Redesigning career and technical education in the state of Mississippi

In the United States, responsibility and authorization for Vocational Education and Training (VET) rests overwhelmingly with individual state and local governments, not the federal government. As a result, the organization and delivery of VET programs varies significantly. Over the past two decades, VET in America has undergone a significant makeover including the new name Career and Technical Education (CTE), fewer students concentrating on CTE in secondary schools, and increased emphasis on post-compulsory education. This article uses Mississippi, a rural and racially diverse state in the United States South, to illustrate the direction CTE is taking in the U.S. Policies Mississippi is pursuing include dual (secondary and college) credit for CTE courses, tighter integration of career and academic education, greater efforts to support work-based learning, more emphasis on entrepreneurial skills, and stronger industry-education relationships. In Mississippi and across the United States, CTE is shifting away from overly specialized high school CTE programs that limit career aspirations and possibilities and towards programs that require some postsecondary education.

En Estados Unidos, la responsabilidad y autorización de la Educación y Formación Profesional (Vocational Education and Training - VET) corresponde casi únicamente a los gobiernos locales y a los estados, no al gobierno federal. El resultado es que la organización y realización de los programas VET varían mucho de un lugar a otro. En las dos últimas décadas la formación profesional en Estados Unidos ha sufrido una importante reforma, incluyendo la adopción de un nuevo nombre: Career and Technical Education (CTE) [Educación Técnica y Profesional], menos alumnos concentrados en la CTE en los centros de enseñanza secundaria y un mayor énfasis en la educación post-obligatoria. Este artículo se centra en Misisipi, un estado rural con diferencias raciales del sur de Estados Unidos, para ilustrar la dirección que la CTE está tomando en el conjunto del país. Las políticas que se aplican en el estado de Mississippi incluyen doble acreditación (enseñanza secundaria y universitaria) para los cursos CTE, una mayor integración de la enseñanza académica y profesional, mayor apoyo para el aprendizaje basado en el trabajo, más énfasis en las competencias empresariales y relaciones enseñanza-industria más estrechas. En Misisipi y en todo Estados Unidos, la CTE se está alejando de los programas CTE de enseñanza secundaria excesivamente especializados que limitan las aspiraciones profesionales, dirigiéndose hacia programas que requieren cierta educación post-secundaria.

Estatu Batuetan, Hezkuntza eta Lanbide Heziketaren (Vocational Education and Training - VET) erantzukizuna eta baimena ematea tokiko eta estatuko gobernuei dagokie ia erabat, eta ez gobernu federalari. Horren ondorioz, VET programak egitea, eta berauen antolaketa, aldatu egiten da leku batetik bestera. Azken hamarkadetan, Estatu Batuetako lanbide heziketak aldaketa sakon bat izan du, izen berria izatea barne: Career and Technical Education (CTE) [Hezkuntza Teknikoa eta Profesionala], bigarren hezkuntzako ikastetxeetan ikasle gutxiago CTE-en, eta derrigorrezko hezkuntzaren osteko hezkuntzan garrantzi gehiago. Artikulu honek Mississippin jartzen du arreta, arrazan desberdintasunak dituen nekazaritzari lotutako Estatu Batuetako estatua, erakusteko, herrialdean oro har, CTE hartzen ari den norabidea. Mississippi estatuan aplikatzen diren politikek CTE ikastaroetarako akreditazio bikoitza dute barne, irakaskuntza akademiko eta profesional integratuagoa, lanean oinarritutako ikaskuntzari laguntza handiagoa, enpresa konpetentzietan arreta gehiago eta irakaskuntza-industria harreman estuagoak. Mississippin eta Estatu Batu osoan, CTE urruntzen ari da nahi profesionalak mugatzen dituzten, eta lar espezializaturik dauden, bigarren hezkuntzako CTE programetatik. Horren ordez, nolabaiteko bigarren hezkuntza osteko hezkuntza behar duten programetara zuzentzen ari da.

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Table of contents

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1. INTRODUCTION

The goals of Vocational education and training (VET) in America are quite similar to those of its western European counterparts –to provide the skills and knowledge to enable people to earn a sustainable wage in a constantly and rapidly changing workplace and to meet the labor force and entrepreneurial needs of the economy. Unlike Europe, however, in the U.S. the responsibility and authorization for VET– and for all of compulsory and postsecondary education –rests overwhelmingly with individual state and local governments, not the federal government. How states and localities choose to organize and deliver their programs varies significantly. Furthermore, in the U.S. the term VET has faded into obsolescence and been largely replaced by Career and Technical Education (CTE) to represent substantial shifts in goals and policies.

