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Professional Development Needs of Alternatively Credentialed Ohio CTE Teachers

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Abstract

Career and technical education (CTE) teachers who enter the profession through alternative licensure pathways arrive with strong occupational expertise but limited pedagogical preparation. Considerable focus is placed on their needs when they enter the classroom, but very little attention is given during the years that follow. This study examined the professional development needs of experienced, alternatively credentialed CTE teachers after initial licensure, treating them as dual professionals who must maintain both instructional skill and occupational currency. Using a qualitative descriptive survey, responses were gathered from 60 teachers across 23 districts in a single state, with a response rate of 49.1%. Respondents represented a wide range of subject areas and averaged nearly 14 years of teaching experience. Responses were interpreted through four interdependent domains: pedagogical responsiveness, technical and occupational currency, contextual fit, and implementation capacity. Teachers reported ongoing concerns about student motivation, differentiation, and support for learners with varied needs, alongside newer demands tied to artificial intelligence and student mental health. Technical skills were maintained primarily through self-initiated, workplace-based activity. Relevance to their own classrooms motivated participation more than additional pay, with time cited as the most common barrier. Findings indicate that professional development for this population should be specific to CTE settings, treat occupational updating as professional learning, and promote the conditions that let teachers implement what they learn.

Keywords: professional development, career and technical education, alternative licensure, experienced teachers

Introduction

Career and technical education (CTE) is a subset of general education designed to prepare students for postsecondary education and for direct entry into skilled occupations. Teachers in CTE programs are expected to build instructional expertise while keeping their technical and occupational knowledge current (Zirkle et al., 2024). A welding instructor, a practical-nursing teacher, or a business teacher must plan lessons, manage a classroom and/or laboratory, assess

authentic performance, and differentiate instruction for diverse learners while remaining connected to the standards and practices of the occupation. When a teacher's instructional skill or occupational knowledge falls below standard, students receive instruction of lower quality.

Career and technical education teachers who are alternatively credentialed represent a distinct population within an already specialized workforce. Rather than entering through a traditional undergraduate teacher-preparation pathway, they are recruited directly from industry for their occupational expertise and generally complete their pedagogical preparation while teaching (Zirkle, 2018). Many, therefore, begin with strong content knowledge but limited preparation in classroom management, instructional design, assessment, differentiation, and support strategies for varied learners. Because the pathway commonly requires several years of documented occupational experience, many of these teachers are second-career adults who bring established professional identities and an orientation toward experience-based learning. Their professional development (PD) needs may differ in topic, format, relevance, and implementation support from the needs of traditionally prepared teachers who lack industry experience.

Professional development is the primary mechanism through which schools and systems address educator needs. This study defines PD as structured professional learning that changes teacher practice and improves student learning outcomes (Darling-Hammond et al., 2017). Understood this way, PD is more than workshop attendance or a compliance requirement and gives the study a consistent standard for judging the professional learning that CTE teachers report.

Changes in teacher beliefs and practice develop gradually and depend on sustained support (Guskey, 2002). Professional development systems do not always provide learning that matches what teachers need. The OECD's Teaching and Learning International Survey (TALIS) found that most teachers participated in PD, yet many reported that the available offerings were not relevant to their work and that participation was constrained by barriers such as scheduling, cost, and limited employer support (OECD, 2019). High participation alongside low relevance indicates a problem of fit; PD is available, but it does not match the work these teachers do. This mismatch is likely sharper for CTE teachers, whose classrooms, laboratories, shops, clinical placements, student organizations, credentialing demands, and work-based learning responsibilities differ substantially from general academic settings.

Existing CTE literature offers limited guidance for alternatively credentialed CTE teachers, even though well-aligned PD is clearly relevant to them. Much of the foundational work on their PD needs concentrates on the transition into teaching. Far less is known about the post-licensure period: the challenges these teachers face once they are established, and the design of PD that would help them sustain instructional effectiveness and stay current with industry norms (Ruhland & Bremer, 2002). Recent scholarship calls for more research on who these teachers are, how they are prepared, and what support they need to remain effective (Anglum et al., 2023; Zirkle, 2025). This study addresses that gap by examining the post-licensure needs of experienced, alternatively credentialed CTE teachers who must maintain both their instructional effectiveness and technical skills.

The purpose of this study was to determine the professional development needs of alternatively credentialed Ohio CTE teachers after they complete initial licensure, with attention to the pedagogical, technical, contextual, and implementation conditions that shape usable professional learning. Four research questions guided the study:

1. What teaching challenges do alternatively credentialed CTE teachers identify in their current classroom, laboratory, or program setting?
2. What professional development needs do CTE teachers report in relation to student behavior, differentiation, assessment, pedagogy, and technical instruction?
3. What professional learning formats, implementation supports, and participation incentives do teachers perceive as most useful?
4. What barriers limit participation in professional development, and how do alternatively credentialed CTE teachers maintain technical and occupational currency?

The Current Study

This study focused on program completers of a university-based alternative licensure pathway for CTE teachers. These teachers completed a state-mandated teacher education sequence while teaching in CTE classrooms and laboratories in the state of Ohio. Because they have finished initial licensure and now work to maintain both instructional and technical expertise, their perspectives demonstrate what practicing CTE teachers need after formal preparation ends. The study examined how alternatively credentialed CTE teachers described their continuing professional learning needs as established practitioners. The study did not evaluate the licensure program, program compliance, or program completion.

Conceptual Framework: CTE Teachers as Dual Professionals

The conceptual framework for this study views CTE teachers as dual professionals whose effectiveness depends on maintaining pedagogical and occupational expertise at the same time (Zirkle et al., 2024). Because PD for this population serves two developmental trajectories, any assessment of that PD must account for both. It must support teachers as they improve instruction and as they stay current with the tools, standards, credentials, and expectations of their industries. The framework draws on two theoretical anchors that serve different purposes. First, Darling-Hammond et al. (2017) supply an evaluative standard for judging the quality of the learning experiences teachers describe. Consistent with Desimone's (2009) framework, they emphasize content focus, active learning, collaboration, models of effective practice, coaching and expert support, feedback and reflection, and sustained duration. Second, Knowles et al.'s (2015) theory of andragogy explains why particular PD designs matter for alternatively credentialed CTE teachers. Adult learners tend to be self-directed, draw on prior experience, prefer learning tied to their immediate roles, and value problem-centered application. These assumptions apply directly to second-career CTE teachers, whose occupational experience is central to their professional identity. Professional development that treats them as generic novices overlooks their industry knowledge and offers little immediate relevance to their classrooms and laboratories, and such PD rarely engages them or changes their practice.

For this study, these anchors define what we call CTE-responsive PD: structured professional learning aligned with the distinctive responsibilities of CTE teachers, including pedagogy, the maintenance of technical skills, laboratory and classroom instruction, student support, and implementation within particular program contexts. Four interdependent domains emerge from these two anchors and align with this definition. First, pedagogical responsiveness refers to teachers' needs for classroom and laboratory management, student engagement, differentiation, assessment, instructional design, and support for diverse learners. Second, technical and occupational currency refers to the need to remain up to date with industry tools, technologies, credentials, safety practices, and workplace expectations. Third, contextual fit refers to the extent to which PD applies to CTE classrooms, laboratories, shops, clinical spaces, student organizations, work-based learning, and credentialing requirements. Fourth, implementation capacity refers to the supports teachers need, including time, funding, substitute teacher coverage, materials, administrator backing, peer collaboration, coaching, and follow-up, in order to apply what they have learned. These domains are codependent. Technical updating without pedagogy may not improve instruction. Strong pedagogical PD may be ignored if it does not fit CTE settings. Relevant well-matched PD can stall when teachers lack the time, coverage, or resources to apply it.

Literature Review

Professional Development

Research on teacher PD generally agrees that its value rests on whether it changes practice and improves student learning (Darling-Hammond et al., 2017). Desimone (2009) argued that PD research should rest on a common framework built from core features: content focus, active learning, coherence, sustained duration, and collective participation. Guskey (2002) added that teachers' beliefs and practices tend to change after they see evidence of improved student results, so effective PD is iterative and depends on ongoing support and feedback. The literature converges on one point: the value of PD depends on how well it fits the teachers it serves. Generic programming serves specialized populations poorly. The TALIS 2018 survey bears this out, reporting that although most teachers took part in whatever PD was available to them, roughly 38% said no relevant PD existed for their work (OECD, 2019). If broadly designed PD misses the mark for teachers in general, it will likely miss by a greater margin for a population as distinctive as alternatively credentialed CTE teachers, whose content, settings, and career paths differ sharply from those of traditionally prepared academic teachers. What matters in practice, then, is usability: whether teachers can apply PD within the occupational and instructional settings where they work.

Experienced Teachers

No single, agreed-upon definition of an experienced teacher has emerged from the literature. The most common proxy is years in the classroom, but the cutoff varies widely, from roughly three years to ten. Career-stage research suggests that experience is better understood as a developmental condition than as a count of years. Huberman (1989) recognized that teachers move through identifiable career phases, moving from early-career survival and discovery to

stabilization and later to experimentation and reassessment, with each phase marked by different professional preoccupations. Day and Gu (2007) found that years of service is not a linear indicator of teacher effectiveness, that expertise accrues unevenly, and that commitment and effectiveness are shaped by shifting professional, personal, and workplace conditions throughout a career.

Viewing teacher experience as an accumulation of phases and conditions, not a tally of years, supports two distinctions. The first is that experience is not the same as traditional training. A teacher can be highly experienced in the classroom yet have arrived there by a nontraditional route, as alternatively credentialed CTE teachers do. The second is that the respondents in this study are best treated as experienced practitioners, not novices. They had completed initial licensure and were teaching well past the induction period. Their PD needs extend beyond entry-level concerns about surviving the first years and include refinement-level concerns about sustaining, extending, and adapting established practice. Seen this way, the pressing problem is how to support these teachers after formal preparation ends, not how to bring them into teaching in the first place.

Alternatively Credentialed CTE Teachers

Alternatively credentialed CTE teachers occupy a distinctive position defined by how they enter the profession. Across CTE fields, alternative routes to licensure are a leading route into teaching, primarily because the occupational expertise these programs demand resides in industry rather than in undergraduate teacher preparation (Jacques & Potemski, 2014; Zirkle, 2018). These pathways recruit individuals because of their industry experience and then develop their pedagogical capacity on the job, in areas such as classroom management, instructional design, and assessment. Recent work underscores both the importance of these pathways and the need for more systemic research on CTE teachers' characteristics, preparation, and support needs. Comparative analyses of CTE teacher preparation reinforce the industry-based route as a defining feature of the field (Anglum et al., 2023; Ferand et al., 2025; Zirkle et al., 2024).

The licensure pathway relevant to this study required a 24-semester-hour program delivered through an approved university within the state of Ohio. The pathway began with an intensive summer experience before the first year of teaching and continued through mentoring, on-site observation, coursework, and performance-based assessment. Coursework addressed teaching methods, curriculum and assessment, work-based learning, educational technology, and the foundations of CTE and workforce development. Candidates completed a culminating observation and a teaching portfolio. After licensure, responsibility for ongoing professional learning shifted to teachers and their respective districts through individualized professional development planning. That post-licensure stage is the focus of this study because it is the stage in which continued pedagogical growth and technical updating must be sustained outside the initial preparation structure.

CTE-Specific Professional Development Needs

Consistent with the conceptual framework, the PD needs of CTE teachers are reviewed across four interrelated domains: pedagogical responsiveness, technical and occupational currency, contextual fit, and implementation capacity.

Pedagogical responsiveness. Pedagogical responsiveness is the domain most directly implicated by the alternative-credentialing pathway because alternatively credentialed CTE teachers enter with occupational expertise but often need continued support in translating that expertise into instruction. Ruhland and Bremer (2002) found that novice CTE teachers reported needs in curriculum development, instructional strategies, classroom and laboratory management, and support for students in special populations. Broader needs-assessment work has similarly identified teaching students to think critically and creatively, motivating students, assessment, laboratory organization, classroom management, and support for students with learning disabilities (Cannon et al., 2012). It is also worth noting that while teachers may prefer PD that is coherent, content-focused, and collaborative, preferences do not always fully align with evidence-based recommendations, particularly around sustained duration, which research identifies as essential (Ehlert & Souvignier, 2024). For CTE teachers, then, PD should be both contextually relevant and grounded in evidence. A session that feels useful in the moment can still produce little change if it offers no follow-up, modeling, coaching, or opportunities for practice.

Much of the foundational CTE needs-assessment literature predates the post-pandemic shift, in both students and conditions, that has broadened the pedagogical demands CTE teachers now face. Pandemic-related learning disruption, rising youth mental-health needs, and the rapid spread of generative artificial intelligence have raised the stakes for engagement, differentiation, assessment integrity, and student support (Cotton et al., 2024; Kuhfeld et al., 2022; Racine et al., 2021). While these issues are not unique to CTE, they do reach CTE classrooms and laboratories in specific ways, shaping how teachers manage student attention, design authentic assessments, support struggling learners, and uphold expectations in performance-based settings.

Technical and occupational currency. Unlike general-education teachers, whose subject matter is relatively stable, CTE teachers are responsible for content that industry continually redefines through new tools, technologies, standards, and credentials. Occupational knowledge, therefore, carries a shelf-life in which maintenance becomes a continuing obligation rather than a one-time qualification. This is what makes CTE teachers dual professionals. They are expected to sustain up-to-date knowledge of tools, technologies, standards, credentials, and workplace practices in their fields (Schmidt, 2019; Zirkle et al., 2024). For teachers recruited from industry, being current in their respective field is also a matter of credibility, since their importance to students rests partly on a continuing connection to the occupation.

By their nature, the activities required to maintain technical and occupational currency are occupation-specific and workplace-based rather than generic. Andersson and Köpsén (2018) examined how 886 vocational teachers kept pace with changing knowledge demands and technological developments, framing their ongoing work as the necessary maintenance of industry currency by CTE teachers. They also found that participation was uneven, varying by vocational area and geographic region, which indicates that opportunities to stay current are neither uniformly available nor uniformly undertaken. These findings are not limited to one

national system. In a multiple-case study of Australian vocational teachers, Schmidt (2019) argued that the policies and practices shaping PD need more consistent, grounded, and sustained approaches to maintaining vocational teachers' industry currency. Jacques and Potemski (2014) likewise identified PD as an underdeveloped lever in CTE teacher human-capital policy. Each of these findings suggest that technical currency may often be informal, self-initiated, and weakly recognized by district PD systems. A CTE teacher may attend trade shows, renew industry certifications, consult with employers, work summers in industry, or learn new equipment independently, yet these activities may not be supported with time, funding, or formal credit. A PD system that supports pedagogy but leaves occupational updating to individual teachers therefore addresses only half of what the dual-professional role requires.

Contextual fit. Contextual fit assesses whether PD translates into the particular settings in which CTE teachers work. Effective PD changes practice when it is content-focused and coherent with teachers' curriculum and working conditions (Darling-Hammond et al., 2017; Desimone, 2009). For CTE teachers, that means PD must account for laboratories, shops, clinical spaces, credentialing requirements, safety practices, equipment, advisory committees, student organizations, and work-based learning. Professional development that includes active learning and collaboration can still fall short when its examples, tools, and strategies fail to transfer to CTE settings.

Both general and CTE-specific research support the importance of contextual fit. TALIS 2018 showed that teachers consider PD most effective when it builds on prior knowledge and supports application in their own classrooms (OECD, 2019). Ferand et al. (2025) found that PD needs among Virginia CTE teachers varied by certification pathway, which indicates CTE teachers are not a uniform group and that generic programming is unlikely to meet their needs. What CTE teachers need are instructional strategies adapted to performance-based learning environments and genuine, industry-connected opportunities to update their occupational knowledge through authentic experiences.

Implementation capacity. Professional development that is pedagogically responsive, technically current, and well fitted to the CTE context can still fail to change practice when the enabling conditions are missing, among them time, funding, substitute teacher coverage, administrative support, peer collaboration, coaching, and follow-up. Darling-Hammond et al. (2017) identify coaching, expert support, feedback, reflection, and sustained duration as defining features of effective PD. Guskey’s (2002) model takes this a step further and suggests that new practices take hold only when teachers have opportunities to try them, observe their effects on student learning, and receive continued support.

Barriers to implementation can restrict the transfer of PD into practice. TALIS 2018 identified schedule conflicts, cost, family obligations, lack of incentives, and limited employer support as common obstacles to participation (OECD, 2019). A CTE program's structure can compound these barriers. Releasing a teacher from a laboratory or clinical course may require a substitute teacher who holds the appropriate technical knowledge or license, and many programs must also protect contact hours, clinical hours, credentialing timelines, or safety requirements. As previously noted, Andersson and Köpsén (2018) found that even teachers who were deeply

committed to their occupation and their students took part unevenly, affected by institutional and situational conditions. The most relevant technical PD may therefore sit off-site, with employers, industry associations, or credentialing bodies, well beyond the school district. Each of these conditions raise the costs of participation and may push technical updating onto teachers' personal time.

Method

This qualitative descriptive study utilized an online survey facilitated by Qualtrics, a cloud-based software widely used for academic research. The survey was distributed to 122 CTE teachers in 23 school districts in central, southeast, and southwest Ohio during March and April 2026. Prospective study participants were recruited via email from a purposive sample of CTE teachers who completed an alternative licensure program from The Ohio State University from 2005-2025. Individual contact information (emails) was located through school website searches and outreach to district offices requesting contact information. Requests to complete the survey were sent twice, initially, and then again 10-12 days later to nonrespondents. No additional requests were sent after the reminder.

Instrumentation

The survey contained 14 questions and included demographic queries (name ID, CTE subject(s) taught, years of teaching experience, educational preparation) and 10 open-ended questions focused on the perceptions of individual professional development needs. The survey was constructed and guided by previous work from Darling-Hammond et al. (2017), Ehlert and Souvignier (2024) and Cannon et al. (2012). The survey was face validated by a panel of university faculty and school district administrators, who made suggestions that were integrated into the survey. The survey and study procedures were submitted to The Ohio State University Institutional Review Board (IRB), which approved the study in February, 2026.

Data Analysis

Open-ended responses were analyzed using a deductive qualitative content analysis, with four conceptual-framework domains serving as a priori categories: pedagogical responsiveness, technical and occupational currency, contextual fit, and implementation capacity. Inductive subcodes were developed within each domain to identify recurring topics (e.g., student motivation, mental health, AI). Each item's response was read in full by two independent reviewers, divided into meaning units, and assigned one or more codes, followed by a joint review of reflexive memos and verbatim quotations to finalize the analysis.

Results

From the 122 teachers identified as the purposive sample for the study, 60 teachers responded and completed the study, for a response rate of 49.1%. Thirty-nine teachers responded to the initial survey request, while 21 teachers responded after the reminder.

Respondent Demographics

Study respondents came from a wide variety of CTE subject areas. Traditional CTE subjects such as automotive technology, business, cosmetology, and culinary arts were well-represented. Newer technologies, reflecting CTE's focus on technological change, were also very evident; engineering technology and multi-skilled allied health technologies were reflective of this trend. The top five subject areas were as follows (number of teacher respondents in the subject area is in parentheses):

- Multi-skilled health/allied health (10)
- Culinary arts (6)
- Cosmetology (5)
- Business (5)
- Engineering technology (5)

The range in years of teaching experience was from 5 to 26 years, with 12 teachers reporting 20 or more years of experience. The mean teaching experience was 13.81 years, and the median was 12 years..

