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Exploring Teachers' Integration of Math and ELA into the Career Technical Education Curriculum

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,

and that any and all revisions required by

the review committee have been made.

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January 2024

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Project Study in Partial Fulfillment

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Abstract

Career technical education (CTE) teachers are required to integrate math and English/Language Arts (ELA) into the CTE curriculum to improve students' college and career readiness. Though teachers in a rural West Virginia CTE center are required to integrate math and ELA into the curriculum, only 68% have industry experience and have yet to learn other methods or pedagogy to support students with additional academic skills. The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills. The conceptual framework was Bruner's spiral curriculum theory. The key research questions explored what CTE teachers experience when attempting to incorporate these academic skills into their curriculum and the training and support they perceive as needed to work more effectively. Data were obtained from semistructured interviews of 10 CTE teachers from a volunteer pool that had at least one year of classroom experience. The open-ended interviews were transcribed, and axial coding was used to reveal two themes: (a) instructional strategies with additional classroom resources in teaching and assessment of integrating math and ELA, and (b) professional development needed to integrate Math and ELA into the curriculum. The results and conclusions of this study may impact social change by helping CTE teachers improve their ability to integrate math and ELA skills more effectively and giving administration suggestions on supporting their teachers in this task.

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Dedication

This journey is dedicated to my parents, Edward and Thelma Arnold, who always believed in me more than I did in myself. My father and mother did not have the privilege of an education beyond eighth grade but understood it was the gateway to a better life. Without his encouraging words and her loving support, this journey and life would not have been possible.

This dedication addresses the background, morals, and values I received as a child and represents what both of my parents mean to me. I am truly blessed to have had them nurture, care for, and guide me throughout my life. Thank you for choosing adoption and giving a baby girl unconditional love. For that, I am eternally grateful.

In memory of Edward and Thelma Arnold, thank you, and I love you!

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To my biggest fan, my husband, Dave Thomas, thank you for years of encouragement, eating takeout, and investing in my dream. I love you!!!!

To my daughters, Adriana and Ava, who have encouraged me every step of this journey. Thank you for understanding homework during family time and sporting events.

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To my first chair, Dr. Heather Caldwell, thank you for guidance, endurance, and supporting me throughout this process and important phase of my professional development.

To my second chair, Dr. Christopher Cale, thank you for your guidance on my educational journey.

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Section 1: The Problem

Local Problem

The National Assessment of Educational Progress reported that 37% of 12th-grade career technical education (CTE) students possessed inadequate academic skills (Stone et al., 2018). Specifically, the school district where the local CTE center is located in rural West Virginia reported that 31% of students met state standards and 34% did not. In ELA, 28% of students met standards, and 27% did not (West Virginia Department of Education, 2022a). In response to stakeholders' concerns, the 2015 West Virginia Board of Education Common Core Standards was repealed (West Virginia Department of Education, 2022a). On July 1, 2016, the West Virginia Board of Education implemented West Virginia College and Career Readiness (WVCCR) mathematics and English Language Arts (ELA) standards to prepare students for the fast-growing job market requiring postsecondary education/training. The rigorous WVCCR standards are in place, and students still need math and ELA components on state assessments.

Following the provisions of WVCCR math and ELA standards, CTE teachers are required to include math and ELA into their CTE curriculum. Most CTE teachers are different from traditional K-12 teachers that attend a 4-year university, graduate with a teaching degree, and are certified to teach math and ELA standards. CTE teachers in rural West Virginia school districts share students with core content teachers, meaning that students attend both regular academic classes and CTE classes. Although CTE teachers are experts in their field, experience in a classroom is unfamiliar territory, and they have

yet to learn the same content in their preparation courses as regular classroom teachers. However, the Education Commission of the States (2020) described the importance of CTE teachers' industry work experience. Regardless, integrating math and ELA skills into such CTE courses as welding, building maintenance, or cosmetology can be intimidating. For example, a cosmetology CTE teacher may understand certain beauty concepts but need to learn how to turn those lessons into math or literacy. Although CTE teachers expect to integrate math and ELA into the curriculum, they may need more teaching skills (Stephens, 2019).

Most West Virginia CTE teachers are credentialed within the discipline which they teach, transitioning industry skills into the classroom. Since industry credentials are the foundation of a CTE teacher, they have little to no formal education beyond high school. Therefore, due to CTE teachers' lack of integrating math and ELA skills, students may not have the opportunity to enhance their academic skills needed for today's high-skilled workplace or college entrance requirements (Stone et al., 2018). The problem under investigation in this study is that teachers in a rural West Virginia CTE center are required to integrate math and ELA into the curriculum (Stephens, 2019); however, only 68% have industry experience and have yet to learn other methods or pedagogy to support students with additional academic skills. CTE teachers who incorporate math and ELA skills into the curriculum give content knowledge in real-world classes and kinesthetic settings, which provide college or career preparedness. This qualitative study explored teachers' integration of math and ELA into the CTE curriculum for student

college or career readiness and what training or support they may need to improve their teaching of these basic academic skills.

Rationale

This research study was conducted to explore rural West Virginia CTE teachers' experiences integrating math and ELA into the curriculum to improve student college or career preparedness. CTE teachers bring real-life experiences that prepare students for entry-level positions in industries where proficiency, competency, and accuracy are critical. However, the West Virginia Teacher Certification Code (WVTCC) does not dictate math and ELA requirements to secure or maintain an Annual Occupational Authorization (AOA) for CTE teachers to instruct in federally funded programs (West Virginia Department of Education, 2022a). This means that while they are trained in their respective fields (i.e., automotive, cosmetology, etc.), they are not trained in teaching basic academic skills such as math or ELA. Due to West Virginia school districts' reluctance to offer training to CTE teachers in basic academic skill integration, these teachers are unprepared to begin integrating math and ELA into daily lessons (West Virginia Department of Education, 2022a).

Rural West Virginia CTE teachers expressed their inability to incorporate math and ELA into daily learning successfully. One teacher said, "I am experiencing difficulty incorporating math into daily lessons; I need help" (Teacher 1, Personal Communication, August 2, 2022). Teachers also voiced concerns over the need for more professional development (PD) or support to aid with their challenges of integrating math and ELA

into their teaching. A second teacher said, “I am required to intergrade ELA into my curriculum, but I feel unprepared and in need of more instruction” (Teacher 2, Personal Communication, August 2, 2022). As the school year begins, teacher PD is offered but not in basic academic skill integration; rather, teachers are shown videos on defensive driving, safe schools, and suicide prevention. Although these short virtual training segments are essential, the repetitiveness over the years has teachers discouraged and wanting something new and more applicable to their current needs. PD days are set into the approved school calendar throughout the school year. However, if a traditional school day is canceled, a scheduled PD day turns into valuable instruction time. A quarterly planned PD day consists of various subjects, but none are related to implementing math or ELA into the CTE curriculum.

Directed by the WVTCC and within the guidelines of AOA, West Virginia CTE teacher’s certification requirements do not require a math and ELA background. Although CTE classroom curriculum follows state issued standards that include math and ELA lessons, 68% of educators have industry experience only and have not learned other methods or pedagogy to support students with math and ELA skills. The purpose of this qualitative study was to explore teachers’ integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills. Integrating math and ELA into CTE courses improved student scores on standardized assessments (Park et al., 2017), and core-subject teachers acknowledged the benefit of math and ELA in CTE

courses for student post-secondary success (Tucker & Hughes, 2020).

Definition of Terms

This qualitative study used definitions to understand words exclusive to CTE and applicable to this study. Throughout this study, many educational terms needed clarification to establish a clear awareness of their relevance to the problem of how teachers in a rural West Virginia CTE school integrated math and ELA into curriculum to improve student college or career preparedness. Therefore, I used the following terms and utilized the definitions throughout this qualitative study.

Achievement gap: The observed disparity in a number of educational measures in academic performance between different groups of students, especially groups that differ in race, gender, and socioeconomic status (Clark, 2019).

Annual occupational authorization: A permit issued to an individual who does not meet the requirements for the professional teaching certificate (West Virginia Board of Education, 2022a).

Career and technical readiness (CTE): A learning institution that provides coursework designed to prepare students for employment or entry-level college courses (National Center for Education Statistics, 2019).

Career and technical readiness (CTE) Teacher: A person who teaches in the technical field of education (Goh, 2015).

Certified: Possessing an industry-recognized license or certification (West Virginia Board of Education, 2022a).

College and career readiness: Knowledge of skill sets that students need to succeed in a postsecondary course, 2- or 4-year college or technical school without any need of remediation (Green et al., 2023).

Education: This may include a high school diploma or equivalent, postsecondary degree or completion of postsecondary level CTE coursework (West Virginia Board of Education, 2022a).

Implementation: The strategic and intentional delivery of curriculum material. It demonstrates an educator's consistent act using a curriculum to deliver, apply, and evaluate instructional content and strategies. Implementation refers to the educator communicating content and skills knowledge to the student audience as a practice (ASCD, 2018). It can also include the educator providing differentiated opportunities for levels of complexity, intervention, and support within the instructional process.

Instructional practice: A teaching strategy used by teachers to meet the learning needs of students to develop critical thinking skills to improve academic performance (Hill, 2016).

Partnership of Assessment for Readiness for College and Careers (PARCC): The PARCC exam is a standardized ELA and Mathematics assessment that measures students' learning according to the Common Core State Standards. This is a computer-based test administered annually to students in grades three to twelve. The PARCC assesses a student's critical thinking and problem-solving skills in ELA and mathematics. This assessment provides a level score of 1-5 that measures a student's proficiency level

in content areas. The scores identify a student's performance level, from needing intervention up to high performance (National PTA, 2022).

Professional development (PD): Training opportunities provided to improve teachers' instructional practice so that their lessons are more effective and enable students to learn at a higher level (Lee & Schallert, 2016).

Proficiency: A term used to describe the ability to achieve a cumulative score or grade that proves a student's mastery level in grade level or state academic standards on assessments. The score or grade can indicate a student's achievement or instructional level in a content area. Many institutions use scores or grades as descriptors for measuring mastery or ability. A student's ability to obtain the recommended score or grade can be used to determine academic promotion or retention (American College Testing, 2018).

Program for International Student Assessment: The global Organization of Economic Cooperation and Development established a 5-point Program for International Student Assessment. This assessment is a computer-based test and is administered every three years to fifteen-year-old students. The Program for International Student Assessment measures students' ELA, mathematics, and science abilities for preparedness to meet real-life challenges (Schleicher, 2019). The results are tabulated by country and ranked globally to help determine educational equity (West Virginia Board of Education, 2022a).

Teacher or Career technical training: This may include completion of PD or

training required for teachers generally, PD or training in the CTE field or in a specific occupational area, mentorship experience or other pedagogical training (West Virginia Board of Education, 2022a).

Work experience: This may include completion of a special number of hours or years of work or apprenticeship experience in the occupational area (West Virginia Board of Education, 2022a).

Significance of the Study

The study was significant as the results may provide positive social change by enhancing CTE teachers' ability to integrate math and ELA into the daily curriculum. Improved teaching skills mean CTE students are prepared to succeed in college or career readiness. This research was based on exploring CTE teachers' integrating math and ELA into the curriculum for student success (Picott-Bryan et al., 2021). Other studies indicated that a quality curriculum contributes to academic success (Koedel & Li, 2019). Teacher education programs aid teaching candidates with tools that will engage positive change (Fullan, 2019). CTE teachers influence the next generation, and as most students spend 180 days in the presence of a teacher, professional relationships begin to form as they become a mentor. In addition, a well-versed CTE teacher that can instruct in math and ELA plus industry knowledge creates college- or career-prepared students.

This study can also contribute to student success in CTE programs by identifying the support and resources teachers need to aid their math and ELA teaching. Introducing new math strategies can be challenging (Johnson et al., 2019); however, teachers can

contribute to student success by reinforcing and integrating skills, such as math, learned from other courses (Hasselquist & Kitchel, 2019). This study demonstrated the importance of CTE teachers' implementation of math and ELA curriculum for students' college or career readiness.

Research Questions

The problem under investigation in this study was that teachers in a rural West Virginia CTE center are required to integrate math and ELA into the curriculum, but only 68% have industry experience and have not learned other methods or pedagogy to support students with additional academic skills. The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills. The research questions developed for this qualitative study were open-ended, objective, and unbiased (Rubin & Rubin, 2014). The guiding research questions were as follows:

- RQ 1: What are teachers' experiences in integrating math and ELA skills into the CTE curriculum?
- RQ 2: What training and support do CTE teachers need to effectively integrate math and ELA skills into the curriculum?

Review of the Literature

Conceptual Framework

The conceptual framework for this qualitative study was Bruner's spiral

curriculum theory. Bruner's spiral curriculum theory focuses on re-engaging ideas to keep them relevant and scaffolded as a form of evolution in knowledge (Weng, 2018). The three main principles of Bruner's spiral curriculum theory are cyclical learning, increasing depth, and building knowledge as an open-ended nature of education (Smith, 2019). This theory has supported the design of knowledge on complex topics if the content is structured and presented accurately to any audience (Ireland & Mouthaan, 2020).