This article uses Mississippi, a rural and racially diverse state in the U.S. South, to illustrate the status of CTE in the U.S. Mississippi's efforts to reform secondary CTE to match both the changing economy and rising youth aspirations typify challenges being faced across the U.S. but with less wealth and this fewer resources at its disposal. As in the U.S., Mississippi's CTE begins in the 12-year compulsory public

school system and, for most, extends into the two-year colleges. The state has a highly respected system of Community and Technical Colleges. This article, however, focuses on the entry phase, high school-based CTE, where youth choose and embark upon their initial career paths.

The early years of CTE are particularly important because historically public schools have treated vocational and technical education as a second-class education, directing low socioeconomic class and low performing students towards the lower rungs of the workforce rather than providing the opportunities associated with higher education (Grubb & Lazerson, 1974)[1]. Mississippi's CTE is attempting to change both the image and reality of CTE in its high schools by making it more relevant to even the most challenging and promising career paths. They're doing this by integrating academic coursework with career and technical programs and by using the more experiential and hands-on career and technical courses to improve academic outcomes. Mississippi schools have taken on the challenge of re-defining their niche in supporting economic growth, generating more economic opportunities, and raising incomes in a state that has significantly less wealth, lower average incomes, and higher rates of poverty than the U.S. average.

2. CAREER AND TECHNICAL EDUCATION IN AMERICA'S HIGH SCHOOLS

Virtually every modern economy acknowledges the need for an extensive vocational education and training (VET) system in order to respond to current and future labor market demands. The responsibilities and structures of those systems vary significantly across nations, but in America's highly decentralized system of education they also vary greatly among states and among local school districts within each state.

Education is not cited as a responsibility of the federal government in the U.S. Constitution or in any of its amendments and has never been a significant part of the federal budget. States pay more than 46 percent, and local school districts pay about 45 percent of the annual education budget, while the federal government pays less than 9 percent[2].

Within public education, however, vocational education alone was singled out as a national priority a full century ago. Influenced by lobbying from agricultural and industrial interests, in 1917 the U.S. Congress passed the Smith-Hughes Act–in perpetuity, ensuring funding forever–providing modest support to rural schools for agricultural education to help farmers mechanize and modernize and to urban

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[1] Norton Grubb and Marvin Lazerson, *American Education and Vocationalism: A Documentary History,* 1870-1970, New York: Teachers College Press, 1974.

[2] Revenues for public elementary and secondary schools, by sources of funds. (2016) *Digest of Education Statistics,* 2013-14. Washington, DC: National Center for Education Statistics. Table 236.20.

schools for trade programs and domestic sciences to help prepare a growing immigrant workforce to meet the needs of industrialization.

Other roles the federal government has assumed over the years have been to (a) ensure equal access and opportunity, (b) measure and collect standardized data and, more recently, (c) encourage innovation and program improvement.

2.1. **Distinguishing Features of Secondary VET/CTE**

The U.S. takes a different approach to VET/CTE than do most European countries. One difference is that compulsory education extends for twelve years though grade 12, not nine years as in many western European nations. Whereas students in other advanced nations are sorted after grade 9, in the U.S. vocational education has been an essential and distinctive program in comprehensive high schools that offer both academic and vocational, liberal arts and technical education. Even after the proliferation of separate Area Vocational Centers in the 1960s, students were still part of their same comprehensive high school and graduating class.

Second, in most states labor unions are rarely included in policy deliberations or decisions. The majority of states are «right to work states», which means unions cannot require workers to join or pay dues. Less than 11 percent of U.S. workers are unionized, and almost half of those are in public sector unions. The social partnerships that typify many European governance systems are all but absent across the U.S. This is one of the reasons that no state has any form of school-based apprenticeship that approaches the workplace learning of Europe's dual systems.

Third, CTE in the U.S. is treated as a private, not public or even quasi-public good. The advantages of CTE are assumed to accrue to the individual and employer and are not viewed in terms of benefit to society and the greater good (National Academy of Engineering, 2017)[3].