The educational preparation of the responding teachers was also varied. In addition to the five years of occupational experience, alternatively credentialed CTE teachers in Ohio must have a minimum of a high school diploma, and the addition of a degree (associate's, bachelor's, and/or master's) in the occupational area can reduce the occupational work experience to as few as two years. Thirteen teachers (22%) reported a high school diploma as their level of educational attainment, along with the requisite 24 semester hours of university teacher education coursework. Four teachers (seven percent) reported holding an associate's degree, while nine (15%) listed a bachelor's degree. Thirty-four teacher respondents held a master's degree (56%).

Professional Development Needs

In addition to the four demographic questions (name ID, CTE subject(s) taught, years of teaching experience, educational preparation), the 10 open-ended questions targeting CTE teacher professional development needs formed the core of the study. All 60 respondents provided at least some form of response to all of the questions, and several teachers offered highly detailed responses to specific questions. Summarized results of the responses are provided for each of the 10 survey questions, with notable quotes provided where merited.

What teaching challenges are you currently facing in your classroom/lab?

Career and technical education teachers cited three distinct challenges. First, many students lack the motivation and focus needed to perform well in the classroom and lab. This was a theme cited by 17 (28.3%) of the respondents. A dental assisting teacher captured this sentiment: "Students have a lack of motivation to support their learning," while an automotive technology teacher noted his "Students (not) wanting to learn, complete assignments and do homework".

The second stated challenge involved students entering CTE programs with significant learning needs and the lack of support provided to meet those needs, especially for special needs learners on Individualized Education Plans (IEPs) and English language learners (ELL). This population of students was mentioned in 14 of the 60 responses (23.3%) and was best described by a medical assisting teacher who stated “The challenges that I am facing are the lack of support for students who are ESL and IEP. I have had to do a lot of modification.” More than one CTE teacher noted the “higher numbers of students on IEPs”.

The third challenge, albeit closely related to the first two – is the diversity of student capabilities, including less motivated students paired with academically talented and highly motivated students in one CTE program. Mentioned by 10 respondents (17%), comments related to this challenge included one from a health occupations teacher, “We are blessed to have great students, but we need to somehow balance the gap between our high achievers and our IEP students.” Another health occupations teacher echoed this by stating, “Meeting the needs of students that have autism. Those are the students that I struggle with because the only thing that I've seen success with is individual instruction - which is impossible to give 100% during class time.” In addition to these comments, several other CTE teachers noted the lack of math skills in their CTE students, including an electrical trades teacher who said, “Most of my challenges come from severely underdeveloped math skills. In the world of skilled trades, math skills are an everyday requirement, so this reality makes teaching the basics extremely difficult.”

What student behavior management techniques would you like to learn more about?

Responses to this question highlighted two behavior-related issues. The first, perhaps related to the initial question regarding teaching challenges, revolved around the need to develop new and better ways to motivate disengaged students. Comments were fairly brief and included “Keeping students engaged during a three-hour block schedule” (landscape teacher), and “I would like to learn more about interesting ways to continue to keep students engaged and motivated” (allied health teacher).

The second behavioral issue centered on mental health concerns. Several CTE teachers mentioned struggling with “managing the mental health of students” (culinary teacher) and “troubleshooting mental health” (hospitality teacher). Other CTE teachers mentioned behaviors potentially tied to mental health, including needing to know how to “deescalate upset students” (engineering technology teacher), struggling with students who are “overly defiant” (marketing teacher) and “what to do with "reactive" students, when there are students that seem to explode with minimal causality” (health sciences teacher).

On a positive note, several teachers stated they did not experience behavior issues in their classes/labs. Comments such as “I really don't experience any behavioral problems” (carpentry teacher), “I generally do not have issues with behavior” (emergency management technician teacher) and “I am fortunate that my students are well behaved and I don't have any issue here.” (interactive media teacher) were also voiced by CTE teachers less concerned with this area.

How comfortable are you differentiating instruction for diverse learners?

Despite many CTE teachers noting the diversity of students in their programs, almost all of the respondents (54 of 60, or 90%) felt at least some level of comfort and proficiency with differentiating instruction. This was best summed up by a career connections teacher who said, "I feel confident now with the number of extensions I have for advanced learners and also amended content (thanks to AI) for the level of reading materials and quiz questions for those who need extra support." A common sentiment was shared by a natural resources teacher who stated, "I feel like I do a pretty good job reaching out to all learning types." Those CTE teachers who voiced concern were mostly focused on their challenges with differentiating instruction for English language learners and those with other special learning needs.

What assessment methods would you like to explore or improve?

This question resulted in the widest range of responses, as there was not one assessment method or strategy that was frequently named. Formative assessment methods were mentioned by five teachers (eight percent), with one business teacher commenting "I would like to continue improving formative assessment strategies that allow me to check for understanding in real time and adjust instruction accordingly." Several teachers responded "unsure," "unknown" and "NA". The remaining responses were quite diverse with no specific method standing out, and included such options as AI assessment tools, student self-assessment, portfolio assessment, rubrics for skill-based assessment and having guest assessors participate in the classroom and lab.

Which pedagogical areas do you feel need more professional development support?

Although this question sparked a number of different responses, it also illustrated CTE teachers' uncertainty around artificial intelligence (AI). The topic of AI came up in eight (13%) of the responses. An early childhood education teacher noted the two aspects of AI that impact CTE classrooms and labs, stating "Ethical AI Integration - I don't just want to know how to catch AI cheating; I want pedagogical training on how to integrate AI tools into my curriculum to teach students to be able to use AI appropriately". An information technology (IT) teacher noted, "I want to use AI to develop and plan curriculum".

The remainder of the responses reflect the diversity of needs in this area. The wide variety of areas included inquiry and project-based learning, student engagement, social-emotional learning, working with diverse learners, and keeping up with technological change, an area highlighted by an IT teacher who said, "Because I teach IT, I need continuous professional development in new technological advances pertaining to IT. Technology is constantly changing."

Do you prefer learning independently or in collaborative groups?

Responses to this question somewhat depended on the context, i.e., what type of learning was taking place, and the subject matter being explored. The CTE teachers were about evenly split – some liked to learn independently, while others stated an interest in collaborative learning. Twenty of the CTE teachers stated a preference for independent learning, while 18 stated they

preferred to learn in a group setting. However, many of the respondents also stated their inclination depended on the situation. For example, a dental assisting teacher commented "Both, I feel it is situational. There are times, I can learn on my own with my own research, and other times it is better to be with coworkers and learn from their experiences." A multi-skilled health teacher said "I like both for different reasons. Independent learning lets me focus on the areas most important to my goals. Collaborative groups let me see different perspectives that I would not have thought of." This situational context was very common throughout the responses, even among the CTE teachers who indicated a preference for either independent study or with collaborative groups and was perhaps best articulated by a cosmetology teacher who said "Both, depending on time. I enjoy collaborative groups, but I have done a lot of independent learning to make learning fit into to my life".

What support would help you implement new ideas that you obtained through professional development?

The theme of providing time to implement new ideas was a prominent theme in response to this question. In addition, the ability to implement new ideas with the help of a mentor and with administrative support also came through the responses of the CTE teachers. Simply put, a digital design teacher said "I generally need time to prepare to implement and try out new things." while an engineering technology teacher commented "Having a little extra time (maybe part of the PD time) to reflect on and plan around professional development would be beneficial." Mentoring and administrative support came through comments such as "Having a mentor - someone I can call who has the knowledge of what I am trying to implement and the ability to help me or guide me along the process." (marketing teacher), "Building support from the principal" (marketing teacher) and perhaps more pointedly "Just having administration that lets you incorporate ideas without micromanaging." (hospitality instructor)

What motivates (or would motivate) you most to participate in professional development?

"Meaningful professional development" voiced by an automotive technology teacher encapsulated the views of many of the CTE teachers in response to this question. While two CTE teachers out of the 60 respondents mentioned additional compensation (pay) as a motivator, 53 (88%) desired professional development that was applicable and of specific use in their teaching. Their comments were remarkably similar and included "It needs to be relevant to what I am teaching, and it needs to be developmental for me so that I am able to teach my students." (information technology teacher), "Professional development that is relevant, practical, and directly connected to my classroom and participants motivates me the most" (business teacher), and "I am most motivated to participate in professional development when I can see a clear benefit for my students' learning outcomes, such as offering them an industry recognized credential, or feeling better equipped to teach them new information." (engineering technology teacher).

How do you keep your technical skills up to date?

Career and technical education teachers often struggle with keeping their technical skills up to date as technological change impacts their programs in a myriad of ways. Perhaps as a result of this, the ways in which CTE teachers keep their skills up to date are also varied. Twelve CTE teachers cited working in the field during the summers or in their free time when not teaching, while the following other strategies were specifically listed as ways they keep their technical skills at the forefront of their teaching:

- Industry sponsored training (5)
- Working closely with their advisory committee (4)
- Attending professional conferences (4)
- Vendor websites, social media, YouTube (4)
- Obtaining additional certifications in their occupational field (3)
- College/university courses for credit or continuing education units (CEUs) (3)
- Reading professional journals and magazines (3)

What barriers prevent you from attending professional development?

The response to this question can be summed up in one word: time. Thirty-seven of the 60 respondents (61.6%) indicated time, or more accurately, the lack of it, was the biggest barrier to their attendance and participation in professional development activities. A pharmacy/multi-skilled health teacher responded "Time! Time! Time! Who has time?", which was a common sentiment expressed by a majority of the teachers. Teachers also expressed their challenges with being able to get away from their teaching responsibilities and how their absence affects their students' progress. An interactive media teacher stated this conundrum "It's hard to leave my students. They tend not to be productive when I'm absent. Subs are never knowledgeable about my content area, so they only serve to be the adult in the room." In addition to the time factor, funding to attend professional development was listed as a barrier by five teachers (eight percent), who simply stated "lack of funding" as their response.

Discussion

This study sought to determine the professional development needs of alternatively credentialed CTE teachers in the state of Ohio. Results of the study revealed a diverse set of respondents, who are teaching a variety of CTE subjects, from historically traditional ones such as cosmetology, carpentry, culinary and hospitality, business and marketing, as well as more recent and "hi-tech" subjects like engineering technology, digital design and pharmacy. There was also diversity within the range of years of teaching experience, with 12 teachers (20% of respondents) reporting 20 or more years of experience. This data point is intriguing in light of the fact that the population of alternatively credentialed CTE teachers in Ohio must have five years of occupational work experience to qualify for the initial license and thus are older than teachers prepared through a traditional, university-based degree program. Lastly, the majority of the CTE teachers (34 of 60 or 56%) reported having earned a master's degree. This may indicate this group is keenly interested in their own personal and professional growth.

Results support the study's conceptualization of CTE teachers as dual professionals who must simultaneously develop their pedagogical practice and maintain current occupational expertise.

Respondents reported persistent pedagogical challenges related to student engagement, classroom behavior, differentiation, assessment, and support for diverse learners, while also remaining responsible for keeping pace with changes in the industries and occupations associated with their respective fields. The usefulness of PD depended further on whether it applied to CTE instructional settings and whether teachers had the time, resources, and organizational support required to participate and implement what they had learned. The recorded responses are therefore best interpreted through the four interdependent domains of pedagogical responsiveness, technical and occupational currency, contextual fit, and implementation capacity.

Pedagogical Responsiveness

The teaching challenges these experienced teachers identified were overwhelmingly pedagogical, with student motivation and engagement cited by 28.3% of respondents as persistent instructional concerns. This topic appeared again when teachers were asked directly about acquiring behavior management techniques. Several respondents cited the need to develop practical ways to sustain student engagement or re-engage students who had withdrawn from classroom or laboratory activities. Despite 90% of respondents reporting comfort with differentiating instruction, nearly a quarter of respondents (23.3%) also cited the challenges of serving students with significant learning needs, including those on Individualized Education Plans and English language learners, while 17% named balancing wide ranges of ability and motivation within a single classroom. This contradiction reveals that self-reported comfort should not be viewed as evidence the need has been met; rather it suggests that teachers could benefit from targeted PD for this population. These concerns are consistent with earlier CTE research identifying student motivation, classroom management, and laboratory management as continuing areas of need (Cannon et al., 2012; Ruhland & Bremer, 2002). The fact that these same needs also arise among respondents with over a decade in the classroom indicates that these issues should be viewed as topics for continued PD rather than concerns resolved by time.

Results also call out pedagogical demands outside of existing literature. Student mental health has become a prominent theme in the behavior management response, as was the recurring uncertainty around artificial intelligence (AI). Respondents cited student mental health concerns relating to anxiety, defiance, and emotional escalation. These responses reflect a post-pandemic classroom in which engagement, differentiation, assessment integrity, and student support have become increasingly demanding (Cotton et al., 2024; Kuhfeld et al., 2022; Racine et al., 2021). Because teachers may be expected to manage these behaviors without preparation or authority to address their underlying causes, PD should support recognition, de-escalation, safe classroom management, and appropriate referrals beyond disciplinary measures, especially concerning areas where escalation creates an immediate safety risk. AI was the most frequently identified pedagogical support topic, identifying AI as a tool which should be taught rather than policed. Respondents asked for help with student misuse, curriculum planning, instructional preparation, differentiation, and workplace applications. These teachers requested pedagogical training on integrating AI tools into instruction and curriculum planning, recognizing issues surrounding privacy, safety, and licensing. Because acceptable AI use varies by occupation, PD should

connect AI to authentic occupational expectations rather than treat it only as a general classroom technology issue (Cotton et al., 2024).

Technical and Occupational Currency

Findings from this study support the concept of CTE teachers as dual professionals who must maintain both instructional and occupational expertise. Respondents reported using summer employment, industry-sponsored training, advisory committee participation, conferences, certifications, college coursework, and trade publications as ways to stay current in their respective fields, with most occurring outside the district's PD system, which is consistent with prior research on vocational teachers' occupational learning (Andersson & Köpsén, 2018; Schmidt, 2019). This suggests that teachers may complete substantial technical training without receiving release time, financial assistance, PD credit, or recognition within district development plans. District PD that addresses instructional practice without supporting occupational renewal does not fully account for the demands of CTE teaching, a finding consistent with concerns that PD remains underused in CTE teacher workforce policy (Jacques & Potemski, 2014).

Findings from this study illustrate why pedagogical and technical learning cannot be considered interchangeable; updating a teacher's industry knowledge does not necessarily improve the teaching of that knowledge, and likewise strong instructional practice cannot indefinitely offset outdated occupational content. Therefore, CTE-responsive PD must provide opportunities to update technical knowledge and to translate that knowledge into curriculum, assessment, and student performance tasks.

Contextual Fit and Motivation

Relevance was a salient factor influencing teachers' participation in PD. Nearly 90% of respondents identified practical application to their teaching, subject areas, or students as their primary motivation for attending PD, whereas only two respondents identified additional compensation. For CTE teachers, practices developed for conventional classrooms may require substantial adaptation for laboratories, shops, clinical spaces, extended instructional blocks, work-based learning placements, or courses governed by industry credentialing requirements. Preferences for relevant PD are consistent with research showing teachers value PD that is built upon prior knowledge and is directly applicable to their settings, especially when it accounts for variation across CTE fields rather than treating all of CTE as a monolith (Ferand et al., 2025; OECD, 2019).

Additional findings concerning andragogy, preferred learning formats, and access are mixed. Results show that alternatively credentialed CTE teachers enter education with strong occupational knowledge and are therefore likely to evaluate PD according to its usefulness for an immediate problem of practice and its relationship to what they already know (Knowles et al., 2015). Responses concerning preference of learning delivery formats showed a relatively even split between independent learning methods and collaborative learning, with several respondents indicating that their preference depended on content, purpose, and time available. This suggests that independent formats may be most appropriate for individualized goals or procedural content,

whereas collaborative formats may be more useful when teachers need guided practice, feedback, or access to colleagues with relevant expertise. Flexibility in available PD has potential to improve access; however, it likely does not replace the desire for meaningful PD. Because effective PD generally includes opportunities for practice, feedback, collaboration, coherence, and ongoing support, the flexibility of self-paced resources may not be able to adequately prepare teachers to adapt new knowledge to their programs or apply it with students (Darling-Hammond et al., 2017; Desimone, 2009).

Implementation Capacity

Relevant, current, and well-fitted PD can still fail to change practice when teachers lack the conditions needed to participate, apply what they've learned, and evaluate its effectiveness. Results from this study echoed this concept. Time was the most frequently reported barrier (61.6%), whereas only eight percent cited funding, a finding that aligned with prior research (OECD, 2019). Respondents also described capacity constraints specific to CTE. Releasing a CTE teacher for external training may interrupt labs, clinical, or technical instruction because substitute teachers often lack the occupational expertise necessary to continue the work. Programs with limited staffing may only have one person qualified to operate equipment or assess technical performance. Release time for CTE teachers therefore must account for staffing limitations, required contact hours, equipment use, and external credentialing expectations (Andersson & Köpsén, 2018).

Respondents named enabling conditions that serve as a counter to these barriers. When describing what would help them implement new ideas, many respondents identified time to prepare and reflect as a priority, as well as mentoring and administrative support. This included administrators who permit teachers to try new approaches without micromanagement. These priorities directly align with the features identified in research as being key to effective PD, such as coaching, expert support, feedback, reflection, and sustained duration, especially when teachers are given the opportunity to test an approach, observe its effect, and receive continued support (Darling-Hammond et al., 2017; Guskey, 2002).

Implications and Recommendations

Findings from this study have implications for those who design PD, the school districts and administrators who authorize and support PD, the licensure programs and policymakers who shape the CTE teaching workforce, and the researchers who study it. The four domains that organize the results of the study are interdependent upon one another. They are intended to address the combination of instructional need, occupational currency, contextual fit, and implementation capacity reported by the respondents.

Professional Development Design

Teachers in this study were nearly unanimous in support of PD that is relevant, practical, and directly usable in their own classrooms and laboratories, and they were somewhat indifferent to compensation as a motivator. The clearest implication for those who design and deliver PD is

that generic PD programming is unlikely to be well received or influence practice in a meaningful way. For alternatively credentialed CTE teachers, PD should be designed with structure that research identifies as central to changing practice; this includes a clear content focus, active learning, coaching and expert support, feedback and reflection, and sustained duration (Darling-Hammond et al., 2017; Desimone, 2009). Professional development designers should draw on the occupational expertise of these teachers to ensure learning is oriented toward immediate, problem-centered applications (Knowles et al., 2015).

Professional development should also reflect the specific needs cited by the teachers. Sessions on motivating disengaged students, differentiating instruction for ELL students and those with disabilities, and responding to student mental health should be prioritized. Uncertainty expressed by respondents around AI integration and assessment integrity is an opportunity for PD providers to frame this need as building instructional capacity (Cotton et al., 2024). Teachers described their preference for independent and collaborative learning as situational. Designers and providers of PD should therefore recognize the appropriateness of each format for the tasks at hand and offer flexible formats that allow teachers to move between modes rather than offering a one-size-fits-all delivery model.