Bruner's spiral curriculum theory of learning applies to CTE classrooms' need to increase the depth and build on previous knowledge of math and ELA through student learning of their chosen subject. CTE programs provide education in both career and academic courses that prepare students for a variety of postgraduation opportunities (Michaels & Liu, 2019), and Bruner's learning theory is a continuous process for learners to construct knowledge based on their current level of comprehension (Johnson, 2019). Curriculum based on previously introduced material can be revisited, built upon, and learned at a higher level (Johnson, 2019). Spiral curriculum is an approach that focuses on a learning sequence that builds upon learned knowledge, not on the individual learner (Fairclough, 2022). Bruner's spiral curriculum theory addresses the strategic practice of utilizing experiences to gather insights into teachers' integrating practices with the CTE curriculum (Johnson, 2019). The CTE classroom consists of real-world industry-related learning combined with previously learned math and ELA, resulting in students learning with a deeper understanding of the subject content. Teachers try to incorporate or extend

real-world inquiry with the problem sets, homework, and exit tickets from Bruner's spiral curriculum theory to support math and ELA concepts and applied skills within the instructional design (College of Education and Professional Development, 2022). Therefore, Bruner's Spiral Curriculum Theory was used as this study's conceptual framework.

Review of the Broader Problem

The literature review for this study included an assortment of sources to reach a saturation level on the topic related to the problem. The problem under investigation was that teachers in a rural West Virginia CTE center are required to integrate math and ELA into the curriculum. Still, only 68% have industry experience and have not learned other methods or pedagogy to support students with additional academic skills. The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills.

The criteria required all articles to be (a) full text, (b) peer reviewed, and (c) published between 2017 and 2022. Search terms such as *achievement gap, college and career readiness, instructional practice, professional development, CTE, CTE teacher, implementation, a partnership of assessment for readiness for college and careers, program for international student assessment,* and *proficiency* aided in finding peer-reviewed journals, websites, and dissertations. Peer-reviewed journal (2003-2023) articles were found using the following databases: EBSCO Publishing, Google Scholar,

Sage, ProQuest Central, Academic Search Premier, Academic Search Complete and Educational Research Information Center (ERIC). The topics revealed through the literature search that supported this study were CTE teaching certification, CTE Educators, West Virginia Career and Technical Education Teach to Lead, and Southern Regional Education Board.

Career Technical Education Teacher Certification

The West Virginia Board of Education (2020) explained the procedures that lead to CTE teacher licensure examinations and industry certification. West Virginia CTE teacher certification requires each educator to achieve the required score on the basic skills test (West Virginia Board of Education, 2020). Table 1 indicates the requirements of a career technical teaching permit and career technical teaching certification. Required basic skills are reading, writing, and mathematics, suggesting CTE teachers' comprehension of baseline subject knowledge.

Table 1

Career and Technical Educators Required California Achievement Test Score

Requirements	Career/Technical permit	Career/Technical certificate
Reading	771	777
Writing	757	765
Mathematics	757	783

Note. West Virginia Department of Education (2020). West Virginia Career and Technical Education Endorsement and Testing Manual

Table 2 indicates that CTE teachers' work experience, not a teaching degree, is of the utmost importance. The Education Commission of the States (2020) indicated that 68% of CTE teachers had required work experience, and 60% have an education level of

at least a high school diploma (Education Commission of the States, 2020). Table 2 demonstrates that work experience holds more credibility than the CTE teachers' education. The Education Commission of the States defined education as a high school diploma, or postsecondary completion of CTE coursework, not a standard teaching degree. Therefore, it is necessary to explore CTE teachers' experiences in integrating math and ELA into the CTE curriculum to improve college or career preparedness.

Table 2

Certification and Licensure Requirements for CTE Teachers

Requirements	Percentage
Work experience	68%
Teacher or CTE training	58%
Certification	46%
Education	60%

Note. Education Commission of the States. (2020). What Are the Certification and Licensure Requirements for CTE Teachers? 50-State Comparison: Secondary Career and Technical Education.

Across the nation, states reported an increased number of alternative teaching certifications (Ruhland & Bremer, 2003). Educational state departments, policymakers, schools, and higher education institutions established classroom preparation programs to assist alternative certified teachers who enter the teaching profession (Ruhland & Bremer, 2003). The West Virginia Title 126 Legislative Rule, 5.3 defined a CTE certified teacher

> as an individual who has acquired prescribed CTE and/or technical skills through specific wage-earning experience and/or WVBE-approved equivalent training as identified in the WV CTE endorsement and testing manual maintained on the WVDE website, and who has been assessed as competent to assume a role in

> public education in keeping with the specialization(s) and grade levels designated in this license. The CTE certification is equivalent to the professional certificate for salary purposes only. (p. 9)

For this study, a West Virginia Career Technical Education Certification was administered through a local university's Adult and Continuous Education department, West Virginia Education Teach to Lead (WVETL). When CTE teachers enter the classroom, only a few holds a 2- or 4-year degree. CTE educators' requirement is industry training before the academic subjects of math or ELA (Zirkle & Jeffery, 2017). However, CTE teacher instructional requirements are to blend industry with traditional math and ELA into the daily lesson. A challenge for CTE teachers who hold an alternative certification is inadequate support needed for their first day in a classroom (Bottoms et al., 2013). First-year CTE educators are particularly in need of classroom related skills, such as workshops and curriculum instruction (Bottoms et al., 2013).

The West Virginia Department of Education (WVDE) recognized the challenging transition from industry to the CTE classroom. To address these challenges, the WVDE requires newly hired CTE teachers to attend the West Virginia Career and Technical Education Teach to Lead program (West Virginia Department of Education, 2022a). To provide needed support, each newly hired West Virginia CTE educator is required to attend WVETL. This distance learning environment provides mentors and peer connections as they meet four times throughout the year. The WVETL is a series of college courses providing CTE educators with credits toward a master's degree,

bachelor's degree, and/or a non-traditional teacher certification (College of Education and Professional Development, 2022). WVETL courses provide new CTE teachers with various classroom skills but recognize they are not academically inclined (College of Education and Professional Development, 2022). The WVETL plan of study guides CTE teachers through the basic classroom essentials learned in a traditional four-year teaching degree such as, but not limited to, classroom management, curriculum maps, and lesson plans (College of Education and Professional Development, 2022).

Integration of Basic Academics into the CTE Curriculum

The relationship between CTE and the federal government is long and has withstood the changing times of workforce development (Granovskiy, 2016). Over the years, federal legislation has been the driving force of CTE integration of math and ELA that aligns with secondary education (Imperatore & Hyslop, 2017). Throughout the course of public education, federal legislation has developed policies for the improvement of student academic progress. The Carl D. Perkins Career and Technical Education Act (The Perkins Act), No Child Left Behind Act (NCLBA), Every Student Succeed Act (ESSA), and Southern Reginal Education Board (SREB) demonstrate how educational policies have evolved with changing social and economic demands. An overview allows an insight into policy changes on state and local levels.

Although past federal policies such as the Morrill Acts (1862 and 1890), Smith-Hughes Act (1917), and Vocational Education Act of 1946 established learning institutes, the hiring and training educators. The Perkins Act of 1984 expanded on the previous

Vocational Education Act (VEA) of 1963 and Vocational Education Amendments of 1968 that opened CTE courses to special populations and post-secondary educational programs (Granocskiy, 2016). The Perkins Act expanded into various areas of CTE education as it was amended over time (Granocskiy, 2016). The Carl D. Perkins Vocational and Applied Technology Act Amendment of 1990 (Perkins II)

- Created tech programs
- Developed a coherent sequence of courses
- Developed performance standards
- Implemented measures of learning
- Measured program performance

The Carl D. Perkins Vocational and Technical Education Act of 1998 (Perkins III)

- Explained state accountability
- Introduced core indicators of performance
- Introduced sanctions based on failed student performance
- Introduced incentive grants for exceeding performance levels

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV)

- Renamed Career and Technical Education
- Developed Basic State Grants (BSG)
- Required that states must meet 90% of each indicator of performance
- Developed a State Improvement Plan if the 90% target is not met
- Developed CTE provisions linked to academic standards

Finally, the Strengthening Career and Technical Education for the 21ST Century Act

- Went into effect on July 1, 2019
- Fully developed academic knowledge
- Fully developed technical skills
- Fully developed employability skills. (Edgerton, 2022)

Over time, federal legislation has evolved CTE standards through the various amended stages of The Carl D. Perkins Vocational Education Act. Imperatore and Hyslop (2017) stated that federal legislation is not only driven by but also receptive to CTE integration of math and ELA that aligns across middle school through the postsecondary educational system. In the early development of vocational school, during the Morrill Acts, the focus was learning a trade. In present time, stakeholders demand more from a CTE graduate, one that is knowledgeable in both math and ELA and a specialized trade.

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV) linked CTE with the No Child Left Behind Act (NCLB; Granocskiy, 2016). Former President George W. Bush signed the NCLB to establish a step forward in approving education of students that may have been left behind in America's educational systems (Darling-Hammond, 2018). NCLB is an avenue to raise student achievement levels for all learners by narrowing the achievement gap of class distinction and race (Fletcher, 2006). These are the goals of NCLB:

- An overhaul of the educational system
- Raising standards by testing

- Holding all students and schools accountable
- Increasing public awareness of schools' progress
- Ensuring highly qualified teachers

The goal of NCLB is to improve the education of students with disabilities, of color, and living in poverty. Perkins II mandated that state standards for all CTE courses align with NCLB policies (Fletcher, 2006). However, the problem with NCLB was the mistake of measuring schools as a way to fix them, Adequate Yearly Progress (Granocskiy, 2016). The key factor was that struggling educational institutions should acknowledge this and receive the help needed to strengthen staff as they embrace successful programs.

NCLB became a topic of discussion among local and federal stakeholders, questioning its effectiveness. In 2015, former President Obama signed the Every Student Succeeds Act (ESSA; Sharp, 2016). Hodge et al. (2020) reported that making the shift from NCLB to ESSA takes the emphasis from academic proficiency to an implication of pathways into various configurations of academic and career readiness. The ESSA shifted educational authority from federal government to states and local agencies with a focus on college or career readiness (Sharp, 2016).

- State accountability
- High standards for college and career readiness
- Empowers state evidenced-based interventions for school improvement
- Preserves assessments for information without overshadowing teaching and learning

- Secures new resources for educational practices
- Replicates strategies that improve educational outcomes

Title I of the Act required each state to submit a blueprint of how each ESSA program would be administered (Coppes, 2016). Under ESSA every high school graduate must be college or career ready, without any barriers (Coppes, 2016). To achieve graduate expectations, ESSA supports educators and administrators through recruitment, training, and various professional development opportunities (Coppes, 2016).

Federal legislation has been the driving force behind CTE integration of math and ELA into the curriculum (Imperatore & Hyslop, 2017). Over time The Perkins Act, NCLB, and ESSA enhanced CTE curriculum with the intention of students increasing math and ELA ability for college or career readiness upon graduation. Fletcher (2006) suggested that through legislation, today's CTE centers have evolved to meet contemporary students' needs across the nation.

Academic Integration Assistance

Southern Regional Education Board (SREB) allows CTE teachers to ask for assistance when integrating math and ELA into the curriculum. Founded in 1948, SREB is established as a non-profit organization to increase regional students' social and economic vitality. SREB serves sixteen southern states, ranging from Texas and Arkansas to Kentucky and West Virginia (Southern Regional Education Board, 2022). Students who fall below math and ELA standards within the first year of high school often find themselves enrolled in CTE courses. To increase math and ELA understanding,

the SREB created an innovative program titled Preparation for Tomorrow within CTE building. Each state located within the SREB district is mandated by the local state legislature to employ additional support staff for math and ELA student assistance, under the direction of Preparation for Tomorrow (Southern Regional Education Board, 2022). The SREB program of Preparation for Tomorrow aims to build course sequences that follow the trends of real-world high-demand areas with a rigorous academic core as it supports classroom teachers to incorporate math and ELA into the curriculum.

Importance of Student College or Career Readiness

Today's CTE courses no longer focus on industry education. The findings show that industry and entry-level employment requires practical cognitive and knowledge skills (Park et al., 2017). However, CTE teachers have real-life industry experience to prepare students for entry-level positions. Unfortunately, the CTE certification code does not dictate academic requirements (Stephens, 2019). CTE teachers need to gain the skills to incorporate academic standards into the required state curriculum standards (Piccott-Bryan et al., 2021). Stone et al. (2018) reported that data collected by the National Assessment of Education Progress showed that 37% of 12th-grade students are below the basic academic skill level. Therefore, many CTE students arrive at a two-year college and struggle to pass remedial theoretical sequences (Wang et al., 2017). Incorporating academic skills into the curriculum adds content knowledge to real-world classes and kinesthetic settings, providing CTE students with college or career readiness. Adamuti-Trache et al. (2020) found the importance of college and career readiness by examining

how the vocational and academic dimensions are reflected in Texas high school endorsements. The research was based on analyzing restricted-use Texas longitudinal administrative and transcript data for 9th graders enrolled in Texas public schools in 2015/16. The article reported how the Texas Legislature passed House Bill 5 in 2013 to adopt the Foundation High School Program, a new program intended to support college and career readiness graduates. In 2012, the West Virginia Department of Education designed Simulated Workplace, a collaboration between stakeholders to establish highly skilled students, preparing them for college or career readiness post-graduation (D'Antoni, 2019). Following the design of the Simulated Workplace, in 2016 the West Virginia Department of Education required all CTE centers to follow the newly adopted state standards.