Fourth, while CTE is overwhelmingly a state and local responsibility, there is limited federal support for specific goals. This modest support, however, is spread across a polycentric system of agencies and policies. While the Departments of Education and Labor carry most of the load, some 46 federal education and training programs are supported by 9 different federal agencies. At least 3 other federal agencies provide funds for innovation and assessments. In addition, in America private foundations such the Gates, Ford, Kellogg, Alfred P. Sloan, and Carnegie support public education including CTE, particularly programs and organizations that promote equal opportunity and innovation, «let a thousand flowers bloom» approach. With such a multitude of actors and an emphasis on innovation over replication, there is no shortage of successes across the U.S. But without a centralized education

[3] National Academy of Engineering. (2017). *Building America's Skilled Technical Workforce.* Washington, DC; National Academies Press. p. 65.

policy and resources, there are few examples of widespread adoption of the successful programs.

Finally, in most parts of the U.S. vocational education has not been held in high esteem. Throughout most of the 20th century it has been viewed as, a «dumping ground» for lower class and low performing students. The *Economist* wrote that «America has a unique disdain for vocational education» (The Economist , 2010)[4]. Upper and middle class parents do not want their children in a vocational education track, even if redesigned as CTE. American parents' knowledge of CTE is often drawn from their own experiences with «voc ed». They have little knowledge of current CTE or its goals. Employers also appear unaware of contemporary CTE. One survey found that 63 percent of business leaders believe that a four-year bachelors degree is most important for workplace success, and only 18 percent named CTE degrees as important (Bridgeland, Milano & Rosenbaum, 2011)[5].

2.2. **Repositioning Secondary CTE for the 21st Century**

The catalyst for the transformation of 20th century Vocational Education to 21st century CTE was a 1983 path-breaking government report titled «A Nation at Risk» (National Commission on Excellence in Education, 1983)[6]. That report criticized the performance of American students in reading, writing, math, and science, which led it to question America's very ability to compete with emerging global economies.

Increased attention to the basics, however, came at a cost to vocational education, and compulsory education re-focused its resources on raising the basic skill levels needed for college and more demanding jobs, not the types of entry level jobs that had been targeted by VET. In recent years, the emphasis on «common core standards» and standardized testing have further shifted content of public education away from the specialized coursework associated with career pathways.

The following year, a national commission representing high school VET embraced and clarified that position in a report «The Unfinished Agenda». It agreed with «the need for stronger bridges between vocational and academic education…» (National Commission on Secondary Vocational Education, 1984)[7] and

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[4] «Vocational Training: Too narrow, too soon?» (2010). *The Economist*, June 17.

[5] John Bridgeland, Jessica Milano, and Eklyse Rosenbaum. (2011). *Across the Great Divide: Perspectives of CEOs and College Presidents on America's Higher Education and Skills Gap.* Washington, DC: Civic Emterprises.

[6] National Commission on Excellence in Education. (1983). *A Nation at Risk: The Imperatve for Educational Reform.* Washinton, DC: U.S. Department of Education.

[7] National Commission on Secondary Vocational Education, *The Unfinished Agenda: The Role of Vocational Education in the High School.* Columbus, OH: National Center for Research in Vocational Education, 1984.

that secondary VET systems must no longer be primarily preparation for employment but shall give equal weight to preparation for careers requiring postsecondary education.

As a result of this growing consensus on secondary education, the Carl Perkins Act of 2006[8] officially eliminated the word «Vocational» from the name of programs previously aimed at employment, replacing it with «Career and Technical Education» (CTE). The legislation represented much more than a cosmetic name change. It redefined the purpose of CTE as «a sequence of courses that provide individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions».

The new goals include «building on the efforts of States and localities to develop challenging academic and technical standards and to assist students in meeting such standards» and promoting «the development of services and activities that integrate rigorous and challenging academic and career and technical instruction». The legislation aims to strengthen career and technical education links between secondary schools and postsecondary institutions.

Given these general guidelines, each state has the authority to determine how to organize, fund, and deliver CTE to best match its own particular economic profile, circumstances and workforce needs. States have substantial flexibility in the emphasis given CTE in the secondary schools, the degree of integration with academic programs (i.e., they must be freestanding «area vocational centers»), types of sector or career specialization, and forms of collaborative arrangements with both industry and higher education.

Overall across the U.S., however, the role of CTE in America's public schools is in decline. The proportion of students enrolling in occupation-specific programs while in high school is dropping, federal funding for CTE declined by 13 percent between 2007 and 2016, and almost half of all CTE educators say their program budgets have decreased in recent years. Across the U.S. employers and politicians acknowledge the importance of workforce development yet are not investing in school-based workforce development.