Districts and Administrators

The most relevant finding from this study for school districts and their administrators is the need to address the conditions which allow teachers to participate in PD and act upon what was learned. Certain policy-mandated training and regulations are unavoidable, and many of these can be addressed through self-guided modules. In the CTE context, however, time remains an overwhelming barrier that is compounded by a lack of qualified substitute teachers to fill in for CTE teachers who must fulfill occupational training obligations during the workday. Districts should treat protected time as a precondition for effective PD by building planning and reflection time into the PD itself. Districts need to develop coverage arrangements so participation does not come at a direct cost to students. In practice this can include scheduled PD during targeted periods, shared regional substitute teachers with relevant backgrounds, and extended-day options with compensation. These recommendations are grounded in the evidence that new practices find traction only when teachers have opportunities to implement them with fidelity (Guskey, 2002).

Administrators are encouraged to have a firm understanding of the operational requirements of each CTE program they oversee. Administrators unfamiliar with technical instruction could underestimate the time required to change equipment-based lessons, revise performance assessments, coordinate with employers, or prepare students for an industry credential. Further, mentoring is recommended to continue beyond initial licensure when teachers are adopting a new instructional method, technology, assessment, or standard. The role of a mentor extends far beyond the initial survival phase of a new teacher and can play a pivotal role in assisting a teacher in adopting new industry equipment or implementing new standards from an employer or technical trainer. Taking this a step further, districts should recognize technical updating as legitimate professional learning. Working in industry, renewing occupational credentials, attending manufacturer training, participating in advisory committees, and attending industry conferences all contribute to the maintenance of technical skills expected of a CTE teacher.

Recognition could include PD credit, financial support, release time, reimbursement for credentials, or documentation with the teacher's PD plan.

Licensure Programs and Policy

Findings from this study also have implications for the licensure programs and the broader policy environment. The needs reported by teachers in this study span pedagogical demands and continuous technical currency and provide a strong rationale for extending support beyond obtaining an initial license. Universities, districts, educational service organizations, industry associations, and employers may all benefit from stronger post-licensure partnerships. A university program could maintain an alumni network, offer advanced modules based on recurring needs, connect graduates with mentors, or help districts identify patterns across program completers. Employers and industry organizations could provide access to current equipment, practices, and credentials, while districts could connect that technical learning to curriculum and instructional planning. This aligns with recent calls to understand and support CTE teachers as a distinct workforce with distinct preparation and ongoing needs (Anglum et al., 2023; Jacques & Potemski, 2014).

Policy should allow occupational learning to count within formal teacher-development systems when it is relevant to the teacher's assignment and accompanied by appropriate documentation. Participation in an industry activity, however, does not automatically improve teaching. Policies and local procedures should encourage teachers to connect occupational updating to curriculum, assessment, laboratory practice, or student credential preparation. This would preserve the duality between technical exposure and professional learning that changes instruction.

Research

This study provides several implications for research. Interpretation and generalizability of the findings from this study are constrained due to limitations of the design of this study, which drew on a single-state sample, relied on self-reporting, and used open-ended items. While these features offer an exploratory foundation for future research, they limit the extent to which the results can be generalized beyond this population. A multi-state, longitudinal study would clarify whether the post-licensure needs identified here generalize across systems and how they change over a CTE teacher's career. Comparative studies examining alternatively and traditionally credentialed CTE teachers could help distinguish which needs are specific to the alternative pathway compared with those common to the field. The apparent gap between the teachers' reported comfort with differentiation and their simultaneous requests for help with specific learner populations deserves further research, ideally using methods that observe practice rather than an over-reliance on self-assessment. Finally, because technical currency appeared to be so informally maintained, research that examines how CTE teachers actually keep pace with their industries, and how institutional conditions enable or restrict that work, would address one of the least understood aspects of this dual professional role.

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Beyond Technical Expertise: Professional Development Needs of Secondary Family and Consumer Sciences Teachers

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Abstract

The purpose of this study was to identify the teaching and learning professional development (PD) needs of secondary Family and Consumer Sciences (FCS) teachers in Idaho. Guided by Danielson's *Enhancing Professional Practice* (2007), Shulman's (2005) signature pedagogies framework, and Borich's (1980) *Needs Assessment Model*, a descriptive survey assessed teachers' perceived importance and competence across 22 teaching and learning competencies. The survey was distributed to 306 secondary CTE teachers, with 35 FCS responses received and 32 usable responses included in the analysis. *Mean Weighted Discrepancy Scores* (MWDS) were calculated to identify and rank perceived PD priorities. The highest-ranked needs included teaching students to think critically and creatively, integrating current advances in technology into the curriculum, teaching problem-solving and decision-making skills, planning cognitively engaging activities and assignments, and managing student behavior. Although respondents reported relatively high perceived competence in teaching technical skills and concepts within their CTE content areas, several of the largest discrepancies occurred in pedagogical competencies. These findings suggest that participating FCS teachers perceived greater PD needs in how they facilitate student learning than in technical content instruction alone. The findings provide direction for developing targeted, discipline-specific professional learning while highlighting the importance of continued research examining pedagogical development needs among FCS educators.

Keywords: Family and Consumer Sciences, professional development, teaching and learning, Career and Technical Education, needs assessment, Borich Model

Introduction

Career and Technical Education (CTE) plays a vital role in preparing students with the academic, technical, and employability skills needed for success in secondary education and an increasingly complex workforce. The quality of CTE programs depends substantially on the educators responsible for translating technical and occupational knowledge into meaningful learning experiences, and in fact, the Association for Career and Technical Education (ACTE, 2024) identifies effective instruction as a foundational component of high-quality CTE programs. Supporting this view, Conrad and Watkins (2021) argued that the effectiveness of CTE programs depends largely on the quality of the teachers and administrators responsible for delivering them. Effective CTE teaching therefore requires both technical expertise and the pedagogical capacity to engage students, develop higher-order thinking and problem-solving skills, assess learning, and connect instruction to authentic career contexts.

Professional development (PD) provides an effective strategy for strengthening instructional competence, supporting teacher growth, and improving student learning outcomes (Darling-Hammond et al., 2017; Desimone, 2009). Effective PD is sustained, content-focused, collaborative, and aligned with teachers' instructional responsibilities, enabling educators to refine their instructional practices while remaining current with industry standards, emerging technologies, and workforce expectations (Darling-Hammond et al., 2017; Desimone, 2009; Guskey, 2002). For CTE teachers, professional learning may therefore need to address both technical currency and the pedagogical demands of applied instruction.

The need for sustained, discipline-specific PD is particularly evident within FCS, a major discipline within CTE. FCS teachers deliver instruction across diverse content areas, including culinary arts, nutrition, child development, fashion, interior design, financial literacy, and hospitality, while also managing laboratory environments, supervising career and technical student organizations, coordinating work-based learning experiences, and maintaining alignment with industry standards (Arnett-Hartwick, 2020; Ropski et al., 2024). Because of these diverse responsibilities, teaching in FCS has been characterized as both demanding and time-intensive (Ropski et al., 2024). Consequently, FCS educators require ongoing PD that strengthens discipline-specific content knowledge while enhancing evidence-based instructional practices to effectively prepare students for college, careers, and lifelong success. The breadth of these responsibilities raises an important question regarding whether FCS teachers' greatest professional learning needs involve maintaining technical expertise or strengthening the pedagogical practices through which that expertise is taught.

Although PD is widely recognized as essential for improving teaching effectiveness, limited research has specifically examined the teaching and learning PD needs of secondary FCS teachers using a systematic needs assessment approach. Previous research has identified PD needs among CTE and FCS teachers, including needs associated with instructional practice, content knowledge, program management, and changing workforce expectations (Arnett-Hartwick, 2020; Cannon et al., 2012; Kitchel et al., 2010; Ropski et al., 2024). However, less is known about the specific teaching and learning competencies for which secondary FCS teachers perceive the greatest discrepancies between importance and their own competence. This distinction is important because competencies teachers perceive as highly important may not necessarily represent their greatest PD needs when they also perceive themselves as highly

competent in those areas. Conversely, competencies characterized by high perceived importance and lower perceived competence may represent more salient priorities for professional learning.

Systematically examining these discrepancies can provide a more precise understanding of FCS teachers' perceived PD priorities and help determine whether those priorities are concentrated primarily in technical content or in the pedagogical practices through which technical content is taught. Such evidence can inform professional learning within FCS while contributing to a broader understanding of teacher development needs within CTE. Accordingly, the purpose of this study was to identify the perceived PD needs related to teaching and learning competencies of secondary FCS teachers in Idaho.

Review of Literature

Teaching and Learning in Family and Consumer Sciences

Teaching and learning are central to effective CTE programs and represent a primary focus of teacher PD. For secondary FCS educators, effective instruction requires not only strong pedagogical knowledge but also the ability to integrate technical content, laboratory instruction, career preparation, and evidence-based teaching practices. This combination of pedagogical and technical responsibilities distinguishes CTE instruction from many traditional academic settings and creates professional learning needs associated with both what teachers teach and how they facilitate learning. Examining these dimensions provides a foundation for understanding the PD priorities of FCS teachers.

Within CTE, effective teaching extends beyond content delivery by integrating academic knowledge, technical skills, and authentic workplace experiences that prepare students for successful transitions to postsecondary education and careers (ACTE, 2024; Conrad & Watkins, 2021). Consequently, CTE educators must possess strong instructional knowledge and the ability to create meaningful learning experiences that connect classroom instruction with real-world applications. Unlike many traditional academic classrooms, FCS instruction frequently combines classroom learning with laboratory experiences, work-based learning, career exploration, and authentic performance assessments. These applied instructional contexts require teachers to translate technical knowledge into learning experiences through which students can practice, apply, and demonstrate knowledge and skills. Thus, technical expertise alone may be insufficient for effective FCS instruction without the pedagogical knowledge necessary to facilitate learning within applied and career-connected contexts.

Instructional competency encompasses the pedagogical knowledge and skills necessary for effective teaching, including the ability to design engaging instruction, facilitate learning, assess student performance, and adapt instruction to meet the needs of diverse learners (Darling-Hammond et al., 2017). Within FCS education, teachers deliver instruction across multiple program areas, including parenting, interior design, culinary arts, and fashion, while also facilitating work-based learning experiences, maintaining alignment with workforce standards, procuring instructional materials and laboratory supplies, managing laboratory environments, and supervising career and technical student organizations. The breadth and diversity of these

instructional responsibilities present unique challenges for FCS educators (Arnett-Hartwick, 2020). These responsibilities require two related forms of expertise: technical competence within FCS content areas and pedagogical competence in designing and facilitating effective learning experiences. Professional development priorities may therefore differ depending on the extent to which teachers perceive discrepancies between the importance of particular competencies and their competence in performing them.

Professional Development in CTE and FCS

Professional development is most likely to support instructional improvement when it is sustained, collaborative, content-focused, and aligned with teachers' identified instructional needs (Darling-Hammond et al., 2017; Desimone, 2009). Alignment with teacher needs is particularly important within CTE because educators must maintain both occupationally relevant technical knowledge and the pedagogical competence required to teach that knowledge effectively.

Professional development designed for general education teachers does not always address the specialized instructional responsibilities of CTE educators (Ropski et al., 2024). Unlike many traditional classroom teachers, CTE educators are responsible for integrating technical content, laboratory instruction, career preparation, work-based learning, industry standards, and career and technical student organizations into their instructional programs. Consequently, the professional learning needs of CTE teachers often differ substantially from those of teachers in traditional academic disciplines. Lange (2020) noted that the diverse educational backgrounds, industry experiences, and certification pathways common among CTE teachers make it difficult for generalized PD to adequately address their instructional needs. These differences suggest that CTE PD must account for both the technical demands of individual occupational fields and the pedagogical practices through which students develop and apply occupational knowledge and skills. For FCS educators, identifying which of these competencies represent the greatest perceived discrepancies can provide a more precise basis for prioritizing professional learning.

Although many FCS teachers prefer accessible, school-based PD opportunities (Arnett, 2026), the content of these experiences is often determined by administrators rather than the teachers who participate in them (Erwin, 2018). Research has demonstrated that teachers and administrators frequently differ in their perceptions of PD priorities, suggesting that professional learning may not always address the instructional competencies teachers view as most important (Cannon et al., 2010; Kitchel et al., 2009). These differences demonstrate the importance of systematically assessing teachers' own perceptions of professional learning needs rather than assuming that externally identified priorities correspond with the competencies teachers perceive as most important for their development.

Collectively, the literature suggests that professional learning for FCS teachers must respond to two interconnected demands: maintaining competence across diverse technical content areas and developing the pedagogical capacity to translate that expertise into effective learning experiences (Arnett-Hartwick, 2020; Darling-Hammond et al., 2017; Lange, 2020). However, identifying these broad demands does not establish which specific competencies teachers perceive as their

greatest priorities for continued development. A systematic needs assessment can address this distinction by examining the discrepancy between the importance teachers assign to individual competencies and their perceived competence in performing them.

Previous research has identified PD needs among FCS teachers related to instructional practice, content knowledge, and emerging workforce expectations (Arnett, 2026; Arnett-Hartwick, 2020; Ropski et al., 2024). Although these studies have identified broad PD priorities, less is known about the specific teaching and learning competencies for which FCS educators perceive the greatest discrepancies between importance and competence. In particular, existing research provides limited evidence regarding whether teachers' highest perceived development priorities are concentrated in technical content competencies or in the pedagogical practices through which technical content is taught. Examining these discrepancies can provide a more precise understanding of where participating FCS teachers perceive the greatest need for continued professional learning and provide an empirical basis for prioritizing PD within the distinctive instructional context of FCS education. This distinction also provides a foundation for examining whether FCS teachers' perceived professional learning priorities center primarily on maintaining technical expertise or strengthening the pedagogical practices through which technical knowledge is translated into student learning.

Conceptual Framework

Effective PD should reflect both the instructional characteristics of a discipline and the professional learning needs of its teachers. Within CTE, FCS integrates technical content, laboratory instruction, career preparation, work-based learning, and authentic learning experiences that distinguish its instructional practice from other educational disciplines. Accordingly, this study is conceptually informed by Danielson's (2007) framework, Shulman's (2005) signature pedagogies, and methodologically guided by Borich's (1980) Needs Assessment Model. Danielson's (2007) framework served as a guide for clustering the teachers' responsibilities into identifiable domains. Shulman's (2005) signature pedagogies framework provides a lens for understanding the discipline-specific nature of FCS instruction, while Borich's (1980) needs assessment model provided a systematic approach for identifying and prioritizing teachers' PD needs. Together, they provide complementary perspectives for examining the study's central problem: Danielson's (2007) framework informed the development of the survey items in the *Idaho Career and Technical Education Professional Development Needs Assessment (Idaho CTE-PDNA)* and served as the conceptual framework for organizing teaching practices that foster student engagement and learning. Signature pedagogies provided a conceptual lens for understanding how disciplinary knowledge is translated into teaching and learning, while the Borich model provided a mechanism for identifying discrepancies between the importance teachers assign to instructional competencies and their perceived competence in performing them.

Danielson's Enhancing Professional Practice

Danielson's (2007) framework for teaching is based on what is important for students to learn, the nature of learning and how to promote it, the nature of teaching, and the nature of

professionalism. Danielson's (2007) framework served as a guide for clustering the teachers' responsibilities into four identifiable domains:

1. planning and preparation
2. the classroom environment
3. instruction
4. professional responsibilities

Professional development is necessary to become a high-quality teacher, and teachers are responsible for identifying what PD they require (Danielson, 2007). Guided by Danielson, the items in the Idaho *CTE-PDNA* were categorized within the areas of technical CTE, student organization development, teaching and learning, and program management.

Signature Pedagogies

As defined by Shulman (2005), signature pedagogies shape how professionals think, perform, and act within a discipline. Signature pedagogies represent the distinctive instructional practices, values, and assumptions that characterize teaching and learning within a profession. Building on Shulman's work, Walker and Atkins (2021) argued that CTE disciplines also possess signature pedagogies that reflect their unique instructional practices, technical content, and workforce expectations. Consequently, effective PD should align with the instructional competencies required to prepare students for professional practice. Within FCS, instruction occurs across applied contexts that may include technical content, laboratory experiences, career preparation, work-based learning, and authentic application. Viewed through the lens of signature pedagogies, these instructional contexts require teachers not only to possess disciplinary knowledge but also to translate that knowledge into forms of teaching and learning appropriate to professional and career-related practice. The signature pedagogies framework therefore provides a useful conceptual lens for interpreting the pedagogical dimensions of FCS teaching and the PD competencies examined in this study.

Shulman (2005) described signature pedagogies as consisting of three interrelated structures: the surface structure, the deep structure, and the implicit structure. The surface structure reflects the observable acts of teaching and learning, the deep structure represents assumptions about how knowledge and skills are most effectively taught, and the implicit structure encompasses the professional values and dispositions embedded within a discipline (Shulman, 2005). The competencies examined in this study primarily concern observable instructional practices and teachers' perceptions of their capacity to facilitate learning. These competencies can be interpreted in relation to the surface and deep structures of signature pedagogies because they address both what teachers do instructionally and the pedagogical processes through which disciplinary knowledge and skills are developed. Rather than treating signature pedagogies as a direct measure, the framework is used as a conceptual lens for interpreting the instructional competencies and the pattern of PD priorities identified through the needs assessment. This distinction is particularly relevant to the present study because FCS teaching requires the integration of technical expertise with pedagogical practice. Examining teachers' perceived PD priorities through this lens provided a basis for considering whether the largest perceived

development needs are associated primarily with technical content or with the pedagogical practices through which teachers facilitate student learning.