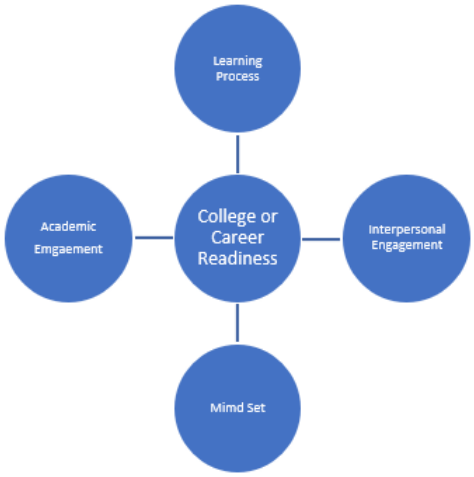
College or Career Readiness

Career Technical Education—known as Career-tech Ed or CTE—describes classes designed to prepare students for work after graduation (Gewertz, 2018). However, the legislative act of 2006, Perkins IV, addresses the division of career technical education and academic curricula. Perkins IV worked to bridge the gap between CTE and state academic standards, incorporating math and ELA into the daily curriculum. Bozick and Dalton (2013) reported that The American Education Reform had been a guide in raising academic standards to prepare the student for college or career readiness. Hackmann et al. (2019) found that college and career readiness emphasized in ESSA state accountability plans was designed to blend academics into CTE courses.

College or Career Readiness (CCR) is the individual preparedness for postsecondary education and employment (Monahan et al., 2018). Over the years, CTE has become a topic of conversation on multiple educational levels, transforming itself from a college alternative to a new kind of college or career pathway. Monahan et al. (2018) described the traits of CCR as academic engagement, the learning process, interpersonal engagement, and mindset, as described in Figure 1. The traits were based on the idea that college- and career-ready students hold knowledge of ELA and math across various disciplines to display independence in evaluating texts. CCR standards aligned with math and ELA skills are essential for basic literacy skills and are vital for societal functioning (Dalton, 2017).

Figure 1

Learning Traits of College or Career Readiness



Note. Adapted from "Promoting College and Career Readiness: Practical Strategies for the Classroom," by Monahan et al., 2018.

Bhat and Stevens (2021) researched CCR programming that assists students with planning for effective post-school transitions during the early high school years. Group interventions that address CCR for early high school students permit school counselors, counselors, career specialists, or teachers to engage with many students at once and facilitate peer-to-peer learning. CCR group interventions supported by research and addressing the National Office for School Counselor Advocacy's (NOSCA) standards present proven strategies for student CCR.

Simulated Workplace

West Virginia has incorporated Simulated Workplace into all CTE centers. In 2016, the West Virginia Board of Education unanimously voted to transform CTE classrooms into a Simulated Workplace (D'Antoni, 2019). As described by the West Virginia Board of Education (2022b), Simulated Workplace is a collaboration between industry and the CTE classroom. Stakeholders can view the West Virginia Board of Education Simulated Workplace (2022b) website to view the program's expectations. Their vision is to create high-quality learning environments, and their mission is to provide students with curriculum that allows them to earn certifications. Simulated Workplace combines math and ELA within CTE curriculum to prepare students for college or career readiness (West Virginia Board of Education, 2022b). During the formative years of Simulated Workplace, educators reported increased attendance, higher test scores, decreased absenteeism, and raised graduation rates (D'Antoni, 2019).

Conclusion

The literature review consisted of multiple peer-reviewed articles that were accessed through various databases. Bruner's Spiral Curriculum Theory was the conceptual framework that guides the professional practice of math and ELA related classroom instruction. Reviewing the broader problem identified fundamental areas of the study's problem: integrating math and ELA into the curriculum. Next was the explication of teacher certification and implementation of math and ELA into the curriculum of CTE courses for college or career readiness. The importance of teacher integration of math and ELA was explained with the traits of college or career readiness and simulated workplace. The literature review supported the study's problem.

Implications

The problem under investigation in this study was that teachers in a rural West Virginia CTE Center must integrate math and ELA into the CTE curriculum. Still, only 68% have industry experience and have yet to learn other methods or pedagogy to support students with additional academic skills. This qualitative study aimed to explore teachers in rural CTE centers within West Virginia integrating math and ELA into the curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills.

The potential outcomes of the research study will offer suggestions and more support for CTE teachers as they continue to incorporate basic academic skills into their curriculum. Utilizing the study results could provide administrators at rural West Virginia

CTE with an understanding of the support and resources needed for teachers to integrate math and ELA into daily lessons.

Summary

Section 1, the problem of this study concerning a local environment, was presented with analytical support and evidence of personal communication with data retrieved from peer-reviewed literature. Therefore, the problem under investigation was that teachers in a rural West Virginia CTE Center must integrate math and ELA into the curriculum. However, 68% have industry experience only and have yet to learn other methods or pedagogy to support students with additional academic skills. The rationale explored the experiences of CTE teachers integrating math and ELA into the curriculum for student college or career preparedness. A list of terms and definitions used in CTE centers that apply to the study was included. The significance of the study was justified as CTE teachers struggle to implement math and ELA into their daily curriculum.

This study contained two research questions exploring CTE teacher experiences and resources for integrating math and ELA into the curriculum. The literature review described how each research question relates to the conceptual framework. An overview of the study's problem was researched by utilizing accessible databases. Peer-reviewed articles about the study's problem were researched.

Section 2, methodology, described the relevance between both RQs and the research design. This section explained why qualitative design is the appropriate research method for the study. Following the relevance were requirements of participants,

description, criteria of selection, justification, access, researcher/participant relationship, researcher/participant work relationship, ethical issues, and a confidentiality agreement that allows an ethical and confidential process. Next was justification and collection of data as an adequate sample size provides evidence through authentic interviews. The researcher used a code protected recording device for added participant protection. The researcher's role was to provide each participant with contact information via electronic mail and conduct interviews following qualitative guidelines. Once data was collected, the analysis began, adhering to the IRB protocols and evidence of quality to assure accuracy. Finally, I examined the study for discrepant cases and adjusted when facing limitations.

Section 2: Methodology

Research Design and Approach

The research for this study was a basic qualitative design using. The research design is the plans, procedures, and detailed data collection and analysis methods (Creswell & Guetterman, 2019). The problem under investigation in this study was that teachers in a rural West Virginia CTE center must integrate math and ELA into the curriculum; however, only 68% have industry experience and have yet to learn other methods or pedagogy to support students with additional academic skills. The focus was teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills though. The National Assessment of Educational Progress (2019) report suggested that 37% of 12th-grade CTE students are below a basic level of academic skills. Further, entry-level employment requires practical cognitive and knowledge skills in the first year of college (Park et al., 2017). Therefore, many CTE students lack basic academic skills and arrived unprepared for college or a career (Wang et al., 2017). CTE teachers incorporating math and ELA skills into the curriculum would bring content knowledge into real-world classes and kinesthetic settings, providing college or career preparedness. The gap in research was relevant, as CTE teachers are expected to instruct according to the standard state curriculum (Stephens, 2015).

This qualitative study explored the problem with substantive interviews. This qualitative study showed the importance of CTE teachers integrating math and ELA into

CTE curricula in an essential aspect of student college or career preparedness. The research questions developed for this qualitative study was open-ended, objective, and unbiased (Rubin & Rubin, 2014):

- RQ 1: What are teacher experiences in integrating math and ELA skills into the CTE curriculum?
- RQ 2: What training and support do CTE teachers need to effectively integrate math and ELA skills into the curriculum?

The method and approach aligned with this qualitative study's purpose to explore CTE teachers' experiences in a rural West Virginia CTE program regarding guidance and support needed when integrating math and ELA into the CTE curriculum to improve student college or career preparedness and what training or support they needed to improve their teaching of these basic academic skills.

Qualitative study is a mature discipline designed by literature, interest groups, and research journals (Merriam & Tisdell, 2016). The purpose of this basic qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. This qualitative research design helped discover the implementation practices required to develop the participants' meaning and comprehension (Merriam & Tisdell, 2016). The opportunity to gain insight or themes gathered from participants was conducive to the qualitative research design (Merriam & Grenier, 2019). Moreover, qualitative research contributed to a more comprehensive

discovery into the implementation practices of teachers (Lindlof & Taylo, 2017).

Participants

Criteria for Selecting Participants

The data points for analysis for this study were based on the individual participants (Yin, 2014). Purposive sampling can be accomplished by nonrandomly selecting participants who represent a cross-section of the population using precise, expert criteria (Sharma, 2017). Purposeful sampling can be a reasonable representation of the more significant population (Bhardwaj, 2019). This way, the most suitable people in the most suitable setting were chosen to respond to the research topic. This qualitative study utilizes the realist sampling method to generate volunteer participants that were active examples of the research goal (Ravitch & Carl, 2020). The CTE teacher came from the industry with little classroom experience (West Virginia Department of Education, 2022a). CTE teachers must gain the skills to incorporate academic standards into the curriculum (Piccott-Bryan et al., 2021), and the West Virginia Department of Education decided to require all new CTE teachers to attend The West Virginia Career and Technical Education Teach to Lead program (West Virginia Department of Education, 2022a). A local West Virginia university that provided new CTE teachers with various classroom skills but recognized that they needed to be academically inclined (College, 2022).

The participants for this study were a voluntary pool of 10 CTE teachers. A population is a group of individuals with similar traits valid for the pool of selected

participants (Creswell, 2012). Ten teachers from rural West Virginia CTE schools were randomly selected who were industry experienced before their new role as classroom educators. The voluntary participation of CTE teachers was based on the following criteria:

1. They must have current state teacher qualifications and licensures.
2. They must have current knowledge of the state standards.
3. They must have taught CTE for 1-4 years.
4. They must have experienced student outcomes in college or career preparedness for 2-5 years.

The selection criteria helped to secure a rich participant pool for the validity of the research (Lodico et al., 2010).

Justification of Participants

For this qualitative research, the participants were selected based on their professional experiences with teaching and facilitating CTE over time. This meant that the teachers have more of an insight and are relevant to the research question (see Ravitch & Carl, 2020). Small sample sizes can contribute to higher quality research inquiries (Creswell & Guetterman, 2019). For this study, examining 10 participants was practical for the student audiences they served (City Public Schools, 2020). Therefore, saturation for this study was achieved.

Gaining Access to Participants

Access to this research study's participants was contingent upon research

stakeholders' approval. When approval was issued by Walden University's Institutional Review Board (IRB; approval no. 07-28-23-0966977), the local school district, and principal leaders, I recruited the anticipated voluntary pool members via electronic mail. This rural West Virginia school district allowed all employee email addresses to be public information, allowing easy access to generate a volunteer pool and send electronic mail invitations to CTE teachers in rural West Virginia. The willing participants received the informed consent document with details and contact information regarding roles and protocols. In case of rejection, an invitation was to be extended to one other CTE teacher. I began my research once I had obtained informed consent from the first five participants. If acceptance was low or participants withdraw after 7 days, I had anticipated to invite all CTE teachers. In the event of saturation, I utilized all 10 participants from the selection pool.

Researcher/Participant Relationship

This study's privacy and confidentiality clause was executed when the appropriate authorizations were established. Upon approval from the IRB, I made initial contact with the anticipated participants. The participants in this project worked within the rural West Virginia CTE schools, as do I; however, they did not interact with me (see Creswell & Guetterman, 2019). My roles within the rural West Virginia CTE schools have included classroom teacher, mentor teacher, and instructional leadership team member. I also ensured an open, unbiased demeanor that fosters a welcoming atmosphere. These continued interactions helped to establish a professional rapport with the anticipated

participants (Lodico et al., 2010). I consistently provided renewed understandings of privacy, confidentiality, protocols of roles, and expectations while revealing the options for participation and withdrawals with every interaction.

Researcher-Participant Working Relationship

Making a professional connection with participants was an essential first step. CTE educators are often viewed as not being "real" teachers and are often misunderstood. CTE educators hold a nontraditional teaching certification because they lack a formal education from a higher learning institution (West Virginia Department of Education, 2022a). An icebreaker was for participants to discover that I also had an industry-to-classroom background.

Measures to Protect Participants' Rights

This study's privacy and confidentiality clause was executed when the appropriate authorizations were established. Upon approval from the IRB, I made initial contact with the anticipated participants before the data collection, known as informed consent (Burkholder et al., 2019). A consent form was emailed to each participant with a comprehensive explanation of the research process, including but not limited to protection from harm, the background of the study, and privacy. Upon receiving the email, each participant had 6 to 10 business days to reply "I accept" for participation in this study.

The researcher took on the responsibility of protecting all participants from harm and considered the risks and or benefits of the study. A part of participation is

confidentiality (Burkholder et al., 2019). For example, in this study, participants' names were withheld and replaced with an alphanumeric code like I1 (interview one), I2, I3, etc. Each participant was also reassured that upon any form of discomfort, they had the right to end the interview, with or without rescheduling. This information was shared in the consent form.

Data Collection

Data were collected from semistructured, open-ended interviews with the applicable recording and research protocols (Creswell & Guetterman, 2019). Qualitative researchers must aim to gain an accurate and comprehensive understanding to discern meaning from everyone (Lodico et al., 2010). Recordings were aided in acquiring precise information for analysis, coding, matrix development, and review processes.

Justification of Data Collection

For this study, examining the 10 participants was practical for the CTE teacher audiences they served (West Virginia Department of Education, 2020a). Small sample sizes contribute to higher quality inquiry for research (Creswell & Guetterman, 2019). With respect to the minority of WV school district personnel who still observed a form of COVID-19 restriction, exploring an in-depth research project was not possible with more than 12 participants.

