are tailored to their specific disciplines (Kerna, 2012). Further, our PD program supplied them with resources to take back and use in their classroom settings. In a region where the average starting salary of an agricultural education teacher is \$40,870 (National Association of Agricultural Educators, 2020), and coupled with the low amount teachers receive from the Education Enhancement Fund Procurement Card Program to use to purchase classroom supplies, many of our Mississippi agricultural education teachers (Wesley, Ashley, Kevin, Fred) faced barriers when it came to funding their classrooms. For example, Kevin noted that he has a meager vocational budget for his agriculture mechanics and greenhouse. Lack of funding for resources is a common concern from teachers across the country; a lack of materials and resources can allow teachers to do their jobs correctly (Kaufhold et al., 2006; Myers et al., 2005).

Research indicates high-quality teachers make the difference in the successful implementation of CTE programs (e.g., Castellano et al., 2007; Gentry et al., 2011), but there are not enough CTE teachers to meet needs (Conchas & Clark, 2002; Kantrov, 2017), especially teachers who can successfully integrate academic content with CTE, a key component of high-quality programs (Godron, 2009; Snyder et al., 2009). Professional development is paramount because many CTE teachers come from industry backgrounds and go through alternative licensing programs (Kerlin, 2002) that often do not include training to support the needs of diverse students, including those with special needs (Casale-Giannola, 2012). The Strengthening Career and Technical Education for the 21<sup>st</sup> Century Act (Perkins V) mandates CTE teachers

participate in "high-quality, ongoing and classroom-focused" PD that will prepare them adequately to integrate rigorous academic skills into their curricula (Sturko & Gregson, 2009, p. 34). However, our teachers indicated they had few opportunities to do so.

### Recommendations

Of the three overarching standards that encompass equity within the CTE equity framework (Kim et al., 2021), our teachers acknowledged that there were barriers they faced with all the standards in the equity framework. As such, we offer some recommended actions that might help alleviate some of the barriers discussed by our teachers.

First, the need for more opportunities for high-quality PD points toward a barrier to educational adequacy for CTE teachers. Our teachers also reported that they faced a barrier to equal treatment compared to their non-CTE colleagues, but this professional development program only appeared to counteract adequacy barriers. Our research implied that more funded programs focusing on agricultural education were needed to alleviate educational adequacy barriers for CTE teachers. We encourage agricultural education teacher educators and others involved in agricultural education to apply for federal or state funding to be able to offer content rich PD for CTE teachers. Providing the teachers with a stipend for their time also allows them to put that money back into their classroom if needed. The equal treatment barrier encountered by CTE teachers is more complex since the organization of agriculture education programs varies between schools and likely contributes to administrative misunderstandings. One suggested recommendation to help overcome this barrier is for school district CTE offices to provide training/professional development to administrators who have CTE programs housed at their schools. If those administrators who are not housed at CTE Centers, but who have CTE programs in their schools had a better understanding of the programs, requirements, and needs to sustain a quality program at their school site, perhaps the CTE teachers might feel like they are more understood by administration.

Further, the teachers discussed barriers to equal educational opportunities; the PD that was offered was able to provide a short term solution to this issue—more resources to use in class during the school year—but a long-term solution to this issue, specifically focused on providing more training for the students in their courses before getting certified in a given field, was not able to be solved for the CTE teachers. A possible long-term solution to this issue could be revising high school programs of study to provide more hands-on training for the students who are working towards certification in CTE areas. A short-term solution could be provided through PD where CTE teachers leave the training with classroom sets of materials that they can use in their classrooms. Undoubtedly further research is needed around equity issues in CTE classrooms, particularly to elicit the role of professional development programs in counteracting equity barriers.

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