Borich Needs Assessment Model

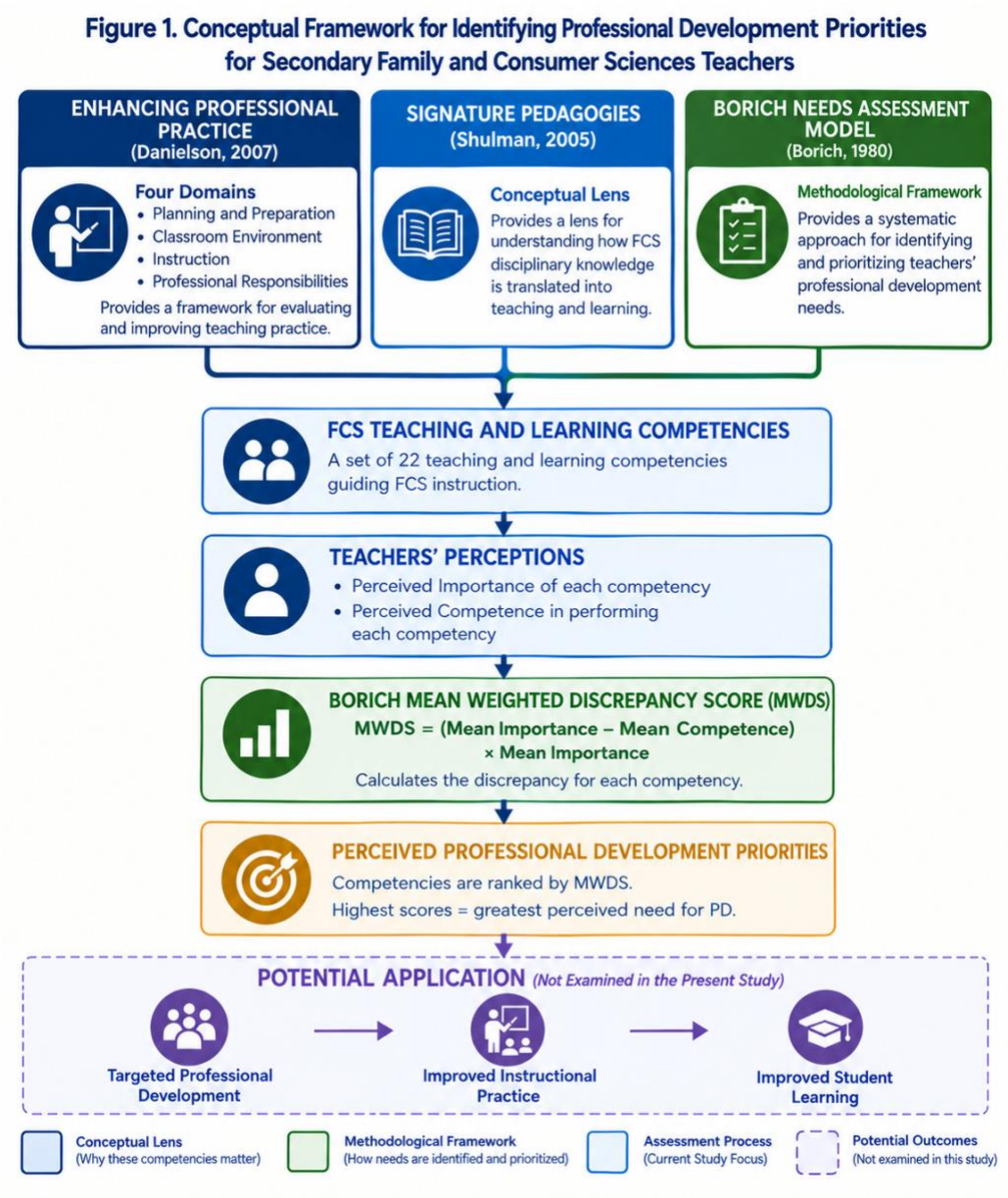
Effective PD should be grounded in a systematic assessment of teachers' professional learning needs rather than assumptions about what teachers need to know. Guskey (2000) emphasized that well-designed needs assessments are essential for planning meaningful PD because they ensure learning opportunities reflect teachers' instructional responsibilities and professional contexts. Consistent with this perspective, the Borich Needs Assessment Model (1980) provides a systematic approach for identifying and prioritizing teachers' PD needs by comparing the perceived importance of instructional competencies with their self-perceived competence in performing those competencies. The model has been widely used by contemporary researchers to identify teaching and learning PD needs across CTE disciplines (Cannon et al., 2012; Duncan & Ricketts, 2008; Garton & Chung, 1996; Jeffery et al., 2022; Kitchel et al., 2010; Smalley et al., 2019).

The Borich model identifies PD priorities by measuring the discrepancy between the importance teachers assign to specific instructional competencies and their perceived competence in performing those competencies. Competencies with the largest discrepancies represent the highest priority areas for PD because they reflect instructional practices that teachers consider highly important but feel less prepared to implement effectively. The resulting discrepancy scores provide a mechanism for distinguishing between competencies that teachers consider important but perceive themselves as relatively competent in and competencies that are considered important but for which perceived competence is comparatively lower. This distinction allows PD priorities to be based on the relative magnitude of perceived need rather than importance or competence ratings alone (Cannon et al., 2013).

The Borich Needs Assessment Model has been applied extensively within CTE to identify discipline-specific PD priorities. Research conducted across multiple CTE disciplines has consistently demonstrated that PD needs vary by program area while reinforcing the value of systematic needs assessment. For example, Cannon et al. (2012) found that Idaho teachers prioritized instructional strategies related to critical thinking, creativity, and digital-age learning, whereas Kitchel et al. (2009) reported that Idaho business and marketing teachers identified grant writing, funding opportunities, and cooperative education as their highest PD priorities. More recently, Ropski et al. (2024) found that Idaho FCS teachers identified establishing student internships or jobs, keeping current on FCS trends and issues, and developing school-to-work and career activities as their greatest PD needs. Collectively, these studies demonstrate the application of the Borich model across CTE contexts and show that perceived PD priorities can differ across disciplines and instructional settings (Ropski, 2020; Washburn et al., 2001). In the present study, the Borich model provided the analytical mechanism for determining which teaching and learning competencies participating FCS teachers perceive as their highest PD priorities.

Taken together, Danielson's framework, signature pedagogies, and the Borich Needs Assessment Model serve distinct but complementary functions in the present study. Danielson (2007) provided a conceptual framework that guided the development of the *Idaho CTE-PDNA*. Signature pedagogies provided a conceptual lens for understanding the relationship between disciplinary knowledge and pedagogical practice in FCS instruction, and the Borich model provided the analytical process for identifying and prioritizing respondents' perceived PD needs. This combination allowed the findings to be considered not only as a ranking of PD priorities but also in relation to the broader distinction between technical expertise and the pedagogical practices through which disciplinary knowledge is translated into student learning. Figure 1 illustrates these complementary roles and the process through which perceived importance and competence are used to identify PD priorities.

Figure 1. Conceptual Framework for Identifying Professional Development Priorities for Secondary Family and Consumer Sciences Teachers



Purpose and Objectives

The purpose of this study was to identify and prioritize the perceived in-service PD needs of Idaho secondary FCS teachers related to teaching and learning competencies. Specifically, the study examined the importance of selected teaching and learning competencies and their perceived competence in performing them and used the discrepancy between these perceptions to identify PD priorities. The following research objectives guided this study:

1. Describe the demographic characteristics of participating secondary FCS teachers in Idaho, including gender, stage of teaching career, age in years, and community type.
2. Describe participating teachers' perceptions of the importance of selected teaching and learning competencies and their perceived competence in performing those competencies.
3. Identify and prioritize the teaching and learning competencies for which participating secondary FCS teachers report the greatest perceived PD needs using the Borich Needs Assessment Model.

Methods

This study employed a quantitative descriptive survey design to identify the PD needs of Idaho secondary FCS teachers related to teaching and learning competencies. The study was conceptually guided by Danielson's (2007) framework and Shulman's (2005) signature pedagogies framework, while Borich's (1980) Needs Assessment Model provided an analytic approach for identifying and prioritizing the perceived PD needs. The following sections describe the research design, population and sampling procedures, instrumentation, data collection procedures, and data analysis methods used to address the study's research objectives. Teachers rated the perceived importance of selected teaching and learning competencies and their perceived competence in performing each competency. These ratings were used to calculate *Mean Weighted Discrepancy Scores* (MWDS).

Research Design

A descriptive survey research design was selected to systematically examine secondary FCS teachers' perceptions of their professional development needs related to teaching and learning competencies. Descriptive survey research is appropriate when the purpose is to describe characteristics, perceptions, or conditions within a defined population without attempting to establish causal relationships (Creswell & Guetterman, 2025). In this study, the design allowed teachers to report both the perceived importance of each teaching and learning competency and their perceived level of competence, providing the data necessary to identify and prioritize areas of professional development need.

Respondents rated both the perceived importance and their perceived level of competence for each teaching and learning competency. These ratings were subsequently used to calculate *Mean Weighted Discrepancy Scores* (MWDS), which were used to prioritize PD needs by weighting the discrepancy between perceived importance and competence according to the importance assigned to each competency (Borich, 1980). The use of MWDS is consistent with Borich's (1980) methodology and has been widely employed in CTE needs assessment research to

identify and prioritize PD needs (Cannon et al., 2010, 2012, 2013; Duncan et al., 2008; Edwards & Briers, 1999; Jeffery et al., 2023). Accordingly, the descriptive survey design provided an appropriate methodological approach for systematically identifying PD priorities related to the teaching and learning competencies that characterize effective FCS instruction.

Population and Sampling

The target population consisted of secondary FCS teachers employed in Idaho during the 2024–2025 academic year. Because the statewide population of secondary FCS teachers was relatively small, a census sampling approach was employed, inviting all identified teachers to participate in the study. A census approach was appropriate because it provided every member of the target population an opportunity to participate and facilitated a comprehensive assessment of the perceived PD needs of Idaho secondary FCS teachers.

The sampling frame consisting of 306 CTE identified teachers was obtained through the Idaho Division of Career Technical Education (IDCTE) and used to distribute the electronic survey. Participation was voluntary. A total of 35 (11.4%) FCS teachers responded to the survey. Following data screening, 32 (91.4%) of the 35 completed surveys were determined to be usable and provided a delivered sample of 10.4% (n=32) for final analysis. Consequently, the findings represent the perceptions of the responding teachers and should be interpreted within this context. Because participation was voluntary, the achieved sample represents respondents to the census invitation rather than a probability sample drawn from the target population. Accordingly, findings are interpreted as reflecting the perceptions of participating teachers. Potential nonresponse bias was examined through comparisons of early and late respondents as described in the Data Analysis section.

Instrumentation

Data were collected using an adapted Professional Development Needs Assessment instrument grounded in Borich's (1980) Needs Assessment Model. Participants rated the perceived importance of each competency (1 = Not Important to 5 = Very Important) and their perceived competence (1 = Not Competent to 5 = Highly Competent). Paired ratings were used to calculate *Mean Weighted Discrepancy Scores* (MWDS) and rank perceived PD priorities.
The instrument consisted of two sections. The first collected demographic and professional characteristics, and the second included 22 teaching, learning, and technical competencies relevant to FCS education. Competencies were adapted from established CTE PD needs assessment instruments (Cannon et al., 2010, 2012, 2013; Duncan et al., 2008 Edwards & Briers, 1999; Jeffery et al., 2023) and revised for secondary FCS teachers in Idaho. Shulman's (2005) signature pedagogies framework provided a conceptual lens for interpreting the competencies.

Content Validity

Content validity was assessed using Lawshe's (1975) Content Validity Ratio (CVR) and was reviewed by seven CTE professionals: one secondary school superintendent, one university faculty member, two community college faculty members, and three experienced secondary CTE

teachers. Panelists evaluated each competency for relevance, clarity, and alignment with secondary FCS education. Twelve competencies received unanimous ratings as essential (CVR = 1.00). The remaining competencies were reviewed using CVR results and panel feedback and revised as appropriate. The final instrument included 22 competencies.

Pilot Testing and Reliability

The instrument was pilot tested with 10 participants with characteristics similar to the target population to assess item clarity, survey functionality, and usability. Feedback informed minor revisions, and pilot responses were excluded from the final analysis. Internal consistency was assessed separately for the importance and competence scales using Cronbach's alpha. The importance scale yielded $\alpha = .86$, and the competence scale yielded $\alpha = .91$. Reliability analyses were conducted using IBM SPSS Statistics (Version 29).

Data Collection

Prior to data collection, approval for the study was obtained from the University of Idaho Institutional Review Board (IRB). The survey was administered electronically using Qualtrics® and distributed to all 35 identified secondary FCS teachers in Idaho. The first page of the survey contained an informed consent statement describing the purpose of the study, the voluntary nature of participation, and participant confidentiality. Participants provided electronic informed consent before accessing the survey.

The survey was distributed using a modified version of Dillman et al.'s (2014) Tailored Design Method for electronic surveys. An initial invitation email was followed by four reminder emails distributed throughout the data collection period to encourage participation. Minor adjustments to the reminder schedule were made because of technical issues encountered during survey administration; however, all participants received the planned sequence of reminder contacts. Survey responses were collected electronically, stored securely, and analyzed in aggregate to protect participant confidentiality. Of the 35 responses received, 32 completed surveys met the inclusion criteria and were retained for analysis.

Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 29) and the *Excel-Based Mean Weighted Discrepancy Score* (MWDS) *Calculator* developed by McKim and Saucier (2011). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize participant characteristics and responses to the teaching and learning competency items.

Professional development priorities were identified using Borich's (1980) Needs Assessment Model. *Mean Weighted Discrepancy Scores* (MWDS) were calculated by subtracting each participant's perceived competence rating from the corresponding importance rating, multiplying the resulting discrepancy score by the mean importance rating for each competency, and averaging the weighted discrepancy scores across respondents (Borich, 1980; Cannon et al.,

2013; McKim & Saucier, 2011). Competencies were then ranked according to their MWDS values, with higher scores indicating higher priority PD needs.

To assess the potential for nonresponse bias, responses from early and late participants were compared using an independent-samples ***t*** test**,** consistent with recommendations for survey research (Lindner et al., 2001; Miller & Smith, 1983; Radhakrishna & Doamekpor, 2008). No statistically significant differences were found between early and late respondents on either importance or competence ratings (***p*** > .05), suggesting that the respondent sample was representative of the target population with respect to the variables examined. Consequently, the findings are unlikely to have been meaningfully influenced by nonresponse bias.

The methodology employed in this study was designed to provide a systematic and reliable assessment of the PD needs of Idaho secondary FCS teachers. Through the use of an established needs assessment framework, a validated survey instrument, and appropriate data collection and analysis procedures, the study identified and prioritized teaching and learning competencies requiring additional PD. The following section presents the findings of the study.

Findings

The purpose of this study was to identify the perceived PD needs of secondary Idaho FCS teachers related to teaching and learning competencies. Findings are presented according to the study's research objectives. The first section summarizes participant demographic characteristics. The second section reports teachers' perceived importance and competence ratings for each competency. The final section presents the *Mean Weighted Discrepancy Scores* (MWDS) used to identify priority PD needs.

Research Objective 1: *Describe the demographic characteristics of Idaho secondary Family and Consumer Sciences teachers*

The 32 FCS teachers who participated in the study were predominantly female (96.9%) and represented diverse certification pathways, teaching experience levels, ages, and community settings. Most respondents were in the early stage of their teaching careers (n = 23, 71.8%) and taught in rural communities (n = 19, 59.3%). Participants were distributed across all age categories with the largest proportion between 45 and 54 years of age (28.1%), followed by those aged 55-64 (25.0%), 35-44 (18.8%), 25-34 (15.6%), and 65 or older (6.3%). Participant demographic characteristics are presented in Table 1.

Table 1

Participant Demographic Data (N = 32)

		f	%
Gender	Female	31	96.9
	Male	1	3.1
Stage of Teaching Career	Early (0-10)	23	71.8
	Mid (11-25)	5	15.6
	Late (26+)	4	12.5
Age in Years	25-34	5	15.6
	35-44	6	18.8
	45-54	9	28.1
	55-64	8	25.0
	65+	2	6.3
Type of Community	Rural	19	59.3
	Suburban	7	21.8
	Urban	2	6.3

Note. N = 32. Frequencies and percentages reflect the number of respondents who provided information for each demographic characteristic. Two respondents did not report their age, and four did not report their community type. Percentages were calculated using the total sample size (N = 32); therefore, percentages for some demographic characteristics do not total 100%.

Taken together, these demographic characteristics provide context for interpreting participants' perceptions of the importance, competence, and PD priorities related to teaching and learning competencies. Research Objective 2 examined teachers' perceived importance and competence ratings for each competency.

Research Objective 2: *Determine Idaho secondary Family and Consumer Sciences teachers' perceived levels of importance and competence related to teaching and learning competencies*

Teachers rated the importance of and their perceived competence in each of the 22 teaching, learning, and technical FCS competencies using separate five-point Likert-type scales. Overall, respondents assigned high importance ratings to most competencies. The highest perceived importance ratings were for teaching skills and concepts in the teacher's area of CTE (M = 4.88), teaching students problem-solving and decision-making skills (M = 4.72), teaching students to think critically and creatively (M = 4.63), managing student behavior problems (M = 4.59), and planning cognitively engaging activities and assignments (M = 4.53). The lowest perceived importance ratings were for conducting an adult program (M = 2.70), integrating AI in the classroom (M = 3.34), using AI in the profession (M = 3.41), and using Career and Technical Student Organizations (CTSOs) as part of teaching and learning (M = 3.44). Complete importance, competence, and *Mean Weighted Discrepancy Scores* are presented in Table 2.

Respondents also reported relatively high levels of perceived competence across many areas. The highest perceived competence ratings were for teaching skills and concepts in their CTE area (M = 4.38), organizing and supervising teaching laboratories (M = 4.16), teaching students problem-solving and decision-making skills (M = 4.06), using instructional materials and resources in teaching (M = 4.06), and using computers in classroom teaching (M = 4.03). The lowest perceived competence ratings were for using AI in the profession (M = 2.94), conducting an adult program (M = 3.03), integrating AI in the classroom (M = 3.09), and integrating current advances in technology into the curriculum (M = 3.38). Across the 22 competencies, perceived importance ratings were generally higher than perceived competence ratings, with the magnitude of these differences varying by competency.

Research Objective 3: *Identify the perceived in-service professional development needs of Idaho secondary Family and Consumer Sciences teachers related to teaching and learning competencies*

Professional development priorities were identified using *Mean Weighted Discrepancy Scores* (MWDS). Higher MWDS values indicated greater discrepancies between perceived importance and competence and, therefore, higher relative PD priorities. The highest-ranked PD need was teaching students to think critically and creatively (MWDS = 4.49). Other high-priority needs included integrating current advances in technology into the curriculum (MWDS = 3.10), teaching students problem-solving and decision-making skills (MWDS = 3.10), planning cognitively engaging activities and assignments (MWDS = 2.97), managing student behavior problems (MWDS = 2.73), teaching students with learning disabilities (MWDS = 2.64), motivating students to learn (MWDS = 2.64), and teaching skills and concepts in the teacher's area of CTE (MWDS = 2.44). These competencies represented the eight highest PD priorities identified by the MWDS analysis.

The lowest PD priorities were conducting an adult program (MWDS = -0.84), planning and conducting student field trips (MWDS = -0.67), using multimedia equipment in teaching (MWDS = -0.12), and using CTSOs as part of teaching and learning (MWDS = -0.11). For these competencies, mean perceived competence was equal to or exceeded mean perceived importance, resulting in relatively low or negative MWDS values. Table 2 presents the importance, competence, and MWDS values for all 22 competencies.