Data Collection Instruments and Source

The data collection source was one-on-one interviews and field notes recorded in a reflective journal. Interviews provided thick, rich, and authentic information that

supported the study's research goals (Bryman, 2006). It included semistructured open-ended and closed questions for the participants to help secure validity and provided opportunities for detailed examples (see Appendix B). The data collection source was researcher-produced and guided by the study framework. The combination of semistructured open- and close-ended questions provide an opportunity to gather more specific information from participants (Creswell & Guetterman, 2019). The collection of questions supported the context of Bruner's spiral curriculum theory in acquiring and targeting themes of teacher practices and experiences with curriculum implementation. These first-hand encounters can support meaningful feedback and input from participants. Incorporating semi-structured open- and close-ended questions can provide more detailed information with less ambiguity (Creswell & Guetterman, 2019).

Sufficiency of Data Collection

Qualitative methodology regards the interview process as the main research tool (Methodology of Qualitative Research, 2019). Interviews are sufficient for data collection because they are infused with semistructured open- and close-ended questions. Combining the types of questions aids in retrieving vital information with the opportunity to include detailed examples. The questions included in the interviews were specific to the problem and purpose of this research. They focused on the individual teachers' implementation practices with the CTE curriculum and teachers' difficulties in integrating math and ELA. The added details served as enriched experiences that contributed to the responses' validity and quality. The added details made it sufficient

due to the provision of information on implementation practices needing to be discovered for a qualitative study and the application of this method.

Data Processes

All study participants and study data were treated with confidentiality by following the ethical protocols during data collection and analysis. The collected data were comprehensive and transcribed in a reflective journal to reference themes (Creswell & Guetterman, 2019). The interview protocol was conducted according to the ethical and confidentiality expectations of qualitative research guidelines. The participants who agreed and signed the consent form received an electronic mail acknowledging their acceptance and offering the next steps for scheduling the interview (see Appendix F). The participants and the researcher confidentially engaged in the interview process utilizing an offsite location. The participants established the scheduling and location information for the interviews. All interviews were conducted using protocols outlined in the informed consent documents and reviewed before each discussion.

The interview protocol contained semi-structured open- and close-ended questions (see Appendix B). According to Creswell and Guetterman (2019), one-on-one interviews permitted educators to share their perceptions of experiences without judgment or fear from their peers. The interview guidelines were initiated with an overview of the study, a review of the consent form, confidentiality expectations, and the researcher's and participants' roles and responsibilities. All participants were given a pseudonym to maintain confidentiality and identifiers were removed throughout the

process (Triola, 2012). All interview responses were recorded on a non-district, password-secured device. The interview notes taken were transcribed onto a secured laptop to ensure data security, accuracy, and validity.

Data Tracking

According to Merriam and Tisdell (2016), maintaining accurate data is an essential part of the research process. To effectively track the data, the researcher used a password-protected electronic calendar and a reflective journal for interviews. The researcher used the electronic calendar and journal to log dates and corresponding notes from interviews and participant interactions. The themes/categories and open coding trackers were e-logged and secured on a password-protected, non-district device.

Access to Participants

The researcher invited the anticipated voluntary pool members via electronic mail. Electronic mail invitations were issued to rural West Virginia CTE teachers from a volunteer pool (see Appendix B). The electronic mail indicated the proposed interview schedule based on participant availability. The interviews applied the practice of mutual respect among all participants and the researcher with shared experiences and feedback (Creswell, 2014). The anticipated volunteering of 10-12 teachers included the CTE teacher leads. The personal experience interviews provided by the voluntary participants served as the appropriate content needed to discover teachers' individual and collective experiences with the CTE curriculum. Utilization of the feedback aided with code themes and implementation practices to help explore the problem that teachers in a rural West

Virginia CTE Center were required to integrate math and ELA into the curriculum; however, only 68% hade industry experience and yet to learn other methods or pedagogy to support students with additional academic skills.

Role of the Researcher

The researcher's role was to establish privacy and confidentiality with her participants. Qualitative researchers must maintain consistent contact and connections with the participants (Lodico et al., 2010). Creswell and Guetterman (2019) indicated that the opportunities for ethical concerns could develop throughout this type of qualitative research because of these trusted interactions. The researcher's role was to ensure an open, unbiased demeanor that fosters a welcoming atmosphere without personal bias. The researcher's history did not impact these continued interactions, connections with the setting, or established relationships with participants (Lodico et al., 2010). As noted in the findings, the researcher only used the participants' voices—this was supported with member checks and participant confirmations of interview transcripts within one to seven days. The researcher consistently provided renewed understandings of privacy, confidentiality, protocols of roles, and expectations, giving valid data for this research.

Data Analysis

Castleberry and Nolen (2018) described coding as a process in which raw data is converted to usable data by identifying concepts, ideas, and themes that have a connection. The researcher adhered to approved IRB protocols and procedures while collecting and analyzing data. The collected data were analyzed using open coding to

allow opportunities for sub-coding (Williams & Moser, 2019). The categories provided the patterns and trends discovered in the research for deeper analysis. The researcher used the themes and categories gathered from the interview questions designed to address the purpose of this qualitative study. This data analysis supported the context of Bruner's Spiral Curriculum Theory and the reflective practices of teacher implementation. The inductive process of qualitative research denoted a gradual collection of data supported by categorizing themes and patterns into generalizations and conclusions (Lodico et al., 2010). The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills.

This study collected data through Microsoft Teams interviews, recorded videos, transcripts, and a reflective journal. According to Ravindran (2019), the data analysis process of a qualitative study consisted of four components.

- Preparing Data- transcripts, recorded interviews, checking for accuracy
- Reflecting- reading interview transcripts, taking notes
- Data- coding, organizing
- Developing Data- themes, models, clusters

The four steps of data analysis were consolidated into a two-step process. The first set of steps was preparing data validation of transcripts and notes through reflection. The second set of steps contained coding data, categorizing data, and determining themes that addressed the research questions of this study.

The two-cycle coding process was applied, including initial and focused coding strategies (Saldana, 2021). Descriptive coding was the appropriate choice for this qualitative study. In the first-cycle coding process, words, phrases, and related concepts were labeled and grouped with meaningful terms (Rubin & Rubin, 2014). Then, a second coding cycle used the respondents' words, or NVIVO, to continue narrowing down the data. NVIVO was used for a deeper insight into the participants' responses as it recorded thoughts in verbiage instead of researcher-created terms. As the analysis continued, the responses were refined, and the repeatedly occurring words were revised into codes. The revision created a small number of significant themes to address the research questions for the study (Castleberry & Nolen, 2018).

Coding Procedure

Castleberry and Nolen (2018) described thematic analysis as a method to identify, analyze, and report patterns within data. Thematic analysis involved the interpretation of codes and constructing themes; it is vital to clearly identify assumptions and paradigmatic orientations to ensure the trustworthiness of data findings (Kiger & Varpio, 2020). Researchers use this method to address various research questions, study the gathered data, and create groups through coding.

Once all participants' interviews were completed, Microsoft Teams provided video recording and transcription for reviewing and accuracy. The next step was coordinating each interview question and participant's response with the appropriate research question. This procedure was recorded manually on a Microsoft Excel

spreadsheet. Referencing Appendix D: Interview Protocol Form, the interview questions were categorized into two research questions.

Research Question One: What are teachers' experiences in integrating math and ELA skills into the CTE curriculum?

- Question 1: What experiences do you encounter when integrating math and ELA into the curriculum?
- Question 6: What explanations might teachers offer to account for their lack of training to teach math and ELA?
- Question 7: In your opinion, does industry demand for a graduate to have proficiency in math and ELA? Explain why.
- Question 8: In your opinion, how are students better prepared for college or a career if they are proficient in math and ELA?
- Question 9: In your opinion, will a potential employer hire a candidate proficient in math and ELA over a potential employee that is below standard?

Research Question Two: What training and support do CTE teachers needed to effectively integrate math and ELA skills into the curriculum?

- Question 2: What forms of guidance do your reference when incorporating math and ELA instruction into curriculum? Can you elaborate on the guidance tool(s) you use daily?
- Question 3: What support have you received to integrate math and ELA into curriculum? Have they been relatively consistently available?

- Question 4: What type of PD is offered to improve the overall quality of math and ELA instruction for effective instruction in the classroom?
- Question 5: In your opinion, what do you perceive as the best approach to train career technical education teachers to improve their math and ELA teaching skills?
- Question 10: What are your thoughts on how integrating math and ELA into CTE curriculum aids in a well-rounded student post high school graduation?

In reference to the above sequence, the next step was transferring data to a Microsoft Excel spreadsheet; each column was designated for keywords, phrases, and concepts. Once this step was completed, all keywords, phrases, and concepts were color-coded by frequency and similarities to find like clusters. The clusters were then labeled into categories. Examination of an Excel spreadsheet reveals commonalities of categories that determine patterns developing into themes (Miles et al., 2020). During this coding process, a reflective journal was used for notetaking, accuracy checking, and reflection. This first coding cycle was conducted through a descriptive coding method, descriptive data, and categorization for the second cycle, NVIVO coding. The first coding cycle included terms referred to "benefits of integrating math and ELA", "training needed for CTE teachers", and "resources of math and ELA teachers".

A second coding cycle combines codes with words or codes produced from the first round with the same meaning. Like the first coding round, Microsoft Excel was used and produced a pivot table, reference Table 3. Cycle two coding produced emerging

themes of additional resources and additional teacher support, both of which assisted in answering the research questions of this study.

Table 3

Pivot Table of Coding

Round 2 of coding	Patterns
Perceived benefits of integration of Math and ELA in CTE, Resources used	Experiences
Resources received: Math teachers Resources received: ELA and Math teachers Perceived industry demands from graduates	Integration
Incorporating practical skills and examples into the curriculum	Curriculum
Resources used	Needed resources
Teacher's integration of ELA into curriculum	Teacher support
Perceived training needed for CTE teachers Suggestions to improve Math and ELA in CTE curriculum PD offered	Math in curriculum
Resistance to integration of ELA and Math in curriculum by students Teacher's skills used to incorporate ELA and math	ELA in curriculum
Lack of professional CTE training Lack of support for new teachers	Professional development
Perceived industry demands from graduates Consequences of not being proficient in Math and ELA	Lack of training
Gap in knowledge base of students	Below standards
Backtracking to teach students critical skills Focus areas of curriculum: Math	Integration of curriculum
Perceived benefits of proficiency in Math and ELA Perceived benefits of integration of Math and ELA in CTE	Efficiency of skills
Prior knowledge of students Lack of resources and training of teachers	Demand of skills

Evidence of Quality

Cramton (2015) noted that research components were critical for quality data analysis, accuracy, and credibility. The accuracy, credibility, and findings of this data were supported by the ethical protocols and procedures implemented by Walden University's IRB. Member checking is another measure to determine the accuracy of the

research findings (Creswell & Guetterman, 2019). Member checking was used during this research process. James (2016) indicated that member checking allowed the participants to review and verify responses to check for accuracy. Member checking was open and on an as-needed basis.

Discrepant Cases

Discrepant cases revealed unforeseen findings during data analysis, challenging the emerging themes (Merriam & Tisdell, 2016). This study addressed discrepant cases with the diligent efforts of member checking. Thus, I examined the information and its relevance to the purpose of this study. I researched, defined, and noted relevant categories that were created for coding. Therefore, using the "does not fit" notation represented the ethical practices of accuracy and validity of content and protocols. It further identified the information's irrelevance to the study's intended purpose. These practices, in addition to the detailed description of the data collection process, helped to maintain efficacy throughout this study. In the event of a discrepancy, it was checked for accuracy to maintain credibility and rigor (Merriam & Tisdell, 2016).

Data Analysis Results

The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The findings of this study reflected the perspectives of the participants gathered from semi-structured one-on-one interviews. The following two research questions were used:

what are teacher experiences in integrating math and ELA skills into the CTE curriculum, and what training and support do CTE teachers needed to effectively integrate math and ELA skills into the curriculum? After analyzing, reviewing, and coding the data, two themes emerged from the data from the research questions.

Data Analysis Process

The demographics of the ten consenting volunteer participants are as follows: all were over 18 years of age, hold current teaching licensure, had knowledge of state standards, had been a CTE teacher for 1-4 years, and had experienced student outcomes in college or career preparedness for 2-5 years. The scheduled private interviews were in-depth, semi-structured, and conducted through Microsoft Teams. Each interview was scheduled for thirty to ninety minutes, allowing ample time for the participant to respond. All interview questions were open-ended, objective, and unbiased (Rubin & Rubin, 2014). Microsoft Teams provided both audio and transcript recording during the interview process. Each interview transcript and a reflective journal provided material coded for data analysis. When an interview is transcribed, everything is preserved for the researcher to analyze (Merriam & Tisdell, 2016), allowing the researcher and participants to member check for accuracy, in which no discrepancies were found.

Coding is a critical link between data collection and the explanation of meaning (Rogers, 2018). Keeping that in mind, the interview transcripts were checked for accuracy against the audio recordings of Microsoft Teams. Once accuracy was established, the coding process began through open coding that generated a concept that

reflected the transcripts. The open coding process involved identifying concepts, labeling concepts, and using that information towards terminology and then short phrases. The advantage of transcript coding is accurate written records and line-by-line codes (Shelly et al., 2021). The process of open coding was applied to transcript one through transcript ten with color-coded terms that developed into color-coded themes and short phrases. Once the process was completed, the information was documented on a Microsoft Excel spreadsheet.

Axial coding is the latter segment of open coding that allows the emergence of significant categories (Walia, 2015). Upon completion of open coding, axial coding investigates concepts and categories developed during open coding (Vollstedt & Rezat, 2019). In referencing the open coding Microsoft Excel sheet, axial coding allowed further grouping of short phrases and terms, revealing several groups. Next, the analyzation process continued by grouping into distinct themes until saturation occurred.

