

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

Robert W. Dusenbery
The University of Kansas

Christopher J. Eck
The University of Tennessee

Xiangyu Dale Li
Tony McAleavy
Oklahoma State University

Haley Murphy
Oklahoma State University

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		<i>f</i>	%
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	<i>M</i>	<i>SD</i>
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.

References

- Aldrich, D. P., & Meyer, M. A. (2015). Social capital and community resilience. *American Behavioral Scientist*, 59(2), 254–269. <https://doi.org/10.1177/0002764214550299>
- Albtoush, R., Dobrescu, R., & Ionescu, F. (2011). A hierarchical model for emergency management systems. *University Politehnica of Bucharest Scientific Bulletin*, 73(2), 53–62. <https://www.scientificbulletin.upb.ro/static/pdfs/full87242.pdf>

- Amineh, R. J., & Asl, H. D. (2015). Review of constructivism and social constructivism. *Journal of Social Sciences, Literature and Languages*, 1(1), 9–16.
<https://api.semanticscholar.org/CorpusID:27273145>
- Atwell, A., Ecton, W., Klein, S., D’Amico, M. M., & Sublett, C. (2022). Community college responses to align career and technical education programs with changing labor markets. *New Directions for Community Colleges*, 2022(197), 45–58. <https://doi.org/10.1002/cc.20496>
- Becker, G. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*. The University of Chicago Press.
- Belland, B. R., Kim, C., & Hannafin, M. J. (2013). A framework for designing scaffolds that improve motivation and cognition. *Educational Psychologist*, 48(4), 243–270. <https://doi.org/10.1080/00461520.2013.838920>
- Caci, L., Nyantakyi, E., Blum, K., Sonpar, A., Schultes, M.-T., Albers, B., & Clack, L. (2025). Organizational readiness for change: A systematic review of the healthcare literature. *Implementation Research and Practice*, 6. <https://doi.org/10.1177/26334895251334536>
- Clark, P. R., Lewis, C., Comeau, E., & Vickers-Smith, R. (2023). Perceptions of community risk assessment and challenges to implementation. *Burns*, 49(8), 1866–1878.
<https://doi.org/10.1016/j.burns.2023.06.008>
- Clark, R. W., Threton, M. D., & Ewing, J. C. (2010). The potential of experiential learning models and practices in career and technical education and career and technical teacher education. *Journal of Career and Technical Education*, 25(2), 46–62.
<https://doi.org/10.21061/jcte.v25i2.479>
- Creswell, J. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). SAGE.
- Dougherty, S. M. (2018). The effect of career and technical education on human capital accumulation: Causal evidence from Massachusetts. *Education Finance and Policy*, 13(2), 119–148. https://doi.org/10.1162/edfp_a_00224
- George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 step by step: A simple guide and reference*. Routledge.
- Gorbunova, A., Kapuza, A., Chen, O., & Costley, J. (2025). Rethinking pre-training: Cognitive load implications for learners with varying prior knowledge. *Frontiers in Psychology*, 16, Article 1628047. <https://doi.org/10.3389/fpsyg.2025.1628047>
- Hamilton, E., & Marckini-Polk, L. (2023). The impact of place-based education on middle school students’ environmental literacy and stewardship. *Cogent Education*, 10(1).
<https://doi.org/10.1080/2331186X.2022.2163789>

- Hasselqvist-Ax, I., Riva, G., Herlitz, J., Rosenqvist, M., Hollenberg, J., Nordberg, P., Ringh, M., Jonsson, M., Axelsson, C., Lindqvist, J., Karlsson, T., & Svensson, L. (2015). Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. *The New England Journal of Medicine*, 372(24), 2307–2315. <https://doi.org/10.1056/NEJMoa1405796>
- Hirschy, A. S., Bremer, C. D., & Castellano, M. (2011). Career and technical education (CTE) student success in community colleges: A conceptual model. *Community College Review*, 39(3), 296–318. <https://doi.org/10.1177/0091552111416349>
- Hoachlander, G. (2021). *Building a system of college and career pathways in New Mexico*. Learning Policy Institute. <https://learningpolicyinstitute.org/product/new-mexico-college-career-pathways-report>
- Jacobs, C. (2011). Measuring success in communities: Understanding the community capitals framework. *Extension Extra*, 517. http://openprairie.sdstate.edu/extension_extra/517
- Johnson, C. C., Vega, L., Kohalmi, A. L., Roth, J. C., Howell, B. R., & Van Hasselt, V. B. (2020). Enhancing mental health treatment for the firefighter population: Understanding fire culture, treatment barriers, practice implications, and research directions. *Professional Psychology: Research and Practice*, 51(3), 304–311. <https://doi.org/10.1037/pro0000266>
- Johnson, K. W. (2022). An exploration of employer participation in internships and other work-based learning experiences. *Journal of Career and Technical Education*, 37(1), 1–20. <https://doi.org/10.21061/jtce.v37i1.a1>
- Kolb, D. A. (2015). *Experiential learning: Experiences as the source of learning and development* (2nd ed.). Pearson.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Levitt, H. M. (2024). How to conduct an integrative mixed-methods meta-analysis: A tutorial for the systematic review of quantitative and qualitative evidence. *Psychological Methods*. Advance online publication. <https://doi.org/10.1037/met0000675>
- Malin, J. R., Bragg, D. D., & Hackmann, D. G. (2017). College and career readiness and the Every Student Succeeds Act. *Educational Administration Quarterly*, 53(5), 809–838. <https://doi.org/10.1177/0013161X17714845>
- Masadeh, M. (2012). Training, education, development and learning: what is the difference? *European Scientific Journal*, 8(10). <https://ejournal.org/index.php/esj/article/view/163>
- McClam, M., Workman, L., Walker, T. J., Dias, E. M., Craig, D. W., Padilla, J. R., Lamont, A. E., Wandersman, A., & Fernandez, M. E. (2025). Organizational readiness for