Table 2

Mean Importance, Competence, and Mean Weighted Discrepancy Scores for Teaching, Learning, and Technical Family and Consumer Sciences Competencies (N = 32)

Statement Items	Rank	Importance	Competence	MWDS
Teaching students to think critically and creatively.	1	4.63	3.66	4.49
Integrating current advances in technology into the curriculum.	2	4.13	3.38	3.10
Teaching students problem-solving and decision-making skills.	2	4.72	4.06	3.10
Planning cognitively engaging activities and assignments.	4	4.53	3.88	2.97
Managing student behavior problems.	5	4.59	4.00	2.73
Teaching learning disabled students.	6	4.22	3.59	2.64
Motivating students to learn.	6	4.44	3.84	2.64
Teaching skills and concepts in your area of CTE.	8	4.88	4.38	2.44
Assessing and evaluating student performance.	9	4.44	4.00	1.94
Developing performance-based assessment instruments.	10	4.22	3.78	1.85
Using AI in your profession.	11	3.41	2.94	1.60
Teaching gifted and talented students.	12	4.00	3.66	1.38
Communicating with parents, such as parent/teacher conferences, emails, other communications using new and emerging platforms.	13	4.09	3.88	0.89
Integrating AI in the classroom.	14	3.34	3.09	0.84
Teaching using instructional materials and resources.	15	4.25	4.06	0.80
Teaching using experiments.	16	3.91	3.72	0.73
Organizing and supervising teaching laboratories.	17	4.31	4.16	0.67
Using computers in classroom teaching.	18	4.03	4.03	0.00
Teaching using CTSOs as part of learning.	19	3.44	3.47	-0.11
Using multimedia equipment in teaching.	20	3.75	3.78	-0.12
Planning and conducting student field trips.	21	3.59	3.78	-0.67
Conducting an adult program.	22	2.70	3.03	-0.84

Discussion and Conclusion

The purpose of this study was to identify the perceived PD needs of secondary FCS teachers related to teaching and learning competencies. Consistent with previous research, the findings

reaffirm the critical role of teacher effectiveness in advancing CTE program quality and improving student outcomes (Conrad & Watkins, 2021; Wong & Wong, 2021). Overall, participants identified their highest PD priorities in competencies associated with higher-order thinking, technology integration, student engagement, instructional planning, and classroom management. The pattern of findings extends previous CTE PD research and can be interpreted through Shulman's (2005) signature pedagogies framework, while the Borich (1980) Needs Assessment Model provides a systematic means of identifying participants' relative PD priorities.

Consistent with prior research using the Borich Needs Assessment Model, the highest-ranked PD needs centered on teaching students to think critically and creatively and developing students' problem-solving and decision-making skills. Cannon et al. (2012) similarly identified these competencies as leading PD priorities among secondary CTE teachers. The consistency of these findings suggests that preparing students to think critically and solve authentic problems continues to represent a significant instructional challenge across CTE. Because these competencies are foundational to preparing students for increasingly complex workplace and postsecondary environments, PD should emphasize instructional strategies that intentionally cultivate higher-order thinking within authentic FCS learning experiences.

Beyond higher-order thinking, participants identified planning cognitively engaging activities, motivating students, and managing student behavior as additional high-priority PD needs. These findings support the characterization by Darling-Hammond et al. (2017) of teaching as a complex, interactive process requiring continual refinement of instructional practice while reinforcing Arnett-Hartwick's (2020) description of the diverse instructional demands placed on FCS teachers. Overall, these findings suggest that teachers are seeking PD that extends beyond technical content knowledge to strengthen instructional effectiveness, student engagement, and classroom management.

A noteworthy pattern in the findings is the relative prominence of pedagogical competencies among participants' highest PD priorities. Although respondents rated teaching skills and concepts within their CTE content area as the most important competency and reported relatively high levels of competence in that area, the highest *Mean Weighted Discrepancy Scores* were associated with pedagogical competencies such as critical thinking, problem solving, cognitively engaging instruction, and classroom management. This pattern suggested that several of the participants' greatest perceived PD needs were concerned with how disciplinary content is taught rather than technical knowledge alone. However, teaching skills and concepts within the teacher's CTE area remained among the eight highest-ranked priorities (MWDS = 2.44), indicating that technical and pedagogical development should not be viewed as mutually exclusive needs. Professional development may therefore be most responsive when it strengthens pedagogical practice while continuing to support discipline-specific technical teaching. The findings also provide strong support for the study's conceptual framework. Through the lens of Shulman's (2005) signature pedagogies, the highest-ranked PD needs primarily reflect the deep structure of teaching, meaning the instructional practices that shape how students learn within a discipline. Developing students' critical thinking, problem-solving abilities, and engagement represents the instructional core of effective FCS education. Consequently, PD should move beyond generalized instructional strategies to reflect the applied, interdisciplinary, and career-

connected nature of FCS teaching. Similarly, the Borich Needs Assessment Model proved effective in systematically identifying those instructional competencies that teachers considered highly important while feeling comparatively less prepared to implement. Consistent with previous CTE needs assessment studies (Cannon et al., 2012; Kitchel et al., 2009), the model provides an evidence-based approach for prioritizing PD initiatives that reflect teachers' perceived needs.

The demographic characteristics of participants also provide important context for interpreting the findings. Most participants were early-career teachers (71.8%), and 59.3% taught in rural communities. Although the present study did not examine differences in PD priorities by career stage or community type, these characteristics identify potentially important directions for future research. Studies with larger samples could examine whether perceived PD priorities differ according to teaching experience, community context, certification pathway, or other teacher characteristics.

Conversely, competencies such as integrating Career and Technical Student Organizations into instruction, planning field trips, and conducting adult education programs were identified as relatively lower PD priorities. Although these findings differ somewhat from previous research emphasizing work-based learning and career connections (Ropski et al., 2024), they illustrate the importance of conducting periodic, state-specific needs assessments because PD priorities may evolve over time and differ across educational contexts (Ropski, 2020; Washburn et al., 2001). Collectively, the findings further reinforce concerns expressed by Erwin (2018) and Kitchel et al. (2009) regarding the potential misalignment between available PD opportunities and teachers' instructional needs. Generic PD is unlikely to adequately address the specialized instructional responsibilities of FCS educators.

Several limitations should be considered when interpreting the findings of this study. First, the study was limited to secondary FCS teachers in Idaho; therefore, the findings may not be generalizable to teachers in other states or educational contexts. Second, the study relied on participants' self-reported perceptions of importance and competence, which may differ from observed instructional practices. Although the analysis found no evidence of nonresponse bias, the relatively small number of usable responses may limit the broader applicability of the findings. Finally, because the study employed a cross-sectional survey design, the results represent teachers' perceptions at a single point in time and do not capture how PD needs may change as educators gain experience or as educational priorities evolve.

In conclusion, this study contributes to the growing body of literature highlighting the importance of discipline-specific PD for CTE educators. The findings provide a systematic understanding of the instructional competencies that FCS teachers perceived as most important for their continued professional growth, offering valuable guidance for the design and implementation of targeted PD initiatives. The findings suggest that effective PD should prioritize higher-order thinking, student engagement, instructional planning, classroom management, and inclusive teaching while building on teachers' existing technical content expertise. Consistent with recommendations by Washburn et al. (2001) and Ropski (2020), periodic statewide needs assessments remain essential to ensuring that PD remains responsive to

the evolving instructional demands of FCS education. Ultimately, these findings provide an empirical foundation for designing targeted PD that better aligns with the instructional realities of FCS educators and supports continuous improvement in CTE programs.

Recommendations

As noted at the outset, the effectiveness of CTE programs is grounded in the strength of their administrators and teachers (Conrad & Watkins, 2021). Because administrators and PD providers are typically responsible for planning and implementing in-service learning opportunities, these findings identify specific areas where PD can better support the instructional practice of FCS teachers. Based on the findings of this study, the following evidence-based recommendations are offered.

First, PD for FCS teachers should prioritize instructional strategies that promote higher-order thinking, critical thinking, and problem solving. These competencies represented the highest PD priorities identified by participants and are essential for preparing students to apply knowledge in authentic career and life contexts. Professional learning should emphasize practical classroom strategies that enable teachers to intentionally integrate these skills into FCS instruction.

Second, PD should place greater emphasis on student engagement, cognitively engaging instructional practices, and classroom management. Respondents identified these competencies as important but reported lower levels of perceived competence. Workshops, coaching, and collaborative learning opportunities that provide evidence-based instructional strategies may help teachers create engaging, well-managed learning environments that support student success.

Third, PD should be differentiated to address the needs of teachers at various career stages. Because many respondents were early-career educators, induction programs, mentoring opportunities, and instructional coaching should emphasize classroom management, instructional planning, and student motivation while continuing to support experienced teachers through advanced professional learning opportunities.

Fourth, state agencies, teacher educators, and professional organizations should collaborate to design discipline-specific PD for FCS educators. Although many PD opportunities address general instructional practices, FCS teachers would benefit from learning experiences that reflect the applied, interdisciplinary, and laboratory-based nature of FCS instruction.

Fifth, PD should be accessible to educators regardless of geographic location. Given the large proportion of respondents teaching in rural communities, online, hybrid, and regional delivery models should continue to be expanded to ensure equitable access to high-quality professional learning opportunities.

Finally, state leaders should conduct periodic needs assessments to ensure that PD priorities remain aligned with the evolving needs of FCS educators. Regular assessment using models such as the Borich Needs Assessment Model can help decision makers allocate PD resources based on

empirical evidence rather than assumptions, thereby increasing the relevance and effectiveness of future professional learning initiatives.

Future Research

Several opportunities for future research emerged from this study. First, replication of this study in other states and regions is recommended to determine whether the PD priorities identified among Idaho secondary Family and Consumer Sciences (FCS) teachers are consistent across diverse educational contexts. Comparative studies may identify regional differences while informing broader national PD initiatives for FCS educators.

Second, future research should examine the effectiveness of PD designed to address the instructional priorities identified in this study. Investigating changes in teacher competence, instructional practice, and student outcomes following targeted PD would provide valuable evidence regarding the impact of these initiatives.

Third, researchers should examine how PD needs vary across teachers' careers. Because many respondents were early-career teachers, longitudinal studies could explore how instructional priorities evolve as educators gain classroom experience and assume additional professional responsibilities.

Fourth, qualitative and mixed-methods studies are recommended to better understand the contextual factors influencing teachers' PD needs. Interviews, focus groups, and classroom observations could provide richer insight into the challenges teachers experience when implementing instructional strategies that promote higher-order thinking, student engagement, and inclusive learning environments.

Finally, future research should investigate factors that influence teachers' participation in PD, including motivation, accessibility, perceived relevance, and barriers to engagement. A better understanding of these factors may assist state leaders and PD providers in designing learning opportunities that are both meaningful and widely utilized by FCS educators.

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Building a Secondary Career and Technical Education Pathway: A Mixed-Methods Stakeholder Analysis

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Abstract

Communities possess finite resources and limited capital to support public safety programs, and the availability of personnel, funding, equipment, knowledge, and organizational support can influence readiness to implement new initiatives. As interest in Career and Technical Education (CTE) grows, emergency services pathways may strengthen stakeholder perceptions and expand the workforce pipeline. Framed by situated learning theory, experiential learning theory, and human capital theory, this study aimed to examine stakeholder perspectives regarding design and implementation of a secondary school Fire/EMS pathway designed to prepare students to meet postsecondary and industry standards upon graduation using an explanatory sequential mixed-methods design. Participants identified a desire to develop CTE pathways in Fire/EMS. CTE programs should be made available at the secondary level, and strong connections between secondary, postsecondary and industry partners are critical for successful implementation of these educational pathways designed to take students through secondary school and into college or career placement. A variety of values arose regarding the benefits to local communities from having CTE pathways available to secondary students. One of the primary benefits mentioned by participants was the workforce development component of a CTE pathway.

Keywords: *Situated Learning; Human Capital; CTE Pathways; SDG 4: Quality Education*

Introduction

Community Risk Reduction (CRR) is a focal point of many fire departments and is heavily influenced by the resilience of the people within that community (Aldrich & Meyer, 2015; Clark

et al., 2023). Emergency management seeks to improve stakeholder perceptions, while fire departments address safer communities through CRR and its 5 Es (i.e., enforcement, engineering, education, emergency response, and economic incentives) (Clark et al., 2023). As interest in Career and Technical Education (CTE) grows, emergency services pathways may strengthen stakeholder perceptions and expand the workforce pipeline (Mobley et al., 2017). High-quality CTE programs can contribute to human capital development by increasing students' opportunities to complete secondary school, earn professional certifications, and prepare for career pathways (Dougherty, 2018). Without comparable Fire/Emergency Medical Services (EMS) pathways, students interested in technical careers may select more visible or accessible occupational pathways, potentially narrowing the future recruitment pool available to emergency-service organizations. Communities may also benefit from graduates possessing foundational knowledge of emergency services and medical care. Bystander cardiopulmonary resuscitation (CPR) before EMS arrival, for example, is associated with substantially improved survival following out-of-hospital cardiac arrest (Hasselqvist-Ax et al., 2015). Schools can also contribute to community disaster resilience by developing knowledge, relationships, preparedness capacity, and connections to community institutions (Mutch, 2023; Zhao et al., 2025). Thus, a Fire/EMS pathway may serve workforce, educational, and community preparedness needs.

However, perceived value does not ensure implementation. Organizational readiness involves both the willingness and the capacity of relevant stakeholders to implement change, and favorable attitudes alone may be insufficient when resources, leadership, planning, or implementation capacity are limited (Vax et al., 2021). Limited capital can hinder development of a high-quality program, and stakeholders face finite resources and seemingly unlimited demands. Stakeholders include education agencies, school districts, administrators, community colleges, certifying agencies, and local Fire/EMS organizations. Their cooperation is necessary to align curriculum, instructional sequencing, dual-credit expectations, certification requirements, equipment, personnel, and work-based learning. Research on CTE program development similarly identifies cross-system stakeholder engagement, employer participation, and connections between training providers and employment opportunities as important implementation considerations (Wind et al., 2022). Decision makers therefore need evidence regarding stakeholder support, concerns, resource commitments, responsibilities, and expectations for program quality and sustainability. Implementation research further suggests that needs assessment, barrier identification, coalition building, formal commitments, resource-sharing agreements, and collaboration with educational institutions are important during pre-implementation planning (Vax et al., 2021).

Students may become interested through curiosity and practicality, but proficiency is more likely when systematic learning begins at an introductory level and develops competence through an increasingly complex curriculum (Nerlino, 2023). Research on scaffolding and cognitive load indicates that novices may become overwhelmed when required to address complex tasks without sufficient foundational knowledge or instructional guidance (Belland et al., 2013; Gorbunova et al., 2025). Engaging introductory courses can build conceptual understanding before advanced application-level and certification courses (Hoachlander, 2021), potentially

improving students' capacity to engage with more complex technical content (Gorbunova et al., 2025).

The central implementation concern is the divide that may exist between stakeholders' stated support and their willingness or ability to commit resources. Organizational readiness research distinguishes positive perceptions of an innovation from the motivation and capacity required to implement it successfully (Caci et al., 2025; Vax et al., 2021). Whether Fire/EMS organizations that view secondary programs favorably are also willing and able to provide personnel, equipment, training materials, and work-based learning opportunities therefore remains an empirical question. School administrators and counselors likewise support CTE because college and career readiness is a priority yet often emphasize core classes over career-tech programming (Malin et al., 2017). Research also indicates that self-reported organizational support may be influenced by social desirability and a desire to portray one's organization favorably, reinforcing the value of examining the rationale and capacity underlying positive survey responses (McClam et al., 2025). Consequently, favorable perceptions may not translate into sustained engagement or resource allocation.

Members of the fire service share an organizational culture distinct from other professions and education (Amineh & Asl, 2015). Therefore, understanding this culture, including its professional norms, values, and occupational experiences, is essential in preparatory programming (Johnson et al., 2020). In addition, place-based education supports connections with local organizations and authentic problems affecting community well-being (Hamilton & Marckini-Polk, 2023), while extending beyond geography to include socially and ethically engaged learning. Modern CTE pathways also incorporate dual credit, certification courses, place-based experiences, and internships, and evidence links CTE participation with human capital accumulation and postsecondary success (Dougherty, 2018; Hirschy et al., 2011).

Training and education are related but not identical, and organizational excellence relies on both (Masadeh, 2012). A modern dual-credit Fire/EMS pathway must therefore be rigorous, relevant, developmentally appropriate, and aligned with postsecondary and certification standards. Research on effective CTE programs supports structured career pathways, professional certifications, and connections among secondary education, postsecondary institutions, and employment opportunities (Dougherty, 2018; Wind et al., 2022). Although existing literature supports CTE participation, scaffolded instruction, place-based learning, and stakeholder engagement, it does not adequately explain how education, certification, postsecondary, and emergency-service stakeholders believe a secondary Fire/EMS pathway should be designed, implemented, supported, and sustained. This study addresses that gap by examining stakeholder perspectives concerning pathway need, instructional sequencing, standards alignment, partnership responsibilities, resource commitments, anticipated benefits, and implementation barriers.

Theoretical Framework

Three theoretical frameworks (i.e., situated learning theory, experiential learning theory, and human capital theory) guided this study. Socially situated learning communities (Lave &

Wenger, 1991) highlight the benefit to learners by surrounding themselves with experienced practitioners in a field, known as legitimate peripheral participation. Experiential learning theory builds on the premise that learning occurs through experience, experimentation, and practice in four general stages (i.e., concrete experience, reflective observation, abstract conceptualization, and active experimentation; Kolb, 2015). Human capital theory focuses on the individual themselves and the education, skills, experiences, and training (Becker, 1964; Schultz, 1971) that individuals acquire in relation to their career interests (Smith, 2010).

Within the context of this study, learning takes place within schools and communities that have experienced teachers and community members (i.e., situated learning theory). Within the school, teachers provide experiences and opportunities to experiment, learn, and reflect within CTE classrooms (Clark et al., 2010). Those CTE classrooms often have connections to industries within the communities where additional experiential learning opportunities exist, along with connections to real-world expertise (Johnson, 2022; Plasman & Linares Ramirez, 2025). All of these experiences and opportunities contribute to the human capital development of each student (Becker, 1964; Schultz, 1971). When considering the need for pathways within CTE programs in a given community, the ultimate goal is to provide opportunities for human capital development that is career-specific (Atwell et al., 2022), which within the case of this study is Fire/EMS programming.

Communities possess finite resources and limited capital to support public safety programs, and the availability of personnel, funding, equipment, knowledge, and organizational support can influence their readiness to implement new initiatives (Caci et al., 2025; Vax et al., 2021). Therefore, human and social capital, as reflected in the theoretical foundations of this study, are especially relevant to education and emergency response (Jacobs, 2011). Both may be strengthened through education, training, and partnerships (Jacobs, 2011). Preparedness and mitigation play prominent roles in reducing damaging effects through hazard and risk assessment (Albtoush et al., 2011). Because education is one of the CRR 5 Es, it can develop human and social capital and enhance resilience before disasters occur (Clark et al., 2023). Research further indicates that social learning, collective action, disaster preparedness, communication, and civic responsibility are mechanisms through which social capital can strengthen community disaster resilience (Zhao et al., 2025), leading to the need to ground an exploratory inquiry in situated learning theory, experiential learning theory, and human capital theory to better understand stakeholder perspectives of secondary Fire/EMS CTE pathways.

Purpose and Objectives

The aim of this study was to examine stakeholder perspectives regarding design and implementation of a secondary Fire/EMS pathway designed to prepare students to meet postsecondary and industry standards upon graduation. Four research objectives guided this study:

1. Identify the desire from Fire/EMS stakeholders to develop educational programs at the secondary level.
2. Determine the ideal format to build a cohesive pathway from secondary to the Fire/EMS industry.