The shift in emphasis from specific job skills to basic academic knowledge diminished the intensity of CTE in secondary education to allow more time for learning more generic academic skills. The new nationally accepted criteria for recognition as a «CTE concentrator» is only three semester courses in a chosen career path (Table 1). There are very few, if any, work experience requirements. In most school districts, however, the majority of students in CTE classes are enrolled in grade 6-9

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[8] *Carl Perkins Career and Technical Education Act of 2006,* P.L. 114-95, Section 3 [U.S.C. 2302], amended 2015.

discovery or enhancement classes aimed at either career exploration or to meet rising STEM (science, math, engineering, and technology) graduation requirements.

Table 1. **CLASSIFICATIONS OF SECONDARY CTE STUDENTS**

Classification	Definition
Concentrator	At least 3 credits in career pathway
Participator	1 or 2 credits in any CTE courses
Explorer	At least 3 credits but not in single career pathway
Discovery/Enhancement	CTE courses in lower grades that meet technology graduation requirements

Source: Own elaboration.

The next largest category of CTE students is the «CTE Participator». This requires only one CTE course credit. As CTE expands into challenging, creative and diverse careers such graphic arts, robotics, web design, and culinary arts, more upper secondary students are enrolling in CTE as an elective. Last year, about 94 percent of all high school students enrolled in at least one CTE class, but only 19.1 percent of high school students earned at least three credits in one of the 79 career pathways. Enrollment in CTE overall, however, was down from 10 years earlier[9].

To be adequately prepared for any but the lowest skilled careers, students now are expected to transfer to a two-year community or technical college. Thus, the primary responsibility for career readiness has shifted to America's even more diverse community and technical college system.

A result of the extension of CTE into postsecondary education is that CTE concentrators today are far more likely –even than the average student– to graduate from high school, and more than 70 percent of CTE students enroll in postsecondary education shortly after completing their compulsory schooling (CTE Today!, 2018)[10]. Two-year colleges, unlike secondary CTE, however, are not free, and colleges, though partially supported by state appropriations, rely heavily on student tuition.

Despite the reforms for CTE, recent employer surveys and government reports suggest that the nation lacks an adequate supply of skilled technical workers to

[9] *Career and Technical Education Statistics* (2012). Table H127DC: Percentage of public high school graduates who earned at least 2.0 credits or at least 3.0 credits in the occupational area, by career/technical education (CTE) occupational area: 2009. Washington, DC, National Center for Educational Statistics.

[10] *CTE Today!* (2018). Newsletter of the Assocation for Career and Technical Education. Alexandria, VA: ACTE. https://www.acteonline.org/WorkArea/DownloadAsset.aspx?id=1909.

achieve its competitiveness and economic growth objectives» (Committee on the Supply Chain for Middle-Skill Jobs, 2017)[11]. The result was a three-year study undertaken by the National Academy of Engineering to address the problem, which included testimony from a large number of experts and practitioners about best practices in the U.S. and about successful VET programs in other countries –particularly European apprenticeship programs.

3. THE CASE OF MISSISSIPPI

The southeastern state of Mississippi is located in what Americans refer to as the «deep South». It's the fourth most rural state in the U.S., as defined by proportion of its population residing in «nonmetro counties» (counties with no city of more than 50,000). Jackson, Mississippi's largest city and its state capital, has a population of only 169,000.

Mississippi has had to work diligently to overcome a history of under-investment and under achievement in education, as have most southern states. After the U.S. Supreme Court's 1954 decision required the desegregation of public schools, Mississippi abolished compulsory education in order to give white children the option of attending segregated private schools and academies. This, however, further drained resources from the public schools. Until 1982, Mississippi had no public kindergartens, and its levels of functional literacy and educational attainment ranked far below the U.S. average. At the time, African Americans were still needed for farm work, and the white-controlled legislature believed that better education for Black youth would harm the agricultural economy.