Saldaña (2021) recognized a theme as the outcome of coding, categorization, and analytic reflection but not being coded itself. Emerging from axial coding were two distinct themes in association with the research questions. To ensure the accuracy of the coding process, material was peer-reviewed to ensure no discrepancies. Merrian and Tisdell (2016) suggested that a peer review will determine if the findings are adequate based on the data to ensure validity.

Research Pattern: Themes in Findings

The problem addressed in this study was that teachers in a rural West Virginia

CTE Center were required to integrate math and ELA into the curriculum; however, only 68% had industry experience and had yet to learn other methods or pedagogy to support students with additional academic skills.

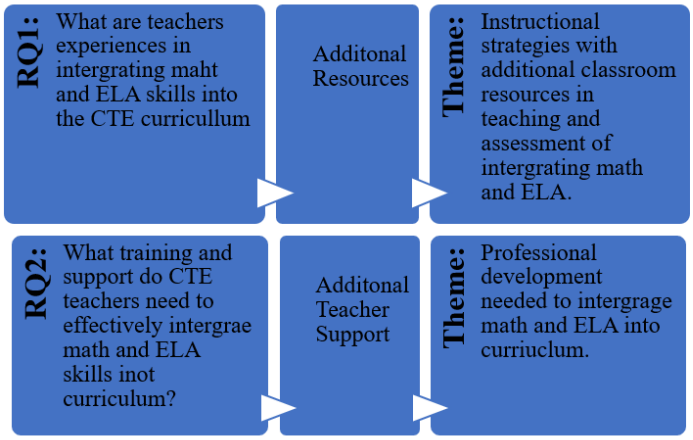
The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The research questions (RQ) that guided this study are as follows:

- RQ1: What were teachers' experiences in integrating math and ELA skills into the CTE curriculum?
- RQ2: What training and support do CTE teachers need to effectively integrate math and ELA skills into the curriculum?

The data collection method involved semi-structured and one-on-one interviews that addressed the problem and purpose of the study, which answered the research questions. Two distinct themes answered the research questions once the open and axial coding process was completed. The themes include a) instructional strategies with additional classroom resources in the teaching and assessment of integrating math and ELA and b) PD needed to integrate math and ELA into the curriculum (see Figure 2).

Figure 2

Emergent Theme from the Research Questions



Results for the RQs

This study's research questions focused on the experiences of CTE teachers with incorporating math and ELA into the curriculum. The identical questions were posed to each participant, and their answers focused on their unique experiences. Two themes regarding the research questions surfaced after the coding procedure of section 2 was completed, as seen in Figure 2. These relationships are shown in the following.

RQ 1: What are teacher experiences in integrating math and ELA skills into the CTE curriculum?

Theme 1: Instructional Strategies with Additional Classroom Resources in the Teaching and Assessment of Integrating Math and ELA

This study's participants discussed different aspects of integrating math and ELA into their curriculum as CTE teachers build from previously learned math and ELA skills taught in the student's core classrooms. Most of this study's participants expressed that

integrating math and ELA was essential for post-graduation college or career readiness and teachers learning how to use tools to improve student success is a vital part of the classroom. Participant eight communicated the demand from industry to integrate math and ELA: "I definitely think industry requires and looking to hire somebody out the door to go and then they can tweak them and train them the way they need." Participant eight continued to express the need for students to understand math and ELA: "They need to know the fundamentals and basics." Participant five reinforced the importance of math and ELA in curriculum: "Well again it, math and English, are the bases to everything." However, most participants were unaware if their teaching and assessment strategies were implemented correctly.

Participants described using a variety of math and ELA assignments in their classrooms, all of which were a way to assess students' learning of course content. Participant Nine spoke about how students are expected to be weak in math and ELA: "So there is probably a lot of people that know students can be very weak in English and math." However, only one out of ten participants reported giving ELA assignments to build students' subject knowledge. Participant Three noted that students are assigned related vocabulary words concerning the week's assignment. The teacher purposefully gives feedback about spelling and grammar to help students improve their ELA skills. Participants four, seven, and eight discussed students' assignments that allow them to assess specific learning processes through math when using a tape measure. Projects like learning to use a tape measure consisted of math teaching strategies such as differentiated

instruction, collaborative learning, three before me, and problem-solving but lacked how to address students' ELA skills.

Participant Six referenced the annual student portfolio, which contains ELA assignments such as resumé writing and descriptions of projects completed in class. "The portfolio assignment is a tool to record the student's progression, analyze their content knowledge, and provide a presentation for college or career readiness." Participant Six continued to express the importance of ELA skills when developing a student portfolio and the aid of an onsite ELA teacher: "So I would say the biggest support would just be relying on those instructors and what resources they have as their special position." Each participant expressed using formative assessments to ensure student comprehension but also stated they need additional resources and knowledge, in addition to the onsite math and ELA teachers.

RQ 2: What training and support do CTE teachers need to effectively integrate math and ELA skills into the curriculum?

Theme 2: Professional Development Needed to Integrate Math and ELA into the Curriculum

In reference to the participants' responses, each voiced a want to learn how to use math and ELA in their classroom more efficiently. However, CTE teachers only build on a student's previous knowledge to complete a newly discovered skill. For example, basic math is used in a building maintenance assignment; the CTE teacher relies on the student's math skills to complete the task. If the student lacks math skills, the CTE

teachers must be able to instruct math for student success. Therefore, the data identified one theme related to research question two: PD needed to integrate math and ELA into the curriculum.

The majority of participants relied on the onsite math and ELA teacher to instruct specific content. Most participants needed help understanding how to integrate math and ELA into their curriculum, as they sent students to the onsite math and ELA teachers. Participant one referenced the experience of integrating math and ELA: "I'm not sure that I've actually been to any PD for math or English, honestly." Participant one acknowledged how she introduces math to students: "We do have an outside math teacher that comes in and helps with that, and he is always available anytime we've messaged him." Participant two emphasized, "I have spoken with our CTE math teacher here at the school, and he has offered help with assignments and some teaching methods, and you know he's right down the hall." Participant ten voiced how the classroom utilizes an ELA teacher: "One way we do that is we have them start writing work orders and more descriptions to help build ELA skills." Participants express concerns about how they are not efficient in reinforcing math and ELA skills and mostly direct instruction to the onsite math and ELA teachers. The participants agreed and are willing to learn how to better incorporate math and ELA into their area of expertise.

Salient Data and Discrepant Cases

In the data analysis process of this study, a review and reflection were designated to discover discrepancies. Upon conclusion of the review and reflection, no discrepancies

were found. This reveals that the data collection process-maintained rigor and ensured the credibility of the researcher. In the event of a discrepant case, additional reviews of the open and axial coding would be revised. The revision would search for additional themes to explain any discrepant data. No salient data or discrepant cases were found in this data collection.

Accuracy of Data Analysis Procedures

The first step to accuracy and credibility is to follow Walden University's IRB protocol. Two components critical to data analysis are accuracy and credibility (Vamanu & Zak, 2022). Hanson-DeFusco (2023) suggested that policy analysis requires a multitude of data to evaluate triangulation. Triangulation consists of a member check, reflective journal, interview video, and interview transcripts.

Researchers used a fact-finding approach to gather information from a participant in an interview (Rexxky et al., 2021). The interview process consisted of notes taken in a reflective journal, video, and transcript recording through Microsoft Teams. The private interviews allowed each participant time to speak freely, process the question, and provide a thoughtful answer. After the interviews were completed, each participant received their copy for a member check.

The use of a member check allows participants to validate their transcripts. Creswell (2012) reinforced member checking to ensure validity in qualitative research. Member checking is a process that allows participants to review and verify the accuracy of their interview (James, 2016). Each participant reviewed their responses to clarify any

discrepancies; none were found.

Summary of Outcomes

The problem addressed in this study was that teachers in a rural West Virginia CTE Center were required to integrate math and ELA into the curriculum; however, only 68% have industry experience and have yet to learn other methods or pedagogy to support students with additional academic skills. The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The research questions addressed the participants' integration of math and ELA.

RQ 1: What Are Teachers' Experiences in Integrating Math And ELA Skills Into the CTE Curriculum?

A theme identified to answer research question one was instructional strategies with additional classroom resources in teaching and assessment of integrating math and ELA. Participants were uninformed about whether the integration of math and ELA was effectively used in the classroom. Research disclosed that students' math and ELA skills were often lacking if effective instructional strategies were absent. Adequate instruction and assessment strategies for math and ELA improve students' skill set (Bazerman, 2018; Accurso et al., 2017).

***RQ 2: What Training and Support Do CTE Teachers Need to Effectively Integrate Math and ELA Skills Into the Curriculum*?**

The theme identified to answer research question two was the PD needed to integrate math and ELA into the curriculum. The research identified support through onsite math and ELA teachers that provide needed resources to participants; however, the research found a lack of training for participants when integrating math and ELA. Dail et al. (2018) declared that PD should be for all teachers and disciplines.

Conclusion

The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The conceptual framework of this study was Bruner's Learning Theory of continuous knowledge. Bruner's Spiral Curriculum Theory promoted the method of complex topic knowledge for all learners (Ireland & Mouthaan, 2020). Bruner's theory assisted the comprehension of PD with Career Technical Education teachers' integration of math and ELA courses.

Section two, methodology, presented the qualitative research design, participants, data collection, and data analysis results. The methodology reported about ten participants interviewed through Microsoft Teams, producing both video and written transcripts. When the data analysis was completed, two themes were created through triangulation of member checks, reflective journals, and transcripts. The data analysis revealed a connection between both themes and research questions. The study's findings supported the axial coding themes of Instructional Strategies with Additional Classroom

Resources in the Teaching and Assessment of Integrating Math and ELA and Professional Development Needed to Integrate Math and ELA into the Curriculum. The interview process revealed participants describing various aspects of how additional resources and additional teacher support were used during instructional procedures. Based on participants' responses, most of them needed additional help to integrate math and ELA into the curriculum. Each participant expressed a willingness to participate in PD that would aid in their skills of integrating math and ELA into the curriculum.

The study's data indicated that Career Technical Education teachers in a rural West Virginia school district's best solution to address the problem is professional development. Smith and Robinson (2020) indicated that participating in PD and implementing new practices through peer collaboration improved teaching skills. The data indicated participants reported needing more skills when instructing and ELA assignments. In addition, the research showed that PD is required to impact students' math and ELA skills positively (Smith & Robinson, 2020). A suggested three-day personal development training was developed to meet the needs of the participants. The project *Who Dares to Teach Must Never Cease to Learn* aims to provide Career Technical Education teachers with additional resources and support when integrating math and ELA into their curriculum. To ensure participant involvement and understanding of the subject matter, both formative and summative assessments were evaluated. In return, each participant has tools to improve Career Technical Education students' comprehension of math and ELA.

Section 3: The Project

This qualitative study contains collected data that addressed the problem of teachers in a rural West Virginia CTE center who were required to integrate math and ELA into the curriculum despite only 68% having industry experience and needing to learn other methods or pedagogy to support students with additional academic skills. The studies finding provided data that indicated participants' acknowledgment of additional resources and additional teacher support. The study's findings demonstrated that in order to provide resources, instructional methodologies, collaborative learning, and peer engagement, PD and more resources are required for teachers. The 3-day PD provided participants with tools to ensure the successful implication of math and ELA into the CTE curriculum. The project is found in Appendix A.

Genre of Project: Professional Development

A 3-day PD training addressed participants' perception of integrating math and ELA into the CTE curriculum from data collected in this study. The following is a list that provides information contained within the project.

- Project title: *Who Dares to Teach Must Never Cease to Learn*
- Purpose: Provide CTE teachers with tools to increase knowledge of integrating math and
    - ELA into their curriculum.
- Goal: To provide CTE teachers with additional resources and additional support when integrating math and ELA into the curriculum that supports student college

or career readiness.

- Outline: Three days of PD with a custom module pertaining to each learning day. Day one through three timelines is 8 a.m. to 4 p.m., which includes two 15-minute breaks and a 1-hour lunch. Each day provides any needed materials to complete activities.
    - Day 1: Module 1: Additional Resources
    - Day 2: Module 2: Additional Support
    - Day 3: Module 2: Putting it all Together
- Closing: At the conclusion of Day 3, each participant was asked to complete an evaluation form that allows the instructor to indicate any positive or negative impact.

Project Goal: Additional Resources and Additional Support

The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The data collected from this study indicated that participants needed additional resources and additional support. Through the planned PD training, CTE teachers had the ability to acquire tools needed when integrating math and ELA into the curriculum. Once participants completed the 3-day PD training, the goal of additional resources and additional support would be achieved.

Rationale

The qualitative study results provided a higher understanding of CTE teachers in a rural West Virginia school district's integration of math and ELA into the student college or career readiness curriculum. Two themes emerged in the competition of coding the acquired data, indicating participants' need for assistance when instructing math and ELA: instructional strategies with additional classroom resources in teaching and assessment of integrating math and ELA, and professional development needed to integrate math and ELA into the curriculum. Therefore, the project genre that aligned with the data results of Section 2 was PD training.

The 3-day PD training was designed to reflect the participant's needs discovered through data collection. PD training allows teachers to instantly implement new knowledge into lesson plans that may not be in the established curriculum (Smith & Robinson, 2020).PD enhances instructional strategies to impact students' learning needs positively (Nooruddin & Bhamani, 2019). PD focused on student learning allows for teacher professional growth (Smith & Robinson, 2020). Participants in this study expressed a need and willingness to participate in PD training focused on integrating math and ELA into their CTE curriculum. The training also provided added time for teacher collaboration, peer review, and brainstorming instructional strategies for student comprehension.