3. Explore partnerships that would be helpful to develop and grow these educational pathways.
4. Describe the community perceptions of a secondary Fire/EMS educational pathway.

Methods

This study used an explanatory sequential mixed-methods design to examine stakeholder perspectives regarding the development and implementation of a secondary CTE pathway in Fire/EMS. The study sought to determine whether stakeholders perceived a need for such a pathway, which partnerships and resources would be required, whether dual-credit courses and industry certifications were appropriate for secondary students, and what benefits and barriers might accompany implementation.

A mixed-methods approach was selected because the research questions required both a measurable baseline of stakeholder support and an understanding of the reasoning behind participants' responses. Mixed-methods integrate quantitative and qualitative data into a comprehensive framework rather than merely identifying agreement or disagreement (Mertens & Hesse-Biber, 2012). It may also bridge fields separated by differences in content, epistemologies, and methods (Snodgrass et al., 2024). Quantitative survey data established patterns across stakeholder groups, while follow-up interviews explored the experiences and rationale underlying those patterns. This design combined deductive survey findings with inductive discoveries from interviews (Levitt, 2024). The data were then triangulated to develop a more complete interpretation of stakeholder perspectives.

Participants and Sampling

Following Institutional Review Board approval (#IRB-23-278), purposive sampling was used to recruit adults representing the principal organizations involved in approving, developing, or implementing a Fire/EMS pathway (Privitera, 2017). Eligible participants were at least 18 years old and belonged to one of the following groups: secondary teachers, administrators, or counselors; community college or technical college instructors or administrators in fire science or emergency medical care; Fire/EMS executive officers or decision makers; or recent graduates of a CTE program. Three participants identified as recent CTE graduates.

The primary target area included Tillman, Jackson, Harmon, and Greer Counties in southwest Oklahoma. Recruitment sought representation from all 10 secondary schools and 11 Fire/EMS organizations identified in this area. Because relatively few postsecondary institutions offered Fire Science or EMT programs, recruitment was expanded to postsecondary institutions across Oklahoma and Kansas. Six postsecondary institutions in each state were identified, with 15 Fire/EMS instructors or administrators invited from the bi-state region. This structure provided perspectives from secondary education, postsecondary education, and emergency-service organizations.

No predetermined sample size was established given the exploratory nature of this study as part of the Oklahoma State University Rural Renewal Initiative and the unknown number of people

that met the study requirements in given communities. The survey produced 39 eligible responses. Participants could volunteer for a follow-up interview by providing their email address, and 13 respondents elected to participate. Secondary school and Fire/EMS contacts were obtained through the Tillman County Extension office, while postsecondary contacts were drawn from colleges and technical centers offering Fire Science or EMT programs in Kansas and Oklahoma. While nonresponse error and sampling bias could be of concern, the research team aimed to mitigate that by having representation across the groups of interest.

Participation was limited primarily to stakeholders involved in pathway development and implementation. This ensured that participants were adults and avoided the additional ethical concerns associated with including minors in a preliminary study. Current secondary school students and parents were therefore not included. Consent was obtained through the online survey, and demographic information was collected to support interpretation and future research. Participant demographics are outlined in Table 1.

Table 1

*Participant Demographics (*n = *39)*

Demographic		*f*	*%*
Sex	Male	24	61.5
	Female	15	38.5
Race	White	31	79.5
	Hispanic	2	5.1
	American Indian	6	15.4
Education Level	Secondary school	8	20.5
	Associate's degree	6	15.4
	Bachelor's degree	9	23.1
	Master's degree	13	33.3
	Terminal degree (PhD, EdD, MD, DVM, etc.)	3	7.7
Professional Role	Industry Professional	11	28.2
	Educator	11	28.2
	Other	17	43.6

Note. The "Other" category within the professional role demographic encompasses school administrators, school counselors, and community members who were recent graduates of CTE programs.

Quantitative Data Collection

A Qualtrics online survey served as the initial data collection instrument. The instrument included demographic items followed by 11 statements scored on a five-point Likert-type scale ranging from "Strongly Agree" to "Strongly Disagree." Items examined perceptions of the need for additional secondary school CTE courses; whether CTE should be required; the relative importance of CTE and core academic courses; anticipated student enrollment; administrative support; the willingness of postsecondary and industry organizations to partner with secondary schools; the potential influence of rigorous CTE programs on dropout prevention and college attendance; the relationship between CTE and well-paying employment; and participants' own interest in having taken additional CTE courses. The survey established a baseline concerning perceived demand, institutional support, partnership potential, and expected educational or workforce benefits, aligning with the theoretical underpinnings of situated learning theory (Lave & Wenger, 1991), experiential learning theory (Kolb, 2015), and human capital theory (Becker, 1964; Schultz, 1971) as they relate to future career preparedness (Smith, 2010) within the Fire/EMS sector. The quantitative survey questionnaire was evaluated for face and content validity by a panel of experts in agricultural education and others in fire and emergency management. The survey questionnaire resulted in a Cronbach's α of .74 for a post hoc reliability estimate, which is deemed acceptable according to George and Mallery (2019).

Qualitative Data Collection

Open-ended, semistructured interviews were used to explore the rationale behind survey responses. Interviews provided depth and context that could not be captured through fixed-response items alone. Creswell (2013) identifies interviews as a principal qualitative information source and recommends approximately five to seven open-ended questions. Accordingly, the protocol contained seven primary questions, with follow-up prompts used as appropriate based on the findings of the quantitative data collection process as a part of the explanatory sequential mixed-methods design. The theoretical foundation of this study was also considered in the qualitative interview protocol development.

The interviews addressed participants' prior access to and experiences with CTE; the grade level at which students should begin a pathway; whether middle school students should receive information about secondary CTE opportunities; the appropriateness of earning college credit and industry certifications before graduation; the role of community colleges in pathway design; the role of industry partners in providing place-based learning, including field trips, guest speakers, and internships; and ways a pathway extending from middle school through postsecondary education and employment could benefit students and the local economy.

Secondary administrators and counselors were asked about recruitment, sequencing, and pathway completion. Postsecondary Fire Science and EMS personnel addressed students'

transition into college-level programs and preparation for advanced coursework. Fire/EMS decision makers discussed desired credentials, qualities commonly lacking among new applicants, and the feasibility of industry-based learning experiences. This structure allowed the implementation problem to be considered from educational and professional perspectives.

Data Analysis and Integration

Quantitative data were compiled and analyzed using Qualtrics analytic software. Descriptive results identified response patterns across the 11 Likert-type items and established the baseline examined through interviews. Qualitative analysis followed an iterative process involving handwritten notes, audio recordings, digital transcripts, written summaries, and data logs (Creswell, 2013). Transcripts and summaries were searched for recurring words, phrases, concepts, and patterns. Related codes were grouped into categories, which were refined into three overarching themes composed of 10 categories and multiple supporting codes through an in-vivo coding process (Saldaña, 2021) by the lead researchers. The recommendations of Saldaña (2021) were followed, including first-cycle coding, memoing, and the transition of codes to emerging themes during second-cycle coding.

The final mixed-methods analysis used triangulation to review the quantitative and qualitative findings in tandem. Survey results identified the prevalence and direction of stakeholder perceptions, while interviews explained the experiences, conditions, and concerns underlying those responses. Integration focused not only on convergence or disagreement but also on how one dataset clarified or expanded the other (Mertens & Hesse-Biber, 2012). This process produced a holistic account of stakeholder support, partnership expectations, curriculum sequencing, resource concerns, and barriers to implementing a rigorous secondary Fire/EMS pathway, all of which are outlined in the findings per the research objectives.

Limitations

This study was exploratory in nature but has limitations associated with it that should be considered. This study was limited to secondary teachers, administrators, or counselors; Fire/EMS executive officers or decision makers; or recent graduates of a CTE program in Tillman, Jackson, Harmon, and Greer Counties in Southwest Oklahoma and postsecondary Fire Science or EMT program instructors in Kansas and Oklahoma. This study is limited by the resulting sampling frame and the data presented is that of the 39 participants in the quantitative data and the 13 follow-up qualitative interviews. Interview participation was limited to those who participated in the quantitative survey questionnaire and opted to participate in a follow-up interview. These limitations should be taken into account when considering the transferability of the findings, conclusions, and recommendations.

Findings

To address the research objectives, data collection began with 39 participants completing the 11-item survey questionnaire. Participants generally agreed that CTE provides a pathway to well-paying jobs, that a need exists for more CTE classes in secondary schools, and CTE classes are

as important as core classes (see Table 2). Survey data identified a lower perceived level of support for CTE courses when compared to core content classes. Table 2 outlines the means and standard deviations for the 11 survey items.

Table 2

*Participant Responses from Survey Data Collection (*n = *39)*

Item	*M*	*SD*
Career and Technical Education is a great pathway to well-paying jobs in the 21st century	4.79	0.46
There is a need for more CTE classes in secondary schools	4.69	0.51
Secondary school CTE classes are as important as the Core classes (math, English, etc.)	4.64	0.66
I would have enrolled in more CTE classes in secondary school if they were available	4.41	0.90
Secondary school students would enroll in more CTE classes if they were available	4.31	0.65
Industry professionals would be willing to partner with secondary schools to provide place-based learning opportunities (field trips, guest speakers, internships, etc.)	4.28	0.56
A secondary CTE program would decrease the number of students who drop out of secondary school before graduation	4.25	0.71
Community Colleges / Technical Centers would partner with secondary schools to provide technical direction and college credit to secondary school students if given the opportunity	4.10	0.84
At least some CTE classes should be mandatory for secondary school students prior to graduation	4.03	1.07
Academically challenging secondary school CTE programs would increase the number of secondary school graduates who enter college (2 or 4-year)	3.66	0.92
Secondary school administrators support CTE classes as much as they do the Core classes	2.69	1.07

Note. Five-point Likert-type scale: 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.

Analysis of 13 semistructured interviews produced three overarching themes: (1) CTE education and pathway development, (2) educational and industry partnerships, and (3) benefits to students, employers, and communities. These findings were compared with the quantitative survey results.

Theme 1: CTE Education and Pathway Development

The first theme addressed the need for Fire/ EMS pathways, appropriate entry points, instructional sequencing, and the value of dual credit and industry certification. Twelve interviewees had some form of CTE available in secondary school, including agriculture, but only five participated. Nonparticipation reflected limited options, negative stigma, competing

plans, or lack of awareness. One postsecondary instructor described the limited availability of technical education:

> We had a tech college right there in town. But we pretty much did not have technical pathways in the high school at all. None of it was really discussed at all. I took maybe three college classes during high school, but they were general education courses. If you wanted to go into a trade or technical program, that wasn't really something that was made available at the high school level.

Participants connected expanded access with workforce preparation. One participant explained, "If we can get these kids college hours and certifications so they can be injected into the workforce right out of high school, then we're taking care of the workforce without burning out the people already in it." Another participant likewise stated, "We would give preference points to an applicant if they already had either EMT or Fire 1 certification."

Participants supported early awareness but distinguished exposure from advanced instruction. Twelve favored informing eighth-grade students through field trips, department visits, career fairs, and videos. Seven identified sophomore year as the preferred formal entry point, compared with two each selecting middle school, freshman, or junior year; none selected senior year. Participants emphasized maturity, the freshman transition, and sufficient time for completion; certification and college courses were considered more appropriate for juniors and seniors. One participant described the need for a visible, scaffolded pathway:

> Catching those kids in ninth grade and giving them options would be great. Not every student is college-bound in the traditional sense, but they still need guidance and direction. They need to hear, 'Hey, you can be a firefighter, a paramedic. Here's how. These are the things you need to do, and here's where you can start.' We have to make it as clear and structured as possible, so they don't get lost along the way.

All 13 participants supported making college credit and industry certifications available, although two noted that student readiness and parent support should be considered. These findings converged with survey questions 1–5. Interviews showed that support reflected participants' limited access, concern about student awareness, and preference for progression from introductory exposure to technical and certification-level coursework.

Theme 2: CTE Partnerships

The second theme concerned collaboration among secondary schools, postsecondary institutions, and Fire/EMS organizations. All 13 participants indicated that community colleges should work closely with secondary schools, using terms such as "critical," "hand in hand," and "true partnership." All 13 also supported close industry involvement through field trips, guest speakers, mentoring, internships, and practical experiences. Postsecondary partnerships supported curriculum alignment, dual-credit agreements, specialized facilities, and continuation into college programs. A participant stated, "We're working hand in hand so that they go through your program and then come right over to our program." Another explained, "High schools aren't going to be able to afford training towers and burn houses… the tech centers are the

resource." One participant described these relationships as "imperative for the success of the program, period. And the student."

Industry partnerships supplied occupational knowledge, equipment, mentors, and authentic settings, as a participant explained:

> It needs to be a partnership. Schools have access to students daily, and fire departments have the knowledge and experience. If we could build stronger relationships, we could create meaningful programs that actually give students the chance to see what this work is like firsthand.

Theme 2 converged with multiple survey items, and participants identified the contributions expected from each partner: schools provide student access and instructional structure; colleges provide aligned curriculum, credit, instructors, and facilities; and industry supplies expertise, mentoring, work-based learning, and recruitment connections.

Theme 3: Benefits of CTE Pathways

The third theme addressed benefits to students, postsecondary programs, employers, and communities. Participants identified retaining local talent and community engagement, workforce development, job-ready skills, life preparation, and reduced workforce shortages. No participant reported that the pathway would provide no benefit. Students could graduate with credentials, college credit, occupational knowledge, and a clearer transition into employment or postsecondary education. One participant stated:

> The benefit to that student is huge. I mean, think about it: I graduated high school with certifications, credit towards an associate's degree, and I'm ready to go to work. Job ready. And that makes a big difference, especially for kids who may not be thinking about a four-year university, or who just want to start making money and building a career right away.

Another reported that students may complete fire, hazardous-materials, and EMT credentials before graduation and enter hiring processes with a competitive advantage. Participants also described broader community outcomes. A retired fire captain explained that students develop "a mindset of service" that can be applied through activities such as installing smoke detectors or assisting community members. Another participant summarized the shared benefit:

> It helps the students, because they're getting real-world experience and job opportunities. It helps the community, because we're developing a skilled workforce that's ready to serve. And it helps the employers, because they're getting people who are trained, prepared, and eager to work.

Theme 3 converged across survey questions concerning graduation, college participation, access to well-paying careers, and interest in additional CTE opportunities. Participants connected these educational benefits to reduced college costs, faster entry into employment, improved recruitment pipelines, practical community skills, and stakeholder perceptions.

Conclusions, Discussion, and Recommendations

This research aimed to identify stakeholder perspectives on the need for and/or desire for a secondary CTE pathway in emergency and fire management. Participants identified a desire to develop CTE pathways in emergency and fire management. Participants agreed that CTE pathways are positive for schools and communities. While this is positive, could it be that stakeholders express support for educational programs such as the CTE pathways identified because of societal pressure to support education? Regardless, it is essential that support be provided to schools and communities to help overcome obstacles and successfully implement CTE programs that can make a community impact.

The majority of participants indicated that more students would take CTE classes if they were made available; however, many of them chose not to participate in vocational classes when they were in school. Many of the older stakeholders remembered when a four-year college degree was the "golden ticket" to a well-paying job, while vo-tech (now commonly referred to as CTE) was for the "dumb kids" as one person put it. When asked to reflect on this perception, even those who chose not to participate in CTE programs as students saw the value in them now, with most stating that they wished they'd stayed with it back then. While fewer respondents felt that such programs should be mandatory, they overwhelmingly advocated for their availability to students. These perspectives from participants align with the role of CTE in providing experiences and opportunities that contribute to the human capital development of each student (Becker, 1964; Schultz, 1971).

Participants agreed that pathway design should include secondary, postsecondary and industry input. CTE programs should be made available at the secondary level, and strong connections between secondary, postsecondary, and industry partners are critical for successful implementation of these educational pathways designed to take students through secondary school and into college or career placement. These partnerships could range from serving as an advisory board for best practices to providing dual-credit college hours to secondary students. While there were no negative comments regarding the pathway offerings, there was some disagreement as to whether college credit in secondary school was appropriate. While only a minority pushed back on this, some felt that it's best to let high school be high school and college to be college. Even this minority of stakeholders agreed that the partnership between the secondary school and community college was essential since the students would eventually attend the college, and the curriculum should be a seamless transition. Participants favored a scaffolded pathway beginning with early exposure, progressing toward dual-credit and certification coursework, and sustained through formal collaboration among schools, colleges, and Fire/EMS organizations. Regardless, these decisions are those of the individual school districts who provide learning opportunities within their schools, which have experienced teachers and community members (Clark et al., 2010).

A variety of values arose regarding the benefits to local communities from having CTE pathways available to secondary students. One of the primary benefits mentioned by participants was the workforce development component of a CTE pathway. Stakeholders mentioned the training and certifications considered as benefits to students, but also that these were beneficial to local agencies that had qualified applicants' job ready. Other benefits to the community included

"building a servant's heart", "building pride in the community", "more people who can save lives in an emergency", "supporting volunteer agencies", "community events like parades and special days", "community involvement and volunteer work", "fire safety for students' families" and "helping neighbors". These community benefits are possible because of purposeful connections between schools/teachers and industry professionals within the communities, which provide opportunities for experiential learning, along with connections to real-world expertise (Johnson, 2022; Plasman & Linares Ramirez, 2025).

Community benefits are further increased as we consider the human capital developed through CTE programs (Clark et al., 2023), helping communities thrive by having an educated and trained citizenry. Social capital, on the other hand, deals with cultural aspects of a community, industry or organization. People often describe first responders as a "special breed" of people; "firefighters running in when others are running out." The types of people who choose to be emergency workers are unique folks with a unique type of work. The social capital gained when students work closely with professional Fire/EMS workers helps to make these classes "real" to them, ultimately helping the student develop career-specific human capital (Atwell et al., 2022).

Based on the findings of this study, we recommend school administrators review their CTE programs to determine if they align with community and industry needs. Specifically, CTE programs that no longer have a viable career path within the community should be reviewed, while high-need areas that currently do not have a corresponding program should be considered. In addition, it is imperative that curriculum standards, career expectations, and career norms be upheld within these secondary CTE programs to adequately prepare students for career opportunities and success. CTE teachers should work to make purposeful connections between school administrators and industry stakeholders to increase administrators' understanding and interest in the given programs. These partnerships will hopefully help to provide the resources necessary for CTE teachers to deliver relevant, real-world programming.

Future research should expand the scope of this study to other states and additional CTE areas. While this study aimed to get community and school administrator perceptions, a gap remains in the perceptions of current secondary students and their parents due to the limitations of this study. Specifically, research should target eighth and ninth graders to examine how they learn about and make decisions related to CTE pathways offered. Longitudinal research would also be of value, providing a continuous dataset from secondary school through dual-credit and certification courses, to postsecondary schooling, and careers.