In 1980, more than one in four adults had fewer than 8 years of education and nearly half had not completed high school. Mississippi then was last among all states in spending on education, student performance, and per capita income. The state still spends only 56 percent of the U.S. state average on public education, which includes VET, and pays its teachers 73 percent of the U.S. average.

a) The 1980s and the Impetus for Change

By the early 1980s, new and intense competition from more technologically advanced Japanese and European companies plus opportunities to attract investment from those same countries caused Mississippi to pay much more attention to technology development and skills. Financial incentives and business climate were no long enough. Competing with other states for manufacturing required a much more highly skilled work force and better schools than in the past. In 1982 a

[11] Committee on the Supply Chain for Middle-Skill Jobs: Education, Training, and Certifications Pathways (2017) *Building America's Skilled Workforce.* Washington, DC: The National Academies Press.

new reform-oriented Governor, William Winter, convinced the state legislature of the importance of improving education for all of the state's citizens and delivered at year-end what some still call the «Mississippi Christmas Miracle». The state passed the Mississippi Education Reform Act of 1982, which led to greater spending on education, including public funds for kindergartens, and the reinstatement of compulsory education.

The reforms and the modernization of industry had an impact on VET at both the secondary and post-secondary levels. The state's system of two-year colleges, originally «junior colleges» that provided the first two years towards liberal arts baccalaureate degrees, were restructured and renamed «community and technical colleges». They shifted a significant part of their focus to extending VET beyond the 12 years of public high schools, expanding their technical certificate and associate of science degree programs, plus taking on customized training for industry.

In 1991 Mississippi formed a committee to develop a new vision for workforce development in the state and develop a plan to lead Mississippi into the next millennium. Its recommended reforms led to the Work Force Education Act of 1994, which created a community college-based workforce system with district councils, a Mississippi Workforce Development Council, and career centers to offer basic adult education, pre-employment training, job analysis, curriculum development, customized training, short-term skills training for the disadvantaged, technology transfer, referrals to industry, and full- and part-time vocational-technical education.

b) **Retrofitting Secondary CTE for the 21st Century**

By the early years of the 21st century, it was evident that Mississippi's economy was facing a different and more uncertain future. Its nearly century-old strategy of «balancing agriculture [only] with industry» was (Cobb, 1984)[12] is clearly inadequate with only about 1 in 7 now employed in farming and manufacturing combined. Despite the recent recruitment of Nissan and Toyota automobile assembly plants and, in 2017, a new Continental Tire facility, Mississippi's Office of CTE recognized that the state needed to prepare for more diverse sources of employment in the future and, consequently, revise its approaches to education and training in the public schools.

To better understand and address the future needs of Mississippi's economy and citizens, Mississippi's Office of Career and Technical Education contracted for a strategic review of career and technical education in its high schools[13] (Regional

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[12] James C. Cobb. (1984) *Industrialization & Southern Society 1877-1984.* Lexington, KY: University Press of Kentucky.

[13] Regional Technology Strategies, Inc. *Learning to Do, Doing to Learn: Retrofitting Career and Technical Education to the Future. Phase Two Report.* Jackson, MS: Mississippi Office of Career and Technical Education, March 2017.

Technology Strategies, Inc., 2017). That process analyzed emerging economic and social trends; reviewed the current goals, organization, programs, and processes of career and technical education in the state's high schools; and recommended modifications and reforms.

3.1. **Prospects for Mississippi's economy and employment**

State and national projections suggest that Mississippi's economy will continue to shift away from production-based towards knowledge-based and service industries. Job growth is more likely to be found in the health care, information technology, creative, leisure and tourism, education, and financial sectors. Manufacturing, which dominated workforce needs for much of the 20th century, currently employs less than one in eight non-farm workers in Mississippi, still higher than the national average of 7.9 percent.

Further automation and digitization are likely to result in fewer, albeit more skilled and thus more highly educated, employees. Across the U.S., nearly all jobs added following the most recent recession (11.5 million out of 11.6 million) require more than a high school education, and most of the recovered jobs require a bachelor's degree (Carnevale, Jayasundere & Gulish, 2016) [14]. Even in occupational groups such as «farming, fishing, and forestry», 82 percent of recovered jobs went to those with some college.

The other change in employment across the U.S. and in Mississippi is a shift from full-time employment to alternative work arrangements, e.g., independent contractors, on-call workers, temporary agency workers, or freelancers[15] (Katz & Krueger, 2015). All of the net new job growth in the U.S. between 2005 and 2015 is attributable to such alternative work arrangements. Nearly a fifth of Mississippi's non-farm, private sector workforce is self-employed, far more than the total working in manufacturing. This has implications not only for employment projections but also for success in the workplace. Reputation, connections, web sites, and portfolios, for example, are more important to forms of work that depend on continually finding new customers than to full-time employment. These national trends are likely to continue, even if at different rates in different states.