Review of the Literature

The peer-reviewed articles for this literature review reflected the integration of

math and ELA into the CTE curriculum, which addressed the themes produced from data collected in this study. The databases of ERIC, EBSCO, SAGE, and Google Scholar were used to search for keywords, which include *curriculum, professional development, integration of math and ELA,* and *career technical education.* Each term was selected for the relationship between data themes and the study's RQs: (a) What are teacher experiences integrating math and ELA skills into the CTE curriculum? and (b) What training and support do CTE teachers need to effectively integrate math and ELA skills into the curriculum?

The literature review was interconnected through the purpose of the study, research questions, participants questions, data analysis, and data themes from Section 2 of this quantitative study. The literature search generated a multitude of peer-reviewed articles that supported a need for PD to aid CTE teachers in rural West Virginia that integrated math and ELA into the curriculum. Referencing Section 2 of this study, the data produced two themes: (a) instructional strategies with additional classroom resources in teaching and assessment of integrating math and ELA, and (b) PD needed to integrate Math and ELA into the curriculum, resulting in a need for PD and instructional strategies with additional resources.

Importance of Integrating Math and ELA into CTE Curriculum

The 21st century continues to see an increase in innovative and collaborative teaching approaches (Nairz-Wirth & Feldmann, 2019). Curriculum integration provides an efficient means of imparting 21st-century skills while preserving and enhancing

academic accomplishment. Curriculum integration is incorporating creative thinking, critical thinking, character development, and communication that transcends the disciplines (Drake & Reid, 2018). There are four types of curricula integration: fusion, multidisciplinary, interdisciplinary, and transdisciplinary (Drake & Reid, 2018):

- Fusion: creative thinking is often the choice to begin, integrating two like subjects.
- Multidisciplinary: critical thinking, same theme, or common capability within different subjects.
- Interdisciplinary: communication, skill sets are taught across different subjects.
- Transdisciplinary: transcends disciplines- revolving around a question.

Although there are numerous obstacles to overcome when integrating math and ELA into CTE classes, there are also advantages for teachers and students. According to a study on the school-to-work transition, 28% of participants lacked advanced math courses, negatively impacting their college readiness (Parr et al., 2019). Therefore, students pursuing a job in the workforce or a college education would get greater exposure and practicing applied math ideas if math were included in CTE courses. A well-integrated curriculum facilitates academic learning (Drake & Reid, 2018). The same conclusion is consistently reached based on data gathered from several pieces of research conducted almost a century ago at all grade levels. Studies have found that CTE completers that have math and ELA integrated into curriculum have a higher passing rate

than non-CTE students (Michaels & Barone, 2020). CTE graduates had a mean ACT reading scores that were 4.25% higher and mean ACT math scores that were 4% higher than those of ordinary academic high school graduates (Michaels & Barone, 2020), which indicates the importance of integrating math and ELA into CTE curriculum for student college or career readiness.

Instructional Strategies for Integrating Math

There will always be a demand to improve academic performance in mathematics, and CTE schools must find a method to address these challenges. Nevertheless, the CTE instructor must be motivated to learn mathematics and possess the necessary skills before integrating mathematics and CTE. Six principles for teaching mathematics in schools include equity, curriculum, teaching, learning, and assessment, which were developed by the National Council of Teachers of Mathematics (2000). According to equity, every student can study mathematics with access to high-quality instruction. Furthermore, the research conducted by the council has demonstrated the significance of contextual knowledge in the comprehension of mathematics (Joyner & Reys, 2000). This leads to the use of real-world applications in contextualized mathematics education and CTE. According to a report by The National Research Center for Career and Technical Education (NRCCTE), CTE teachers can leverage the implicit mathematics already explicitly covered in the curriculum. With the help of this suggested model, students can see where math is used in the real world and then use mathematical concepts and procedures to follow the example. However, additional research on PD that includes both

CTE and math teachers is needed to determine its effectiveness (Anderson, 2018).

Instructional Strategies for Integrating ELA

ELA in CTE differs from traditional English classrooms. The CTE program of study must be the focal point of the activities in order for ELA to be appropriately included in the curriculum. Learners will be more involved if the project or lesson is based on student interests. Literacy in CTE is essential; the inability to read and understand complexes, such as technical materials, tends to have more severe consequences. Example, failure to read a technical manual in manufacturing can result in damaged machinery. Sawchuk (2019) stated that misinterpreting a patient's chart in the health field can be disastrous. To assist students, see greater value in ELA, teachers should provide genuine reasons for their pupils to use their skills (Hall & White, 2019).

In supporting students in finding greater value in ELA, CTE teachers can provide genuine motivation for pupils to use their skills. Examples of teaching strategies that intertwine program content with ELA engage the learner's interest are as follows.

- Writing-to- Learn
- Written Feedback
- Oral Feedback
- Collaborative Learning

Learning how to maximize the impact of ELA teaching strategies is the key to student success. A few examples are explained in the following. Rather than assessing their knowledge, writing- to- learn assignments is to have students practice their writing

abilities while learning new material (Palmquist, 2020). Less teacher feedback is also required for these writing assignments. Assignments for writing -to- learn can include definitions and descriptions, summaries and responses, reflections, forum discussions, and in-class responses to prompts (Palmquist, 2020). In order to help students identify areas in which they performed well and places in which they need to improve, Yaseeni (2021) suggested samples of both oral and written feedback from teachers to students regarding their ELA abilities. Next is collaborative learning, as CTE students work together to assist peers in gaining a better understanding of ELA applications. Peltola (2018) discussed group work as a teaching approach for writing instruction. Students get the chance to practice writing in groups and have their writing skills assessed by their peers. According to academic ability, students are advised to be divided into small, diverse groups, given a scenario to discuss, and required to create a group solution to a problem (Peltola, 2018). Students can use this as an opportunity to collaborate on improving their ELA abilities.

Professional Development

The main responsibility of a professional teacher is to teach effectively. Due to the constantly changing nature of the teaching profession, changes in this field are unending, prompting the need for PD. According to research on adult learning and teacher PD, effective professional development for teachers should be seamless, technology-enabled, complete, unified, and career-spanning (Love et al., 2020). Professional development enhances teachers' comprehension of their subject matter and

instructional strategies (Smith & Williams, 2020).

Darling-Hammond et al. (2016) described professional development as an investment in quality teachers vital for student comprehension. Abu-Tineh and Sadiq (2018) expressed that teachers want professional development to be effective by a practical, not theoretical, application. Zulkifli et al. (2018) reinforced thoughts of professional development as a benefit to novice (1-5 years) CTE teachers that support the early years of classroom instruction. PD aids CTE teachers concerned with fulfilling the demands of 21st-century learning skills by integrating math and ELA into the curriculum for college or career readiness (Zulkifli et al., 2018). Studies showed that teachers who participated in professional development improved their classroom strategies by focusing on student needs (Lin et al., 2015).

Teachers, like other professionals, have a vast range of knowledge, and each learning method should be designed to fit their needs, experience, and subject matter (Martin et al., 2017). Porter and Freeman (2020) reinforced the importance of one-size-fits-all does not apply to professional development as it most likely will not result in professional growth. A quality teacher is an essential part of student success, as professional development is an investment of a knowledgeable educator (McKeown et al., 2019). When conducting PD, one must analyze the needs, create a plan, and customize it to fit the present needs. Svendsen (2020) reiterated that teachers want professional development to concentrate on what directly relates to their daily classroom situations. Taking that newfound knowledge back to their classroom as Farrell (2019)

spook of how PD can help educators discover and exchange effective teaching techniques and tactics for teaching ELA. In this study participants voiced a need for professional development of support, additional resources with integrating math and ELA into their CTE curriculum.

Project Description

Participants expressed a lack of PD based on the results of this study, *Exploring Teachers' Integration of Math and ELA into the Career Technical Education Curriculum*. They were eager to attend training to improve their skill levels. To reflect the data from Section 2, a three-day PD workshop was designed to fit the needs of all participants. The workshop was coordinated with the local school district calendar in which PD days were scheduled. The time frame was established within the first semester of the school year with three days of learning activities. The daily goals: (a) discovering and using additional resources to incorporate math and ELA; (b) finding and using additional support to learn how to incorporate math and ELA; and (b) taking the learned resources into classroom activities, providing time for collaboration, brainstorming, creating lesson plans, and reflection.

Various delivery platforms were used including: Slido, Padlet, and Google Slides, like PowerPoint that enable debates and interactive participant interaction. According to Shuker and Burton (2021), Padlet is an interactive web-based platform that facilitates collaborative learning. Using links integrated into the presentation slides, Slido is an add-on application for Google Slides that allows you to generate word clouds and run real-

time polls. A dependable Wi-Fi connection and teachers' laptops are required for this professional development. A must is the facilitator understanding of the audience's technology ability and choose a delivery platform that works best for those participants.

PD on integrating math and ELA into the CTE curriculum is an appropriate approach to addressing the problem of teachers in a rural West Virginia CTE Center are required to integrate math and ELA into the curriculum; however, only 68% have industry experience and have yet to learn other methods or pedagogy to support students with additional academic skills. This PD course presented possible solutions for rural West Virginia CTE teachers and addressed problems throughout their instructional practices. This project is intended to embody a practical PD approach while addressing the areas of concern in student comprehension of math and ELA.

This three-day PD plan l provided CTE teachers who integrate math and ELA with instruction strategies for diverse learners, collaboration, and teacher feedback. Upon completion, each participant obtained the project's goals. The goals were based on the themes in Section 2 of this study. The three main goals:

- Goal 1: CTE teachers will understand how to gather additional resources to aid incorporating math and ELA into their curriculum.
- Goal 2: CTE teachers will seek out and use additional support to learn how to incorporate math and ELA into their curriculum.
- Goal 3: CTE teacher will gather learned resources, create classroom activities, lesson plans, and reflect on incorporating math and ELA into their curriculum.

Needed Resources and Existing Supports

The project facilitator gathered resources and utilized support to accomplish successful PD training. To prepare for the project, a continuous reflection of the data analysis resulted from Section 2 guided each step. The three-day PD training l included resources and administrative support, project funding, equipment, and material. The three-day PD training offered to rural West Virginia CTE Center teachers who must integrate math and ELA into the curriculum.

Administration Support

Before the scheduled project, a meeting was held with the local school district's administration to discuss the findings of this study and present an outline of the PD training. Once administration approval was granted, the project was sent into motion. The three-day PD training took place on the local school districts' scheduled days designated for teacher continuous learning within the first semester of the school year. The location was provided by a local district's career technical education principal and located in the school's conference room. Over the three-day course, each participant was offered support in various ways.

- instructional strategies intergrade math and ELA into their curriculum
- brainstorming on challenges, teachers may encounter
- peer review
- collaborative learning

Additional support gave each participant tools to be reiterated in the CTE classroom.

Project Funding

Since the PD training took place during the local district's scheduled teacher continuous learning workdays, no funding for participant payment was required. In addition to being scheduled during regular contracted workdays, the project was held within the school building with no fee.

Equipment and Materials

An appreciated assistant to the project was using the conference room and the equipment it contained.

- Access to Wi-Fi with charging stations
- Smart TV for visual presentation - Google Slides; PowerPoint Presentation
- Arraigned seating for collaboration
- Copy machine for additional handouts
- Paper, pen, pencils,
- Sticky note for exit slips

Equipment and materials are necessary for the facilitator and participants to ensure a thorough presentation with adequate comprehension. The facilitator encourages notetaking not only for participants' memory but also the use of formative assessment.

Potential Barriers

A potential barrier that may occur is missed attendance and participation in previously scheduled learning sessions. As noted, the PD training was planned during the local school district teacher continuous learning days. If the local school district planned

a particular learning session, participants of the PD training may need to make up the required material. A resolution to the potential barrier is allowing the PD training facilitator to distribute any material and information. A possible solution was that before the PD training, the facilitator can obtain any assignment and distribute it to the participants for completion at a later date.

Implementation and Timetable

The project was a three-day PD training that meets the participants of this study's request per Section 2 data analysis results. Taking the instruction lead was the facilitator, researcher of this study. The participants are current CTE teachers employed by a West Virginia rural school district. The project was scheduled during the district's continuous learning days, with each day presenting an agenda and learning goals.

The PD training contained eight hours of instruction time, completing one module each day: reference Table 4 for details. The facilitator's role was to present this study's findings, seek the school administration's permission, and present the PD to the CTE teachers. Each day began at 8:00 am and concluded at 4:00 pm with one hour for lunch and two fifteen-minute breaks. Each day, the school provided snacks, coffee, and lunch.

Roles and Responsibilities

A facilitator's role and responsibilities are as important as the participants for a successful outcome. The facilitator may be an experienced teacher who researched, designed, and presented material (Uehling, 2018). Therefore, this facilitator's role was to

study and prepare for successful PD training. A teacher's participation in PD is vital to student learning. Martin et al. (2017) added that teacher participation in professional development was essential to improve student learning through effective instruction. In addition to showing up, the teachers are responsible for being open and willing to accept instruction to deepen their knowledge of the presentation subjects (Martin et al., 2017). With respect to the participant's knowledge of the subjects they teach, the facilitator must find avenues to integrate math and ELA into the CTE curriculum. For example, diesel mechanic teachers used math and ELA differently than carpentry instructors. A lesson plan can be a tool to understand various perceptions of how each CTE classroom intergrades math and ELA instruction.

Project Evaluation Plan

The project evaluation plan was to reflect the findings of this study through formative assessment. The data from Section 2 indicated two main categories and themes. The categories and themes of this project influenced the three-day PD goal.