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Job Postings as Gatekeeping Mechanisms: An Intersectional Analysis of Workforce Access in CTE-Aligned Industries

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Abstract

Job postings are often treated as neutral descriptions of work; however, they function as powerful signals that shape access to employment. This study examines how job postings embed implicit assumptions about the "ideal worker" and how these assumptions may act as intersectional barriers to workforce entry. Using qualitative content analysis, a purposive sample of 20 job postings across healthcare, skilled trades, and information technology was analyzed using an original Intersectional Job Posting Analysis Framework, a seven-category coding rubric developed from existing research on hiring practices, intersectionality theory, and the "ideal worker" construct. This framework represents a methodological contribution that may be adapted and extended in future workforce equity research. Findings indicate that postings exhibited elevated mean scores across categories related to time flexibility, experience requirements, and credential expectations, with meaningful variation across the three industries examined. Notably, roles positioned as entry-level frequently included prior experience requirements, suggesting a persistent misalignment between workforce entry points and practical accessibility. Additionally, inclusion-oriented language was largely absent across postings. The study argues that job postings function as gatekeeping mechanisms: organizational texts that selectively regulate workforce access by embedding structural assumptions not equally distributed across applicant populations. Implications for CTE program design, Perkins V accountability frameworks, and equity-focused employer engagement are discussed, including concrete recommendations for posting literacy curricula and inclusive hiring standards in CTE-aligned industries.

Keywords: job postings, gatekeeping, intersectionality, career and technical education, workforce equity, ideal worker, hiring practices, labor market access

Introduction

Job postings are often treated as neutral artifacts within labor markets, serving as routine descriptions of duties, qualifications, and organizational expectations. However, research suggests that job advertisements function as signaling mechanisms that shape applicant perceptions of fit, belonging, and likelihood of success (Gaucher et al., 2011; Spence, 1973). As such, job postings play a critical yet underexamined role in structuring access to employment opportunities.

Within career and technical education (CTE) and workforce development systems, this gap is particularly consequential. While policy frameworks such as the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) emphasize equitable access and outcomes for special populations (Pub. L. No. 115-224, 2018), less attention has been given to the labor market signals encountered as learners transition from education to employment. Job postings represent a critical interface between training systems and workforce entry, yet they remain largely absent from discussions of accountability, equity, and program alignment.

CTE programs serve a diverse population of learners, including individuals from low-income backgrounds, single parents, adults returning to the workforce, English language learners, and students with disabilities (Advance CTE & ACTE, 2023; Pub. L. No. 115-224, 2018). These learners, often described in the literature as the "new majority" of postsecondary students, disproportionately rely on CTE as a pathway to economic stability and career advancement (Spaulding & Sirois, 2022). Research has documented that CTE participation can improve workforce outcomes, with Brunner et al. (2023) finding significantly higher earnings and graduation rates for male students attending stand-alone technical high schools. However, this evidence base focuses largely on in-program outcomes such as completion, credential attainment, and early wage gains. Far less attention has been paid to what happens at the moment of labor market entry, when CTE graduates encounter the actual language and expectations of job postings in their field. Understanding the accessibility of job postings in CTE-aligned industries is therefore essential not only to measuring equitable outcomes but also to designing employer engagement strategies, career advising frameworks, and program curricula that prepare learners for the structural realities of the labor market transition.

While emerging research has documented bias in job posting language (including gendered wording and credential inflation), much of this work examines disparities along a single dimension of identity at a time (Gaucher et al., 2011; Modestino et al., 2020). This study takes a different approach, applying an intersectional lens (Bowleg, 2012; Crenshaw, 1989, 1991) to examine how overlapping constraints embedded in job postings may compound to produce layered exclusion. Drawing further on the concept of the "ideal worker" (Acker, 1990) and theories of organizational gatekeeping, this research argues that job postings are not neutral administrative documents but consequential texts that actively shape who perceives themselves as qualified to participate in the labor market.

Literature Review

Job Postings as Labor Market Signals

Job postings have traditionally been understood as informational tools; however, research in labor economics and organizational studies suggests they function as signals that shape applicant behavior and labor market outcomes (Spence, 1973). Signaling theory posits that employers use job advertisements to communicate organizational expectations, and that applicants use these signals to assess their perceived fit and likelihood of success (Spence, 1973). Job advertisements

thus communicate not only required skills and qualifications but also implicit expectations about who belongs within an organization.

Bias and Language in Job Advertisements

A growing body of research has examined how job-posting language influences applicant perceptions and participation. Gaucher et al. (2011) found that gendered wording in job advertisements can discourage women from applying, demonstrating that even subtle linguistic choices carry exclusionary potential. More recent studies have identified patterns of credential inflation and shifting skill requirements, with employers frequently raising educational and experiential thresholds beyond what job tasks demand (Fuller & Raman, 2017; Modestino et al., 2020). These studies suggest that job postings may function as more than neutral informational artifacts, and that the social and structural signals embedded within them may shape who self-selects into the applicant pool.

Intersectionality and Workforce Access

While prior research has identified disparities in hiring practices, much of this work remains limited to single-axis analyses that examine one dimension of identity, such as gender or race, at a time. Intersectionality provides a more comprehensive framework for understanding how overlapping identities and structural conditions shape access to opportunity (Bowleg, 2012; Choo & Ferree, 2010; Crenshaw, 1989, 1991). Originally articulated by Kimberlé Crenshaw (1989) in the context of race and gender, intersectionality has since been applied across disciplines to illuminate how systems of advantage and disadvantage interact and compound. Within workforce contexts, this perspective highlights how structural barriers may accumulate for individuals navigating multiple, simultaneous constraints, such as caregiving responsibilities, limited transportation, or nonlinear employment histories.

The "Ideal Worker" Norm

The concept of the "ideal worker," as articulated by Acker (1990), provides a critical lens for understanding how workplace expectations are constructed and embedded in organizational practices. The ideal worker is assumed to be fully available, unencumbered by caregiving responsibilities, and able to demonstrate continuous employment and commitment. This norm, Acker argued, is not incidental but is systematically reproduced through the structures of organizations, including hiring documents and job descriptions. When job postings embed expectations aligned with this norm, they implicitly communicate that applicants who deviate from it, such as single parents, low-income workers, or career changers, are less suitable candidates. This framework connects directly to intersectionality by revealing how multiple, intersecting identities may place individuals outside the bounds of the ideal worker model.

CTE Learners and the Labor Market Transition

A growing body of research has examined the workforce outcomes associated with CTE participation. Brunner et al. (2023) found that attendance at stand-alone technical high schools

was associated with significantly higher earnings for male students, as well as improved high school graduation rates. Research by the Urban Institute further documents that postsecondary CTE programs can provide pathways to economic stability for new majority learners, particularly when programs are well-aligned with local labor market demand and designed with equity-centered employer engagement (Spaulding & Sirois, 2022). Despite these documented benefits, scholars have also noted persistent gaps between program completion and labor market success, particularly for learners from low-income backgrounds and those navigating multiple intersecting barriers (Spaulding & Sirois, 2022). The Perkins V legislation acknowledges this by requiring local recipients to complete a Comprehensive Local Needs Assessment (CLNA) that considers student performance disaggregated by special population status, including individuals from economically disadvantaged families, single parents, students with disabilities, and out-of-workforce individuals (Pub. L. No. 115-224, 2018). However, the CLNA framework does not extend to the structure of labor market opportunities into which CTE graduates transition.

Employer engagement has emerged as a central strategy in CTE reform efforts, with NASDCTEc (2014) documenting that state CTE directors widely report increased employer involvement in program design, curriculum validation, and work-based learning over the past decade. However, existing models of employer engagement in CTE focus primarily on the development of curriculum-industry alignment and work-based learning opportunities, with limited attention to hiring practices or the accessibility of job postings as a downstream equity concern (NASDCTEc, 2014; Lewy, 2021). This gap is significant: even when CTE programs successfully prepare learners with relevant skills and industry credentials, labor market entry remains mediated by employer hiring documents that may embed assumptions incompatible with the lived realities of the populations CTE is designed to serve. Job postings, as the primary public-facing signal of employer expectations, represent an underexamined site of potential misalignment between CTE equity goals and labor market access.

Gatekeeping in Workforce and Organizational Contexts

The concept of gatekeeping has been theorized across multiple disciplinary traditions, from communication studies to organizational sociology, yet its application to labor market access and hiring practices remains underdeveloped. Originally developed by Lewin (1947) to describe how individuals in positions of institutional authority regulate the flow of information or resources through defined channels, gatekeeping has since been extended to describe how social structures, not only individuals, determine whose access to opportunity is facilitated or blocked (Shoemaker & Vos, 2009). In workforce contexts, gatekeeping refers to the mechanisms, both formal and informal, explicit and embedded, through which access to employment is selectively structured. These mechanisms include hiring criteria, credential requirements, interview processes, and, critically, the language and expectations embedded in job postings themselves.

Sociological perspectives on gatekeeping emphasize its role in reproducing existing power relations and social hierarchies. Rivera (2015) demonstrated that elite hiring practices function as gatekeeping mechanisms that systematically favor candidates who reflect the cultural backgrounds of those already within institutions, not simply those with the highest competencies. Similarly, Tilly (1998) argued that categorical inequality, understood as the systematic exclusion

of groups based on ascribed characteristics, is sustained not through individual prejudice alone but through organizational routines and boundary-drawing practices. Job postings, in this view, function as boundary objects: they define who belongs within a role before any candidate interaction occurs.

In labor market research, scholars have examined how credential requirements, screening mechanisms, and application barriers differentially filter the applicant pool, with documented effects across race, gender, and class (Moss & Tilly, 2001; Pager & Shepherd, 2008). This body of work reveals that gatekeeping operates at multiple stages of the hiring process, from initial job advertisement through interview and selection, and that the cumulative effect of these filters is neither random nor neutral. When analyzed through an intersectional lens, these gatekeeping mechanisms may not affect all applicants equally; rather, they may interact with the social positions of applicants to produce differential exclusion (Crenshaw, 1991). An individual navigating caregiving responsibilities, limited transportation, and a non-linear work history may encounter each requirement in isolation as a manageable challenge, but in combination, these expectations may constitute a compounded structural barrier.

This study adopts an integrated definition of gatekeeping that draws on both sociological and labor market traditions: gatekeeping is understood as the process by which organizational texts, norms, and structures regulate access to employment by embedding assumptions about the ideal applicant that are differentially constraining across social positions. Job postings function as gatekeeping mechanisms in this sense not because they are designed to exclude, but because the assumptions they reflect, regarding availability, credentials, mobility, and professional identity, are socially located in ways that systematically advantage some applicants over others. Within CTE-aligned industries, where programs are explicitly designed to expand workforce access for diverse and historically underserved populations, understanding how job postings function as gatekeeping texts is essential to evaluating whether educational equity at the program level translates into equitable access at the labor market entry point. A further dimension of this concern involves the relationship between organizational rhetoric and structural practice. Scholars have documented that organizations frequently adopt formal diversity commitments, including equal opportunity statements and inclusive hiring language, as signals of institutional legitimacy, while the underlying structures and practices that govern access remain largely unchanged (Dobbin & Kalev, 2016; Meyer & Rowan, 1977). This decoupling between stated equity commitments and embedded structural assumptions represents a particularly consequential dynamic in the context of job postings, where surface-level inclusion language may coexist with requirements that systematically narrow the eligible applicant pool.

Research Questions

Primary Research Questions

The following served as the primary research questions for this study:

1. How do job postings across CTE-aligned industries embed implicit assumptions about the "ideal worker" through their language, requirements, and structural expectations?

2. In what ways do these embedded assumptions function as intersectional gatekeeping mechanisms that may differentially constrain workforce access across applicant populations?

Secondary Research Questions

Secondary research questions were as follows:

1. How are expectations related to time, mobility, experience, and workplace culture represented in job postings across CTE-aligned industries?
2. In what ways might these expectations disproportionately impact individuals at the intersection of multiple identities (e.g., single parents, low-income individuals, nontraditional learners)?
3. To what extent do job postings align with or contradict equity goals outlined in workforce development frameworks such as Perkins V?
4. What implications do these findings have for CTE program design, workforce preparation, and equitable access to employment?

Method

Research Design

This study employed qualitative content analysis to examine how job postings embed implicit assumptions about applicants and how those assumptions may function as intersectional barriers to employment access. Qualitative content analysis was selected because it enables systematic examination of textual data while preserving the contextual meaning of language, tone, and structure within job advertisements (Hsieh & Shannon, 2005; Schreier, 2012). Rather than treating job postings as neutral descriptions of work, this study conceptualizes them as gatekeeping texts that communicate both explicit requirements and implicit expectations about the "ideal applicant" (Acker, 1990; Gaucher et al., 2011; Spence, 1973). The analysis was guided by an intersectional framework emphasizing how overlapping identities and structural conditions shape access to opportunity (Bowleg, 2012; Crenshaw, 1991).

Data Collection

A purposive sample of 20 job postings was collected from two publicly accessible online job boards, Indeed and LinkedIn. Postings were selected across three career fields aligned with CTE pathways: healthcare, skilled trades/advanced manufacturing, and information technology. These fields were selected due to their prominence in workforce development initiatives and their relevance to diverse learner populations within CTE systems. This study is explicitly exploratory in scope, designed to develop and pilot an intersectional coding framework rather than to produce statistically generalizable findings. Consistent with this intent, the search was purposefully bounded rather than intended to capture every available posting nationwide; the goal was to assemble a diverse and analytically useful set of postings across industries, role levels, and geographic regions, not to exhaust the universe of available listings. The sample size of 20 postings is consistent with the goals of exploratory qualitative content analysis oriented toward framework development rather than generalization (Schreier, 2012). The corpus was

intentionally bounded to pilot and illustrate the coding instrument across three distinct industry contexts, not to draw frequency-based conclusions about the population of CTE-aligned job postings. The purpose of this study is to develop, demonstrate, and assess the analytic utility of the Intersectional Job Posting Analysis Framework as a tool for future research at larger scale.

Postings were selected with attention to three guiding criteria: (1) industry representation, with postings distributed across all three CTE-aligned fields; (2) role-level variation, with both entry-level and early-career positions included within each industry; and (3) descriptive sufficiency, with only postings that included a detailed job description, explicit qualification requirements, and stated expectations retained for coding. Postings that lacked sufficient detail to support systematic coding were set aside. Search terms included role titles paired with industry keywords (e.g., "medical assistant," "electrician apprentice," "help desk technician"). To introduce geographic variation, searches were conducted across multiple U.S. regions by rotating location inputs, including metropolitan and nonmetropolitan areas across the Northeast, South, Midwest, and West. This approach was intended to capture variation in how posting language and requirements may differ across regional labor markets, rather than to produce a nationally representative sample. Because this study employed purposive rather than exhaustive sampling, searches concluded once the predetermined sampling criteria were satisfied and additional postings were no longer contributing meaningful variation across industries, role levels, and geographic regions. The final sample of 20 postings (seven from healthcare, seven from skilled trades, and six from information technology) was selected when the researcher determined that sufficient variation in role type and posting content had been achieved across the three industries. While not intended to be representative of the broader population of job postings in these fields, the sample provides a structured and purposefully assembled dataset for examining how job postings may function as intersectional gatekeeping mechanisms, and for piloting a coding framework that future research can apply at larger scale.

Table 1
Sample Description of Job Postings

Industry	**Number of Postings**	**Example Roles**
Healthcare	7	Medical Assistant, CNA, Phlebotomist
Skilled Trades/Advanced Manufacturing	7	HVAC Technician, Electrician, Apprentice Welder
Information Technology	6	Help Desk Analyst, Network Technician, IT Support Specialist

Note. Sample includes entry-level and early-career roles across CTE-aligned pathways drawn from Indeed and LinkedIn.

Table 2
Mean Category Scores by Industry

Coding Category	Healthcare (n = 7)	Skilled Trades (n = 7)	Information Technology (n = 6)	Full Sample (n = 20)
1. Time Expectations	1.86	1.71	1.17	1.60
2. Mobility Requirements	1.14	1.86	0.83	1.30
3. Experience Pathway Assumptions	1.57	1.71	1.83	1.70
4. Credential & Access Expectations	1.71	1.57	1.83	1.70
5. Cultural Fit & Normative Professionalism	1.29	1.57	1.17	1.35
6. Hidden Resource Assumptions	1.00	1.71	0.67	1.15
7. Inclusion & Support Signals (absence as barrier)	1.71	1.86	1.50	1.70

Note. Table 2 presents descriptive mean category scores by industry and for the full purposive sample. Scores reflect a 0–2 rubric applied consistently across all seven categories: higher scores indicate greater structural constraint. For Category 7 (Inclusion and Support Signals), the scale is applied to the absence of inclusive features so that higher scores likewise indicate greater barrier contribution. Overall high/moderate classifications were not retained because the available data support category-level comparisons rather than verified posting-level summary classifications.

Table 2 presents mean category scores across the three industries. Time expectations (Category 1) emerged as the most consistently elevated barrier across all sectors, with healthcare and skilled trades postings showing the highest mean scores. Mobility requirements (Category 2) were most pronounced in skilled trades, reflecting the frequent co-occurrence of transportation and physical access expectations in that sector. Experience pathway assumptions (Category 3) and credential expectations (Category 4) were elevated across all industries, with IT postings showing slightly higher scores on credential requirements relative to time expectations, consistent with the pattern of technical certification demands observed in that sector. The absence of inclusion and support signals (Category 7) was notable across all three industries, with skilled trades postings exhibiting the highest mean score, indicating the greatest absence of these features. These distributional patterns provide quantitative texture to the qualitative findings discussed in subsequent sections.

Coding Framework

Data were analyzed using a structured coding rubric, the *Intersectional Job Posting Analysis Framework*, developed from existing research on hiring practices, workforce access, and bias in job postings (Acker, 1990; Gaucher et al., 2011; Modestino et al., 2020) and further informed by an intersectional lens emphasizing structural constraints (Bowleg, 2012; Crenshaw, 1991). Each job posting was coded across seven primary categories: (1) time expectations, (2) mobility and transportation requirements, (3) experience pathway assumptions, (4) credential and access expectations, (5) cultural fit and normative professionalism, (6) hidden resource assumptions, and (7) inclusion, flexibility, and support signals.

Each category was scored on a scale from 0 to 2, where 0 indicated minimal or no barrier, 1 indicated moderate presence of the feature, and 2 indicated strong or potentially exclusionary assumptions.

Coding Procedures and Trustworthiness

All job postings were imported into a structured coding matrix. The researcher conducted an initial read-through of each posting to develop familiarity with the data and identify preliminary patterns, followed by systematic coding using the established rubric. Analytic memos were recorded throughout to capture emerging insights, document decision-making, and note patterns across industries and role levels.