- implementation: A qualitative assessment to explain survey responses. *BMC Health Services Research*, 25, Article 36. <https://doi.org/10.1186/s12913-024-12149-8>
- Mertens, D. M., & Hesse-Biber, S. (2012). Triangulation and mixed-methods research: Provocative positions. *Journal of Mixed-methods Research*, 6(2), 75–79. <https://doi.org/10.1177/1558689812437100>
- Mobley, C., Sharp, J. L., Hammond, C., Withington, C., & Stipanovic, N. (2017). The influence of career-focused education on student career planning and development: A comparison of CTE and non-CTE students. *Career and Technical Education Research*, 42(1), 57–75. <https://doi.org/10.5328/cter42.1.57>
- Mutch, C. (2023). How schools build community resilience capacity and social capital in disaster preparedness, response and recovery. *International Journal of Disaster Risk Reduction*, 92, 103735. <https://doi.org/10.1016/j.ijdr.2023.103735>
- Nerlino, E. (2023). Making curriculum matter to students. *Educational Leadership*, 80(5), 68–72. <https://www.ascd.org/el/articles/making-curriculum-matter-to-students>
- Plasman, J., & Linares Ramirez, N. (2025). Work-based learning for all: Changes in internship and cooperative education participation over time. *Journal of Career and Technical Education*, 40(2). <https://doi.org/10.21061/jcte.488>
- Privitera, G. J. (2017). *Research methods for behavioral sciences* (2nd ed.). SAGE.
- Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). SAGE.
- Schultz, T. W. (1971). *Investment in human capital: The role of education and of research*. The Free Press.
- Smith, E. (2010). Sector-specific human capital and the distribution of earnings. *Journal of Human Capital*, 4(1), 35–61. <https://doi.org/10.1086/655467>
- Snodgrass, M. R., Love, H. R., Roberts, C. A., Gilson, C. B., Yang, X., & Badgett, N. M. (2024). Is mixed-methods bridging educational research divides? Using prevalence as an indicator of change. *Journal of Mixed-methods Research*, 18(4), 430–446. <https://doi.org/10.1177/15586898231184663>
- Vax, S., Farkas, M., Russinova, Z., Mueser, K. T., & Drainoni, M.-L. (2021). Enhancing organizational readiness for implementation: Constructing a typology of readiness-development strategies using a modified Delphi process. *Implementation Science*, 16, 61. <https://doi.org/10.1186/s13012-021-01132-0>
- Wind, S., Lahti, M., Hollis, R. B., Brown, K., Wurster, C. J., & Ferguson, K. M. (2022). Engaging opportunity youth and cross-system stakeholders in program development, implementation and evaluation: Challenges, successes and lessons learned. *Community*

College Journal of Research and Practice, 46(10), 712–731. <https://doi.org/10.1080/10668926.2021.1901796>

Zhao, G., Hui, X., Zhao, F., Feng, L., Lu, Y., & Zhang, Y. (2025). How does social capital facilitate community disaster resilience? A systematic review. *Frontiers in Environmental Science*, 12, Article 1496813. <https://doi.org/10.3389/fenvs.2024.1496813>

AUTHORS' NOTES

Robert W. Dusenbery, Ph.D., The University of Kansas, the author can be contacted at rdusenbery@ku.edu.

Christopher J. Eck, Ph.D., The University of Tennessee, the author can be contacted at ceck2@utk.edu.

Xiangyu Dale Li, Ph.D., Oklahoma State University, the author can be contacted at dale.li@okstate.edu.

Tony McAleavy, Ph.D., Oklahoma State University, the author can be contacted at tony.mcaleavy@okstate.edu.

Haley Murphy, Ph.D., Oklahoma State University, the author can be contacted at haley.c.murphy@okstate.edu.