The other changes schools and employers will have to address are in the values, expectations, and sources of information of young people. Millennials today are far more likely to rely on social networking in both planning their education and seeking work. Over the course of their careers, half of all Millennials anticipate working

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[14] Anthony Carnevale, Tamara Jayasundere, and Artem Gulish, *America's Divided Recovery: College Haves and Have-Nots,* Washington, DC: Georgetown University Center on Education and the Workforce, 2016.

[15] Lawrence F. Katz and Alan B. Krueger, *The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015,* Santa Monica, CA: RAND American Life Panel, 2015.

for 2-5 employers and a quarter expect to work for more than 5 employers. Many also have entrepreneurial aspirations. About 27 percent are already self-employed[16] (U.S. Chamber of Commerce Foundation, 2016), and 70 percent expect to own their own business in the future. Their priorities include job security, good wages, flexible work schedules, and an ability to balance work with home life.

The challenge facing CTE is to design, organize, and deliver programs that respond to the changes anticipated in the economy and society that are already here or anticipated and meet the needs of students. This includes responding to changes in attitudes towards work and careers and to advances in social media that affect how students acquire both codified and tacit knowledge.

3.2. **Making secondary CTE more relevant**

Mississippi's Career and Technical Education is managed by an office of the Mississippi Department of Education. The office is further supported by an independent Research and Curriculum Unit (RCU) located at Mississippi State University, which conducts research on CTE needs and outcomes and assists with curriculum development.

One feature of CTE that has been largely standardized across all states is the organization of career programs. That national framework of 16 career clusters is subdivided into 79 different career pathways. Each state and each school district within the states chooses to offer those pathways and clusters that best match interests of their students and needs of their economies.

Mississippi's schools tend to offer between 3 and 7 different pathways in each of 15 career clusters, electing to bypass only «Government and Public Administration». The state's community colleges offer 14 of the state's 15 career clusters in their postsecondary CTE programs, leaving «Education and Training» to the four-year colleges[17] (Stuart Rosenfeld, 2002). Enrollments by career cluster are shown in Table 2 (no recorded enrollments in *Human Services* or *Law, Public Safety, Corrections, & Security*).

Many of the popular programs are traditional programs long associated with vocational education and with community support, although most now are embedded with new technologies. Agriculture, for example, which is tightly embedded in the agricultural economy, is perennially popular. Agriculture, Food, and Natural Resources and Health Science were the most popular programs, comprising more

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[16] U.S. Chamber of Commerce Foundation, «The Millennial Generation Research Review», https://www.uschamberfoundation.org/reports/millennial-generation-research-review, 2016.

[17] Stuart Rosenfeld (2002). *Fulfilling the Promise: Building a Workforce for a Competitive Economy in the 21st Century*. A Report to the State Board of Community and Junior Colleges and the Worrkforce Investment Board. Chapel Hill, NC: Regional Technology Strategies.

than 40% of all CTE enrollments. Education and finance, both of which generally require postsecondary credentials, were the least often offered and/or enrolled. Within the career cluster «Transportation, Distribution, and Logistics», four out of every five students were in auto mechanics, long among the most popular vocational programs, but only one school offered «transportation logistics», even though transportation and warehousing is responsible for more than six percent of the state's employment.

Table 2. **CAREER CLUSTER ENROLLMENT IN MISSISSIPPI, 2013**

Career Clusters	Enrollment	%
Agriculture, Food, and Natural Resources	6,343	24.2
Architecture and Construction	2,784	10.6
Arts, Audio-Video Technology and Communications	789	3.0
Business Management and Administration	2,935	11.2
Education and Training	215	0.8
Finance	5	0.1
Health Science	4,201	16.1
Hospitality and Tourism	1,520	5.8
Information Technology	442	2.7
Manufacturing	1,561	6.0
Marketing, Sales and Service	2,046	7.8
Science, Technology, Engineering, and Mathematics	816	3.1
Transportation, Distribution, and Logistics	2,513	9.6
Total	26,174	100.0

Source: Mississippi State University Research Coordinating Unit, 2014.

Choices of pathways also are influenced by availability of teachers, which are more scarce in emerging and technology related career pathways, especially in the most rural and poorest areas such as the Mississippi Delta Region. On-line learning can help some isolated and poorer areas overcome the teacher deficit, but CTE courses that require hands-on learning and personal support still need qualified teachers.