This study utilized a single-coder approach. To enhance consistency and rigor, a structured coding rubric with clearly defined categories and anchor examples was applied systematically across all postings. Analytic memos ensured transparency in interpretation. While intercoder reliability was not calculated, this approach aligns with qualitative content analysis traditions that prioritize depth, reflexivity, and systematic procedure in single-researcher designs (Schreier, 2012). The explicit grounding of coding categories in both established literature and intersectionality theory further strengthens the conceptual validity of the analysis. To address trustworthiness systematically, this study employed four strategies aligned with Lincoln and Guba's (1985) criteria for qualitative rigor. First, credibility was enhanced through multiple coding passes: each posting was read three times, with the first pass dedicated to familiarization, the second to systematic scoring against the rubric, and the third to interpretive notation and analytic memo writing. Second, dependability was supported through a structured audit trail, including analytic memos documenting scoring decisions and an a priori rubric developed from established theoretical and empirical literature before any coding began. Third, confirmability was addressed through theoretical transparency: the coding framework and its grounding in intersectionality theory and the ideal worker construct are fully documented, enabling future researchers to replicate or critically engage with the analytical approach. Fourth, transferability is supported through thick description of the sample, the coding procedures, and the analytic process, enabling readers to assess the degree to which findings may be applicable to related contexts. The absence of a multicoder design is acknowledged as a limitation of this exploratory work. Future research should apply the framework with multiple coders and calculate intercoder reliability to strengthen the dependability of the analytic approach.
Limitations of this approach include the relatively small and purposive sample, which restricts generalizability. Additionally, job postings represent only one stage of the hiring process and

may not fully reflect actual hiring practices or workplace conditions. Despite these limitations, the study provides a meaningful exploratory framework for examining job postings as intersectional gatekeeping mechanisms.

A further limitation relates to the sensitivity of the coding rubric itself. Because the framework is designed to identify the presence of structural constraints across multiple categories, it may be calibrated in a way that increases the likelihood of identifying at least moderate barriers in most postings. While this sensitivity is analytically useful for detecting embedded assumptions, it also raises the possibility that the framework privileges identification over differentiation.

Researcher Positionality

Reflexivity is a foundational commitment in qualitative research, and particularly in studies employing an intersectional framework (Crenshaw, 1991). As the sole researcher on this project, my positionality inevitably shaped the questions I asked, the categories I constructed, and the interpretations I drew from the data. My professional background in CTE and workforce development informed my attentiveness to the labor market transition as a site of structural inequality and gave me a working familiarity with the industries and role types examined in this sample. At the same time, this proximity to the field may have oriented my interpretive lens toward a critical reading of posting language as a site of structural constraint—a perspective that is theoretically grounded but not value-neutral, and that warrants acknowledgment. I approached the analysis with the assumption that equity and access are structural, not individual, concerns. Readers should interpret the findings with awareness that the coding rubric, while developed from existing literature, reflects choices about what counts as a barrier that are themselves shaped by this orientation. This does not undermine the validity of the findings, but it does call for interpretive humility and invites future researchers to engage with the framework critically and iteratively.

Data Analysis

Following coding, data were analyzed using a combination of descriptive and thematic approaches. Category scores were first reviewed to identify the frequency and intensity of specific types of expectations across postings. Patterns were then examined across industries and job levels to determine whether certain sectors exhibited more pronounced intersectional barriers. Finally, analytic memos were synthesized to identify broader themes related to how job postings construct the “ideal worker.” This phase emphasized the intersection of constraints across categories within individual postings, consistent with the study’s theoretical framing. Descriptive counts of coded category frequencies were incorporated to strengthen analytic transparency and support cross-case comparison.

Findings and Analysis

Patterns of Structural Constraints Across Postings

Analysis of the 20 job postings revealed consistently moderate to elevated constraint scores across all seven coding categories. Mean category scores ranged from 1.15 (Hidden Resource Assumptions) to 1.70 (Experience Pathway Assumptions, Credential Expectations, and Inclusion Signal Absence) across the full sample, indicating that structural assumptions were present to some degree in the large majority of postings. Overall high/moderate classifications are not reported here because the available data support category-level comparisons rather than verified posting-level summary ratings. Within this exploratory sample, postings frequently embedded multiple overlapping expectations that may limit access for applicants whose life circumstances do not align with dominant workforce assumptions. These patterns are illustrative and not intended to be generalized beyond the sample, but they suggest productive directions for further investigation.

Time Expectations and the "Always Available" Worker

Time-related expectations emerged as one of the most consistent and influential barriers across postings. Many postings included requirements such as evening, weekend, or on-call availability. These expectations were particularly pronounced in healthcare and skilled trades positions, where extended or irregular scheduling was often presented as standard. For example, healthcare postings frequently included language such as *"must be available for rotating shifts including evenings and weekends"* (JP1), while skilled trades postings commonly required *"flexibility to work overtime as needed, including nights and weekends"* (JP7). These excerpts illustrate how temporal expectations are explicitly embedded within posting language rather than inferred from analysis alone. Postings rarely acknowledged these scheduling demands or offered alternatives such as predictable scheduling or flexible arrangements. Instead, flexibility was framed as a non-negotiable requirement rather than a supported condition.

This pattern reflects a broader workforce norm in which the "ideal worker" (Acker, 1990) is implicitly constructed as unencumbered by external responsibilities and fully available on the employer's terms. From an intersectional perspective (Bowleg, 2012; Crenshaw, 1991), these expectations may disproportionately affect individuals with caregiving responsibilities, those working multiple jobs, or those reliant on structured transportation systems. The temporal demands embedded in these postings extend well beyond standard scheduling and are rarely accompanied by acknowledgment of flexibility, support structures, or alternative arrangements.

Entry-Level Misalignment, Experience Requirements, and Credential Inflation

A key finding of this analysis is the disconnect between job classification and actual accessibility. Several postings labeled as entry-level or near-entry roles nonetheless included high-barrier characteristics, particularly in relation to experience requirements, credential expectations, and time flexibility. Postings positioned as entry-level frequently included experience requirements ranging from one to three years, suggesting a persistent misalignment between role classification and practical accessibility.

For example, postings such as JP1 (Medical Assistant), JP7 (Apprentice Electrician), and JP9 (Help Desk Analyst) each required prior experience despite being labeled entry-level. JP9, for

instance, specified *"minimum of 2 years of help desk or technical support experience required,"* while JP7 required *"previous hands-on electrical experience preferred, apprenticeship hours a plus."* These excerpts suggest that entry-level labeling does not necessarily correspond to reduced barriers and may obscure persistent structural expectations embedded within posting language. This pattern is consistent with what Modestino et al. (2020) documented as opportunistic upskilling, a tendency for employers to raise education and experience requirements beyond what job performance demands. The expectation of continuous, linear career progression was evident throughout these postings, with requirements narrowly defined by role type and industry, and little recognition of transferable skills, community-based experience, or non-linear pathways. This absence of alternative pathway language further reinforces the assumption that the most qualified candidates are those who have followed uninterrupted, conventional career trajectories, a standard that disproportionately disadvantages career changers, those re-entering the workforce after caregiving, and CTE learners who lack continuous work histories despite having completed structured training programs.

Credential requirements contributed to this pattern. Postings frequently included degree requirements, certifications, or licensure expectations not clearly tied to job tasks, with multiple cases requiring a "Bachelor's degree" or specific industry certifications even when job responsibilities suggested that skills-based experience may have been equally relevant. This reflects broader trends of credential inflation documented in the hiring literature (Fuller & Raman, 2017; Modestino et al., 2020). From an intersectional standpoint, such inflation may function as a structural barrier for individuals with limited access to higher education, financial resources, or formal training pathways. Postings rarely acknowledged experiential learning, community-based training, or adjacent field experience as legitimate preparation, reinforcing a narrow and exclusionary definition of qualification.

Cultural Fit and the Language of Belonging

A further pattern involved language that signaled cultural expectations and implicit norms of professional identity. This included masculine-coded descriptors such as "competitive" and "assertive," which Gaucher et al. (2011) found can discourage women from applying, and which may similarly signal cultural exclusion to other nontraditional applicants, as well as broader cultural-fit language such as "fast-paced," "high-energy," "self-starter," and "rockstar." While these descriptors may appear benign, they often lack clear operational definitions and function as implicit signals about who belongs. Such language may advantage applicants already familiar with dominant workplace norms while disadvantaging those from different cultural, linguistic, or socioeconomic backgrounds.

The emphasis on organizational "fit" was rarely accompanied by explicit commitments to inclusion (Gaucher et al., 2011). Only four of the 20 postings included meaningful inclusion signals such as training support, flexible pathways, or explicit encouragement of diverse applicants. Where such language was present, Category 7 scores tended to be lower, suggesting that intentional and specific language choices may partially counteract structural exclusion. The near-total absence of inclusion-oriented language across the remaining postings represents a

significant gap: postings communicated expectations in considerable detail but offered little indication of how diverse applicants would be supported in meeting them.

Industry Variation and the Compounding of Constraints

Patterns of constraint varied by industry, with skilled trades postings demonstrating the most pronounced clustering of barriers. In these roles, mobility requirements, time expectations, and resource assumptions such as reliable personal transportation frequently co-occurred, creating compounded constraints for applicants. Healthcare postings similarly exhibited high time-related barriers, while IT postings tended to emphasize credential and experience requirements. The most significant barriers emerged not from any single requirement but from their interaction: a posting requiring evening and weekend availability, two to three years of continuous experience, and specific certifications may be accessible only to a narrow subset of applicants even if each individual requirement appears defensible in isolation. When considered collectively, these expectations reflect a model of the worker that assumes stability, access, and flexibility, conditions that are not equally distributed across populations. This clustering effect highlights the importance of intersectional analysis that attends to how requirements compound within individual postings rather than examining any single dimension of constraint in isolation.

Discussion

Rather than reiterating the descriptive patterns presented in the findings, this discussion focuses on interpreting how those patterns function collectively as structural mechanisms shaping workforce access. Throughout, a distinction is maintained between interpretations grounded directly in the coded data and broader theoretical or conceptual claims that extend beyond what this exploratory sample can confirm. The results suggest not only the presence of individual constraints but also the ways in which these constraints may interact to construct and normalize an implicit model of the "ideal worker." This aligns with Tilly's (1998) argument that categorical inequality is sustained through organizational routines that appear neutral while systematically advantaging some groups over others. The temporal demands identified in the Findings section illustrate this dynamic concretely: scheduling requirements that appear as neutral operational needs in fact function as implicit filters, advantaging applicants whose life circumstances align with the always-available norm while systematically constraining those whose availability is shaped by caregiving responsibilities, economic necessity, or limited access to transportation, conditions that intersect with race, class, gender, and disability in well-documented ways (Bowleg, 2012; Crenshaw, 1991).

These findings are consistent with and extend Gaucher et al.'s (2011) work on gendered job posting language by illustrating that bias operates along multiple intersecting dimensions simultaneously, not merely through explicit linguistic markers. Where prior research identified single-axis disparities in wording, this study reveals how overlapping constraints compound to produce layered exclusion, a phenomenon that single-axis analyses are structurally unable to capture. This supports Crenshaw's (1991) foundational argument that experiences of disadvantage are shaped not by isolated identity categories but by their intersection, and aligns with Bowleg's (2012) call for frameworks that attend to the complexity of simultaneous

constraint. It is worth acknowledging, however, a tension inherent in operationalizing intersectionality through a summative coding framework. The rubric organizes barriers into discrete categories that are scored and aggregated, which risks treating intersectionality as accumulation rather than constitution, that is, as the adding up of separate disadvantages rather than the qualitative transformation that occurs when constraints interact. For example, a transportation requirement paired with mandatory evening shifts in a low-wage healthcare role may not simply equal two barriers; it may produce a compounded, qualitatively distinct exclusion not captured by summing scores. Future iterations of this framework should consider incorporating relational coding procedures or case-level narrative analysis to capture how categories shape one another within individual postings.

Particularly notable is the misalignment between entry-level role classification and actual accessibility. The finding that entry-level postings frequently required one to three years of prior experience, industry-specific certification, and nonstandard availability challenges the assumption that entry-level designation signals openness to diverse applicants. This pattern is consistent with what Modestino et al. (2020) documented as opportunistic upskilling, a pattern in which employers raise education and experience requirements beyond what job performance demands when worker supply increases. For CTE learners who have completed training programs but lack continuous, linear work histories, this misalignment represents a structural gap between program completion and labor market access that existing accountability frameworks do not capture.

The near-total absence of inclusion-oriented language across postings is equally significant. While equity and inclusion have become prominent themes in policy discourse, these values were rarely reflected in the actual language of job advertisements. This gap between stated organizational commitments to diversity and the implicit signals embedded in hiring documents represents a form of structural inconsistency with real consequences for applicant self-selection. Postings that did include inclusion signals, such as acknowledgment of flexible pathways or explicit encouragement of diverse applicants, tended to have lower category-level scores in the Inclusion and Support Signals dimension, suggesting that intentional and specific language choices may partially counteract structural exclusion.

A proposition for future research concerns what might be described as performative equity signaling: the co-occurrence of surface-level diversity language and structurally exclusionary requirements within the same posting. This study did not systematically code for the presence or placement of EEO boilerplate, so no finding is claimed here. However, the pattern is theoretically significant and warrants explicit coding in future work. Research by Dobbin and Kalev (2016) documents that organizations frequently adopt formal diversity statements for purposes of institutional legitimacy while actual practices remain unchanged, and Kang et al. (2016) found that organizational diversity statements led racial-minority applicants to present their identities more openly on resumes, exposing them to the same discriminatory screening they had sought to avoid. Whether these dynamics operate through job posting language specifically, and how CTE learners navigate postings that signal welcome while embedding structural exclusion, represents a meaningful direction for future intersectional workforce research.

Industry variation in the clustering of barriers also warrants attention. Skilled trades postings exhibited the most pronounced co-occurrence of constraints, with mobility requirements, time expectations, and resource assumptions frequently appearing together. This clustering may reflect genuine industry conditions, but it also suggests that certain CTE-aligned fields reproduce structural barriers at the point of labor market entry in ways that are especially difficult for applicants navigating multiple intersecting constraints. For CTE programs preparing learners for skilled trades pathways, these findings raise important questions about whether workforce preparation models adequately account for the structural realities learners may encounter at the point of application.

Taken together, these findings argue for a reconceptualization of job postings not as neutral administrative documents but as consequential texts that actively shape workforce access. This reframing has both theoretical and practical implications for how CTE systems, workforce policy, and employer engagement are designed and evaluated.

Implications for CTE and Workforce Policy

Misalignment Between Training and Labor Market Signals

The findings highlight a potential misalignment between workforce preparation efforts and labor market expectations. CTE programs are designed to equip learners with skills, credentials, and pathways into employment; however, job postings frequently communicate expectations that extend beyond skill proficiency, including time flexibility, mobility, and continuous work histories. This disconnect raises important questions about whether current workforce preparation models fully account for the realities of employment access.

While discourse around skills-based hiring has evolved (Fuller et al., 2022; Fuller & Raman, 2017), the findings of this study indicate that credential requirements and experience expectations remain prevalent, particularly in mid-level roles. This tension suggests that hiring practices, as reflected in job postings, may still reinforce traditional access barriers even as policy rhetoric moves toward competency-based frameworks.

Job Postings as an Unexamined Layer of Accountability

This study positions job postings as an underexamined component of workforce accountability systems. Current accountability frameworks within CTE, including those associated with Perkins V, focus primarily on student outcomes such as program completion, credential attainment, and employment placement. However, these measures do not capture the accessibility or structure of the labor market opportunities into which students transition.

From an intersectional perspective, this represents a critical gap. If job postings systematically privilege applicants with specific forms of availability, stability, and prior access to resources, then equitable educational outcomes may not translate into equitable employment access. Incorporating analysis of labor market signals, such as job postings, into tools like the

Comprehensive Local Needs Assessment (CLNA) could provide a more holistic understanding of workforce alignment and equity.

Reframing Equity Beyond Participation

The findings suggest the need to expand definitions of equity within workforce systems. Much of the existing literature and policy discourse focuses on increasing participation among special populations, including individuals in nontraditional fields, single parents, and economically disadvantaged learners. While these efforts are critical, they may be insufficient if structural barriers persist within hiring practices.

An intersectional framework, as articulated by Kimberlé Crenshaw (1989, 1991) and expanded by Bowleg (2012), emphasizes that inequality is not experienced along a single dimension but through overlapping systems of constraint. The findings of this study demonstrate how job postings may reinforce these constraints by embedding assumptions aligned with a narrow model of the "ideal worker." As such, equity efforts must move beyond access to education and toward addressing how opportunity is structured and communicated within the labor market itself.

Implications for Program Design and Employer Engagement

These findings have practical implications for CTE program design and employer partnerships. Educators and workforce practitioners may benefit from incorporating job posting analysis into curriculum development, career advising, and employer engagement strategies. Specifically, analyzing job postings in targeted industries can help identify misalignments between program outcomes and employer expectations, hidden barriers that may affect student transitions into employment, and opportunities to advocate for more inclusive hiring practices in partnership with regional employers.

Organizations such as Advance CTE (2021) emphasize the importance of aligning education with workforce needs while promoting equity and access. This study suggests that such alignment must include not only skills and credentials, but also a critical examination of how job opportunities are structured and communicated. Employer engagement efforts that include conversation about job posting language and inclusive hiring design represent an underutilized lever for advancing workforce equity.

Toward More Inclusive Workforce Signaling

Taken together, the findings support the need to reconceptualize job postings as more than administrative tools. They are, instead, powerful signals that shape who perceives themselves as qualified and able to participate in the labor market. Addressing inequities in workforce access therefore requires not only preparing individuals for work, but also critically examining and reshaping the signals that define opportunity. The evidence highlighted here suggests several directions for practice and policy that warrant piloting and evaluation. First, Perkins V accountability frameworks could be expanded to include labor market signal analysis, systematically examining the accessibility of job postings in sectors CTE programs prepare

learners to enter. Second, CTE programs themselves could develop "posting literacy" curricula that teach learners to critically read and navigate job advertisement language as part of career readiness preparation. Third, state CTE agencies could develop voluntary standards or toolkits for employers in CTE-aligned industries, establishing benchmarks for inclusive posting design. Finally, workforce funding bodies might explore whether employer accessibility, as reflected in job posting practices, could be considered alongside traditional placement metrics in evaluating program success. Each of these represents an actionable direction for reducing structural barriers at the labor market entry point and warrants empirical evaluation in future work.

Conclusion

This study examined job postings as gatekeeping mechanisms within workforce systems, applying an intersectional lens to an exploratory purposive sample of 20 job postings across CTE-aligned industries. Findings reveal that job postings frequently embed assumptions aligned with an "ideal worker" model characterized by availability, stability, and prior access to resources, assumptions that operate as implicit filters shaping who perceives themselves as qualified to apply.

The findings highlight a critical disconnect between workforce preparation systems and labor market access. While CTE programs emphasize equitable participation and skill development, job postings often reinforce structural barriers that may limit access for individuals navigating intersecting constraints. The near-absence of inclusion-oriented language across postings, combined with the misalignment between entry-level classification and actual accessibility, suggests that equity efforts focused solely on educational access are insufficient if the labor market entry point remains structured around a narrow and exclusionary model of the ideal applicant.

Addressing inequities in workforce access therefore requires extending equity efforts beyond education and into the structure and communication of employment opportunities themselves. Future research should expand this analysis using larger, more diverse datasets, examine the relationship between job posting language and actual hiring outcomes, and explore strategies for supporting more inclusive job posting design in partnership with CTE-aligned employers. Longitudinal and multimethod approaches that pair job posting analysis with applicant experience data would further illuminate how these structural signals shape workforce access across populations. Ultimately, preparing learners for equitable workforce participation requires not only transforming educational systems, but also critically examining the organizational texts that define who is invited to participate in work itself.

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