- Categories
  - additional resources
  - additional support
- Themes
  - Instructional strategies with additional classroom resources in teaching and assessment of integrating math and ELA
  - PD needed to integrate math and ELA into the curriculum

- Goals
    - Instructional strategies for integrating math and ELA into the CTE curriculum
    - Support teacher challenges of math and ELA curriculum integration

Guided by the results of Section 2 and formative assessment, the produced categories, themes, and goals developed a list of learning achievements of integrating math and ELA into the CTE curriculum.

- Instructional strategies
- Gathering additional resources
- Collaborative learning
- Peer review
- Assessment strategies

As different stages of the PD training took shape: categories, themes, goals, and learning achievements, various formative assessments were conducted to check for accuracy. Kowalski et al. (2018) advised using continuous formative evaluation to identify unanticipated challenges for optimized implementation.

Bond and Blevins (2020) defined a learning community as a group of stakeholders with the same attitudes and learning goals. For PD to make an impact, all stakeholders must have the same goal. Camp (2017) reported that a teacher's instructional effectiveness and professional growth may be impacted by their goals. Therefore, continuous formative assessments provided opportunities for the key

stakeholders to participate, comment, ask questions, and reflect on quality results.

Project Implications

The proposed PD was created to address the data collected in Section 2 of this research project. The data contained in Section 2 represented the participant's need for additional resources and support to integrate math and ELA into their curriculum. Acknowledging participants' concerns through data-gathering interviews resulted in a three-day PD that provided resources that supported CTE teachers to implement math and ELA into their curriculum confidently. Understanding the participants' needs to integrate math and ELA into their curriculum offers the facilitator direction to address critical elements of the PD project. Augustine (2020) supported this concept of need-based PD to strengthen teachers' ability and confidence within the classroom for student success.

Stakeholders and Possible Social Change

The three-day PD project that was suggested, together with the study results t were discussed in this paper, had the potential to impact society and be advantageous to all parties involved positively. The proposed PD approach favorably impacted teachers', administrators', and students' confidence and instructional skills. The fact that the suggested PD can be extended outside of the classroom setting and help kids become more proficient in math and ELA and prepared them for college or career readiness is an added advantage. By assisting students to become college or career-ready, the suggested PD could lead to positive social change that benefits both the student and a potential employer. Soliz (2021) stated in recent years educational leaders and legislatures have

made college and career readiness a priority for K-12 students including those enrolled in CTE courses.

Conclusion

The project goals and the justification for developing a three-day PD were covered in Section 3. The two themes from the data analysis were addressed in the literature review. Based on the needs identified by teachers, a three-day professional development program was planned. The facilitator ensured the PD program adhered to an adequate model, follow-up meetings with educators, and offered a website that contained integrating strategies and information to enable participants to continue and expand their learning beyond the program. I gave an overview of the objectives, the project's description, assessment, and ramifications.

The project's success in incorporating math and ELA into CTE curricula is covered in Section 4. Considering how the project had evolved and how my knowledge had grown as a result of carrying out the research and developing the project. I also believed the lessons I've gained during my doctoral journey on integrating math and ELA into CTE curricula and social change.

Section 4: Reflections and Conclusions

The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The semistructured interviews were conducted with current CTE teachers who have been in the classroom for 1–4 years. The data analysis determined the content of the 3-day PD and addressed the emerging themes.

This section describes the project's limitations and strengths of this quantitative study. Section 4 allows time for reflection on what has been learned and how to move forward, helping others learn the importance of math and ELA in the CTE curriculum. This section will discuss implementation, the application, and any future research.

Project Strengths and Limitations

A literature review is when an initiative first shows its strength. The peer-reviewed articles addressed the topic derived from the data collected and demonstrated how math and ELA were integrated into the CTE program. A search of topics such as curriculum, professional development, integration of math and ELA, and career technical education helped choose sources that related to the study's research questions and the data themes.

Another project strength is the saturation of data. Data saturation signifies that collected data contained information to answer the study's research questions (Lowe et al., 2018). The 10 qualified participants answered semistructured interview questions that

produced data specific to each research question. Once the data were analyzed, the information was used to create a PD training that focuses on the data's emerging theme to aid the integration of math and ELA into the CTE curriculum.

Whether or not the instructors effectively applied the knowledge they have received from PD in their classrooms could be one of the project's limitations. Student math and ELA proficiency may continue to deteriorate unless the teachers apply the PD's taught tactics consistently and effectively. Furthermore, CTE students' college or career readiness may not increase if the integration of math and ELA practices is not addressed. Another limitation may be the little fidelity with which the teachers work together and use the resources for integrating math and ELA into the curriculum. The PD training would only be successful if the teachers and stakeholders could see the advantages of changing their curriculum to include more math and ELA and could not perceive the suggested adjustments as helpful to their efforts.

Recommendations for Alternative Approaches

Addressing the Problem from the Study Results

I explored the needs of teachers at a rural West Virginia CTE school regarding integrating math and ELA into the established curriculum by collecting data from semistructured interview questions. To get a deeper grasp of the requirements for incorporating math and ELA into their courses, I considered a focus group where the instructors could have freely discussed and shared their ideas about combining math and ELA as a group. Second, I considered observing educators guiding pupils to search for

other approaches related to math and ELA. Third, I could have looked for evidence that instructors were incorporating math and ELA into their classes by looking at documents like lesson plans (Patton, 2014). However, I decided to use open-ended questions to interview the participants.

Alternative of the Local Problem

To resolve the problem of this study, a 3-day PD training was developed to address the reflected data collected in Section 2. Focus groups or small group mentorship would be an alternative to the PD session. To work on adding more possibilities for math and ELA into the curriculum, the teachers might meet in smaller groups under the guidance of another curriculum specialist or myself. The teachers in the small groups came from the same CTE disciplines and was a mixture of teachers from different CTE classrooms. Mentoring enables strategy modeling, classroom practice, and post-implementation follow-up.

Scholarship, Project Development, Evaluation, Leadership and Change

Scholarship

Although carrying out a project study and organizing a PD training for my EdD has been difficult, it has taught me what it means to be a researcher. As a beginner researcher, I have picked up valuable knowledge. First, I discovered the worth of scholarly research and the significance of time management. Doctoral research can be laborious and time-consuming to complete, and impediments in life might cause delays. For this reason, it was critical to keep track of the procedures involved in finishing the

study and set aside time to achieve my deadlines and objectives. Additionally, I discovered the value of promptly searching for peer-reviewed literature and the researchers before me addressed educational issues in my community (Pattin, 2014). As a scholar, all these abilities enabled me to see a problem, find a solution, and take action by creating a PD training that would provide teachers with the information and skills needed to assist their students in becoming more proficient in math and ELA.

Project Development

I am now knowledgeable on how to carry out a simple qualitative investigation and apply the results to create a project, which was this three-day PD training. I learned how to recognize an issue, gather qualitative information, conduct academic research to resolve the problem, and evaluate research data to create conclusions to handle the topic with a PD. In addition, I understood how to plan, coordinate, and assess a three-day PD training by conducting semi-structured interviews and using data to find codes and themes. During that laborious but satisfying process, I went from being a practitioner to a researcher and project developer. Project development, in the form of a PD, was essential to bringing about constructive social change in education (Fountas & Pinnell, 2020; Hunzicker, 2017).

Reflective Analysis of the Research and Development

Most significantly, finishing this project has taught me that I can handle and overcome various challenges as a student and an educator. My desire to succeed and make a difference in my life and career as a lifelong learner and leader and my empathy

for my students and coworkers have grown dramatically. Having finished this project study and created the three-day professional development workshop, I can lead and bring about change in the field of education. I now have a greater understanding of how crucial it is for educators like me to act as change agents in their communities and classrooms, fostering good social change to support students' needs.

Reflective Analysis as a Scholar

The problem addressed in this study was that teachers in a rural West Virginia CTE Center were required to integrate math and ELA into the curriculum, however, only 68% had industry experience and had yet to learn other methods or pedagogy to support students with additional academic skills. The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. I have grown as a scholar through conducting research and analyzing data for this project study. Many researchers have studied teachers integrating math and ELA into their courses, but only some have learned CTE teachers in both academic courses. Interviewing teachers in a rural West Virginia CTE center for this study helped me identify that some CTE teachers needed to be made aware that the West Virginia Board of Education required them to integrate math and ELA into their courses. While some CTE teachers attempted to, they needed to use effective teaching and assessment strategies due to challenges, including a lack of resources. Through my study and development of a three-day PD training, administration leadership can address the

problem by helping CTE teachers effectively integrate math and ELA into their courses to increase students' college or career readiness skills.

Reflective Analysis as a Practitioner

The experience of working on this doctoral studies assignment was challenging. But having finished it, I have learned valuable skills that will help me become a better educator. I acquired the research abilities required to carry out a qualitative investigation. I learned how to gather information, evaluate it, finish a literature study, and create PD programs. This study has inspired me to acquire new abilities to enhance my professional practices. Finally, I discovered that I am stronger and more determined than ever imagined as a practitioner. I had to overcome many challenges to finish this research study, but I persisted. I started this doctoral journey to improve my practice, allowing me to help students learn more effectively. I have succeeded in that endeavor thanks to this project study experience.

Reflective Analysis as a Project Developer

I created a three-day professional development course to address the issue with the assistance of data gathered through CTE teacher interviews, data analysis to establish findings and a literature study. Creating the PD training has taught me critical skills as a project developer, including organizing, planning, delivering, and evaluating PD. Through my experience, I picked and compiled a PD training evaluation, established a training timetable, and arranged the instruction and information transfer to teachers. Moving forward, I want to concentrate on professional development training in the

educational field. My career objective going forward is to support and train teachers to improve student education through better teaching practices in the classroom.

Reflection on Importance of the Work

This study's work was crucial because it shed light on how CTE instructors incorporate math and ELA into their curriculum. Highlighting tactics that can be applied across various CTE subjects to improve students' math and ELA competence for college or career readiness is valuable. As a result, it is becoming increasingly important for educators to constantly evaluate their methods to adapt to their students' demands and needs. The amount of work I have put into my research is only the start of what I hope will be a systematic change in how math and ELA are integrated into CTE curriculum, as the suggested changes can be advantageous to all stakeholders involved.

I was unaware of what the data would show upon starting this doctorate journey. I knew including math and ELA in the curriculum was crucial to the daily lesson and student success. However, the CTE community understands that teachers should be qualified to teach math and ELA but are only equipped to teach industry-specific skills. Through the process of conducting interviews, research and completing the analysis process, I have reflected on the new knowledge that can aid other CTE teachers. The main focus is on influencing changes in integrating math and ELA for student success. I understood that my work was essential to advancing not just myself but also my students, coworkers, and other potential stakeholders. The process of this study required me to be persistent and patient. Even though external obstacles frequently threatened to impede my

work, I persisted in believing that my research would significantly impact the integration of math and ELA into CTE curriculum.

My research skills and knowledge base have improved due to the coursework for my EdD degree, which will help me make better decisions as a leader in my profession. This doctoral journey has provided information and the most recent learnings to suggest modifications in integrating math and ELA into the CTE curriculum. The doctoral process was terrific and boosted my confidence simultaneously, allowing me to produce the PD training to aid CTE teachers' instruction that in return improve students' math and ELA skills.

Implications, Applications, and Directions for Future Research

In this study, I explored the needs of teachers at a rural West Virginia CTE center regarding integrating math and ELA into their curriculum. Two themes emerged through the study's findings data collection in Section 2. This resulted in PD training entailing additional support and instruction for CTE teachers' integration of math and ELA into their curriculum. The data led to the development of a three-day PD training designed for CTE teachers. The potential positive social change includes CTE teachers at rural West Virginia CTE centers improving their integration of math and ELA to increase students' ability to perform math and ELA basic skills, resulting in students' ability to succeed in college or their careers.

Potential Impact for Positive Social Change

This work is noteworthy for positive social change because it can improve how

math and ELA are integrated into CTE courses, better-preparing students for college or career readiness. The study's findings also informed administrators about the necessity for CTE teachers' PD to incorporate math and ELA into their CTE curricula. By encouraging administration leadership at a rural West Virginia CTE center to use the study's findings to drive future planning decisions for PD opportunities, this research has the potential to impact society positively. I now have a greater understanding of how crucial it is for educators like me to act as change agents in their communities and classrooms, fostering good social change to serve their students' needs better (Fountas & Pinnell, 2020).

Implications for Social Change

Students improved academic abilities will help them become more prepared for college and the workforce and enable them to give back to their communities (Association for Career and Technical Education, 2020). That process was tedious but rewarding because moving from being a practitioner to becoming a researcher plus a project developer and project development as a PD is vital to creating positive social change in education (Fountas & Pinnell, 2020; Hunzicker, 2017). Furthermore, by encouraging CTE administration to support teachers in meeting the requirement of integrating math and ELA into their curriculum to assist students in being more active citizens in their local communities. When administrators use the study's findings to inform their preparation for upcoming PD opportunities for teachers, more positive social change might be produced (Allan, 2014; Hayes & Wilson, 2016).

Recommendation Future Research

Despite being small-scale, this study offers a number of implications for larger research projects. More studies might be conducted with various online educational environments to ascertain the demands for math and ELA instruction and techniques for PD implementation and follow-through. A system for documenting the effectiveness of PD using Guskey's Five Levels of PD Evaluation and the Google Form format, the durability of the new knowledge from the PD, and the effectiveness of the math and ELA instructional strategies teachers are using in their classrooms are some further implications for future research that can be drawn from this study. After the math and ELA instructional strategies have been consistently employed and evaluated, a different monitoring system could be used to measure the student competency levels. Administrators, teachers, and other stakeholders may find it helpful to keep track of facts on implementation and competency assessments when making decisions about PD or future training.

Conclusion

The purpose of this qualitative study was to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they needed to improve their teaching of these basic academic skills. The research study's data collection indicated the teachers' opinions about including math and ELA in the curriculum at a rural CTE center in West Virginia. In order to bridge the practice gap and guarantee student success, a three-day PD training was created to

address the issue of requiring the integration of math and ELA but lacking the necessary abilities. The PD training addressed the data from Section 2, which highlighted the participants' need of additional support and instructional strategies for incorporating math and ELA into CTE curriculum.

The PD training focused on integrating math and ELA into curriculum research, instructional strategies, and opportunities to collaborate with peers. Teachers will exit the PD having gained new knowledge on the research behind math and ELA instruction and a better understanding of where and what kind of lessons to include in their current curriculum. This project helped me become a more reflective practitioner and an agent for change in the classroom and the learning community. The PD found in Appendix A encourages teachers to include more math and ELA opportunities in their lessons, increase their knowledge, and inform the stakeholders about the ways they can make changes to support and benefit the teachers and the students. With this research, my doctoral journey comes to a conclusion and my professional path as a social change agent through teaching, PD presentations, and stakeholder collaboration begins.

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Appendix A: The Project

Purpose

An instructional method for addressing federal and state accountability standards for CTE schools is incorporating math and ELA into the curriculum. The purpose of this qualitative study is to explore teachers' integration of math and ELA into the CTE curriculum for student college or career readiness and what training or support they may need to improve their teaching of these basic academic skills.

Goal

The researcher conducting this qualitative study hopes to understand the experience of CTE teachers and their math and ELA curriculum instruction.

The three main goals:

- Goal 1: CTE teachers will understand how to gather additional resources to aid incorporating math and ELA into their curriculum.
- Goal 2: CTE teachers will seek out and use additional support to learn how to incorporate math and ELA into their curriculum.
- Goal 3: CTE teacher will gather learned resources, create classroom activities, lesson plans, and reflect on incorporating math and ELA into their curriculum.

Learning Outcome

This PD will bring awareness of integrating math and ELA into the CTE curriculum. Upon completing this PD, participants can use learned skills in their classroom, allowing students to use math and ELA in CTE courses. The learning

outcome is designed to reflect this PD goal. In which participants have a better understanding of additional resources to use instructional strategies for student success.

Participants

The volunteer pool consists of ten CTE teachers within rural West Virginia. Each volunteer must meet the criteria of state licensure, knowledge of state standards, have taught for 1-4 years, and have experienced student outcomes in college or career preparedness for 2-5 years.

Components

The three-day PD training occurs at a West Virginia rural CTE center. The facilitator has a background in assessment and instruction that allows the successful instruction of various strategies to integrate math and ELA into the curriculum. Throughout the PD, time is scheduled for discussions and group activities to ensure teacher comprehension. Formative assessments took place throughout the day, with each module ending with a reflection and an exit slip. A detailed agenda is as follows.

Day 1: Module 1 Additional Resources

Time	Activity	Method
8:00-8:30	Teacher sign in, welcome	Slides 1-2
8:30-8:45	Overview of agenda	Slide 3
8:45-9:00	Day 1 study's findings, project goals	Slides 4-5
9:00-9:15	Module 1 overview, icebreaker	Slides 6-7
9:15-9:45	Study's Theme 1 overview	Slide 8
9:45-10:00	Break	Slide 9
10:00-11:00	Curriculum integration	Slide 10
11:00-12:00	Lunch	Slide 11
12:00-1:00	Discuss integration of curriculum	Slide 12
1:00-1:15	Break	Slide 13
1:15-3:45	Group activities	Slide 14
3:45-4:00	Reflection, exit slip	Slide 15

Day 2: Module 2 Additional Support

Time	Activity	Method
8:00-8:30	Teacher sign in, welcome	Slide 16
8:30-8:45	Overview of agenda	Slides 17-18
8:45-9:15	Icebreaker	Slide 19
9:15-10:00	Study's Theme 2 overview	Slide 20
10:00-10:15	Break	Slide 21
10:15-11:00	Resources and support	Slide 22
11:0o-12:00	Lunch	Slide 23
12:00-1:00	Instructional strategies	Slide 24
1:00-1:15	Break	Slide 25
1:15-3:45	Group activities	Slide 26
3:45-4:00	Reflection, exit slip	Slide 27

Day 3: Module 3 Putting it All Together

Time	Activity	Method
8:00-8:30	Teacher sign in, welcome	Slide 28
8:30-8:45	Overview of agenda	Slides 29-30
8:45-9:15	Icebreaker	Slide 31
9:45-10:00	Putting it all together	Slide 32
10:00-10:15	Break	Slide 33
10:15-11:00	Group activities	Slide 34
11:00-12:00	Lunch	Slide 35
12:00-1:00	Group activities	Slide 36
1:00-1:15	Break	Slide 37
1:15-3:30	Group activities	Slide 38
3:30-4:00	Reflection	Slide 39

Power Point Presentation of 3-Day Professional Development

Welcome

Integrating Math and ELA into CTE curriculum

- Day- 1 of Professional Development
- Icebreaker
- Module
- Lunch
- Continue Module Work
- Reflection
- Exit Slips

Study Findings: Exploring Teachers' Integration of Math and ELA into the Career Technical Education Curriculum

Two Themes Emerged for the Data Collection

- **RQ1: What are teacher experiences in integrating math and ELA skills into the CTE curriculum?**

  Theme 1: *Instructional Strategies with Additional Classroom Resources in the Teaching and Assessment of Integrating Math and ELA*

- **RQ2: What training and support do CTE teachers need to effectively integrate math and ELA skills into the curriculum?**

  Theme 2: *Professional Development Needed to Integrate Math and ELA into the Curriculum*

Provide CTE teachers with tools to increase knowledge of integrating math and ELA into their curriculum.

- CTE teachers will understand how to gather additional resources to aid incorporating math and ELA into their curriculum.
- CTE teachers will understand how to gather additional resources to aid incorporating math and ELA into their curriculum.
- CTE teacher will gather learned resources, create classroom activities, lesson plans, and reflect on incorporating math and ELA into their curriculum.

Module 1

Additional Resources

Bellringer

Peer Collaboration

CTE teachers will understand how to gather additional resources to aid incorporating math and ELA into their curriculum.

Icebreaker

- Why is Math and ELA important in CTE curriculum?
- 1.
- 2.
- 3.
- 4.
- 5.

Activity: Audience will answer as a group

Theme 1: Instructional Strategies with Additional Classroom Resources in the Teaching and Assessment of Integrating Math and ELA

Drake and Reid (2018) states, students who experience the integration approach perform as well if not better than students in a traditional academic classroom

Smith (2019) explains Bruner's Spiral Curriculum Theory as re -engaging ideas from previous learned material for cyclical learning and increasing the depth of knowledge

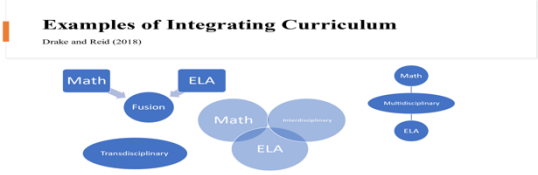
15 Minutes

Curriculum Integration

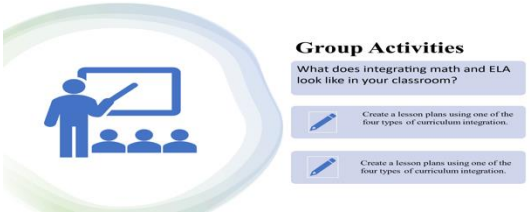
According to Drake and Reid (2018) there are four types of curriculum integration; fusion, multidisciplinary, interdisciplinary, and transdisciplinary.

- Fusion: is often the choice to begin
- Multidisciplinary: same theme or common capability within different subjects
- Interdisciplinary: skill sets are taught across different subjects but
- Transdisciplinary: transcends disciplines - revolving around a question

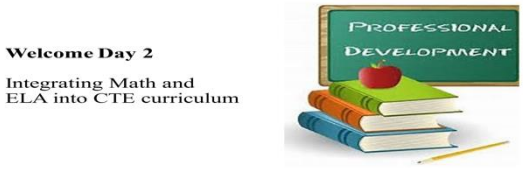
One Hour Lunch Break!


Examples of Integrating Curriculum
Drake and Reid (2018)
Math
ELA
Fusion
Transdisciplinary
Math
ELA
Math
Multidisciplinary
ELA


15
Minutes
BREAK
TIME


Group Activities
What does integrating math and ELA look like in your classroom?
Create a lesson plans using one of the four types of curriculum integration.
Create a lesson plans using one of the four types of curriculum integration.


Module 1
Questions
EXIT SLIP


Welcome Day 2
Integrating Math and
ELA into CTE curriculum
PROFESSIONAL
DEVELOPMENT

- Day-2 of Professional Development
- Icebreaker
- Module
- Lunch
- Continue Module Work
- Reflection
- Exit Slips

Module 2

Additional Support

- Bellringer
- Peer Collaboration
- CTE teachers will understand how to gather additional resources to aid incorporating math and ELA into their curriculum.

Icebreaker

Why is additional support important when using Math and ELA In your classroom?

1.
2.
3.
4.
5.

Activity: Audience will answer as a group

Theme 2: Professional Development Needed to Integrate Math and ELA into the Curriculum

Burner and Svendsen (2020) describes a successful professional development as teachers learning using similar approaches that are used with students.

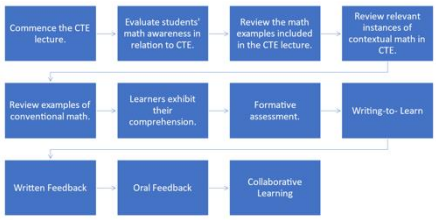
Abu-Tineh & Sadiq (2018) express that teachers want professional development to be effective by a practical, not theoretical, application.

15 Minutes

Resources & Support

- Instructional strategies on intergrade math and ELA into their curriculum
- Brainstorming on challenges, teachers may encounter
- Peer review
- Collaborative learning

Instructional Strangites

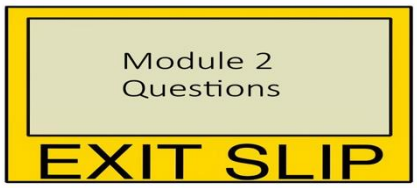


15
Minutes

Group Activities

Create a lesson plans using four types of instructional strategies.

Create rubrics to assure the use of teacher instructional strategies



Welcome Day 3

Integrating Math and
ELA into CTE curriculum

- Day-3 of Professional Development
- Icebreaker
- Module
- Lunch
- Continue Module Work
- Reflection
- Exit Slips

Module 3

Putting it all Together

- Icebreaker
- Peer Collaboration

CTE teacher will gather learned resources, create classroom activities, lesson plans, and reflect on incorporating math and ELA into their curriculum.

Icebreaker

- Reflection: What strategies from the last two days be used in your classroom.
- 1.
- 2.
- 3.
- 4.
- 5.

- Activity: Audience will answer as a group

Putting it All Together

- Reflect on the last 2 day
- Gather learned resources
- Brainstorm with Peers
- Create classroom activities

15 Minutes

Group Activities

Collaborate with a peer and create classroom activities using previously discussed resources.

References

- Abu-Tineh, A. M., & Sadiq, H. M. (2018). Characteristics and models of effective professional development: The case of schoolteachers in Qatar. Professional Development in Education, 44(2), 311-322. https://doi.org/10.1080/19415257.2017.1306788
- Burner, T., & Svendsen, B. (2020). A Vygotskian perspective on teacher professional development. Education, 141(1), 11-20.
- Drake, S. M., & Reid, J. L. (2018). Integrated curriculum as an effective way to teach 21st century capabilities . Asia Pacific journal of educational research, 1(1), 31-50.
- Smith, M. K. (2019). Jerome S. Bruner and the process of education. The encyclopedia of pedagogy and informal education.

Appendix B: Interview Protocol Form

Date _____Beginning Time _____ Ending Time _____

Announce:

This interview session will be recorded for accuracy. It is also your decision to discontinue the interview session at any time.

1. What position do you serve in at this school?
2. How many years have you worked in CTE?
3. What is your highest level of education?
4. How many years did you work in industry before entering the classroom?

Interview Questions

Question 1: What experiences do you encounter when integrating math and ELA into the curriculum?

Question 2: What forms of guidance do your reference when incorporating math and ELA instruction into curriculum?

Can you elaborate on the guidance tool(s) you use daily?

Question 3: What support have you received to integrate math and ELA into curriculum?

Have they been relatively consistently available?

Question 4: What type of professional development is offered to improve the overall quality of math and ELA instruction for effective instruction in the classroom?

Question 5: In your opinion, what do you perceive as the best approach to train career technical education teachers to improve their math and ELA teaching skills?

Question 6: What explanations might teachers offer to account for their lack of training to teach math and ELA?

Question 7: In your opinion, does industry demand for a graduate to have proficiency in math and ELA? Explain why.

Question 8: In your opinion, how are students better prepared for college or a career if they are proficient in math and ELA?

Question 9: In your opinion, will a potential employer hire a candidate proficient in math and ELA over a potential employee that is below standard?

Question 10: What are your thoughts on how integrating math and ELA into CTE curriculum aids in a well-rounded student post high school graduation?