Enrollments in careers for emerging industries, including those dominated by freelancers and micro-enterprises, are increasingly attractive to young people, not only as possible careers but also as skills that are valuable across a wide range of emerging

occupations. Digital media and game and interactive media design, for example, represented only about three percent of enrollments of concentrators and are offered only in few locations. But these programs are popular among non-concentrators in academic fields and can effectively integrate academic and career competencies.

Students often first learn about CTE through (1) career discovery and enhancement programs; (2) on-line and published information such as from the Mississippi Works Job Resource web site; and (3) school-based guidance counselors and teachers.

Enrollments in discovery/enhancement programs in the middle schools through 10th grade, for example, are quite high because they can meet state STEM requirements. The Department of Education is currently working with the Office of CTE to increase access to Computer Science for Mississippi (CS4MS). This program, developed by the RCU at Mississippi State University, is in a two-year pilot phase with nearly 16,000 elementary, middle, and high school students participating in 52 of the state's 162 school districts. Of the students enrolled in Mississippi's CTE courses in 2014, 82 percent were enrolled in discovery or enhancement classes, and the remaining 18 percent in upper secondary as either participators (1 or 2 credits) or concentrators (3 or more credits).

Middle school students (Grades 6-8) also learn about CTE by school visits to companies, hearing from speakers, and by attending trade fairs. Mississippi's 8th grade students in three regions of the state also have access to the Pathways2Possibilities program funded by the state and private foundations, which offers engagement with representatives of business and industry. As students enter high school, up-to-date and accurate labor market and career information (LMI) is available.

Historically school counselors have been assigned responsibility for guiding students' curriculum choices. But since most counselors today are assigned hundreds of students, it is not possible to provide the individual attention students need. The United States ranks well below average among OECD nations in career counseling availability[18] (Simon Field, *et al.*, 2010). Mississippi had only one counselor for every 440 students in 2014. Some Mississippi CTE centers have only one counselor, others have none at all and must draw on academic counselors in nearby high schools.

An even more serious problem is informing the public about modern CTE. A recent survey of perceptions of CTE in Mississippi found that 45 percent of residents were unable to name a single CTE program, and 55 percent did not realize that CTE qualifies students for entry into college. Half of all educators rated the state's CTE programs as excellent or good, but one in five educators were not sure whether their school district even offered CTE. Respondents from both the general population and state educators viewed CTE as most appropriate for «students with

[18] Simon Field, *et al., Learning for Jobs: OECD Policy Review of Vocational Education and Training,* Paris: OECD, 2010.

academic deficiencies or low probability of pursuing higher education»[19] (Julia Jordan *et al.*, 2016).

3.3. **Content and structure of CTE**

Reforms of CTE to combine career and college readiness include closer relationships between academic and career teachers and counselors, and, ultimately, increased integration of programs in career/vocational centers and those in comprehensive high schools. This suggests setting more learning standards that meet postsecondary requirements and allowing more CTE secondary students to earn postsecondary («dual») credits.

Other reforms to promote innovation and to increase career ladder possibilities include curricula that encompass «all aspects of the industry», which enables students to more effectively understand and solve systemic business problems. Finally, given the scale of entrepreneurial and freelance activity in Mississippi, curricula ought to include exposure to such possibilities, especially in career clusters where entrepreneurship is quite prevalent.

a) **Integrating career and academic content**

A study for the National Conference of State Legislatures (NCSL) in 2016 recommends that states invest in a «highly effective and intellectually rigorous system of career and technical education that is available to those (students) preferring an applied education». Such a system should include: (1) a powerful, hands-on applied curriculum requiring strong academic skills, (2) no «dead ends», and clear pathways to college, and (3) partnerships with employers to ensure that high standards are set for the students and provide on-the-job training and learning opportunities to enable them to reach those standards[20] (National Conference of State Legislators, 2016).

California's Linked Learning is perhaps the most effective and most thoroughly evaluated CTE model in the U.S. California's Linked Learning is a high school reform initiative[21] (Hoachlander & Steinhauser, 2015) that gives equal weight to academic and career/technical education, provides exposure to real world experiences, and organizes around a specific industry sector.

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[19] Julia Jordan *et al.* (2016). *Confronting the CTE Stigma: Perceptions of CTE Among Mississippi Public and Educators.* Starkville, MS: Mississippi Satte University Research and Curriculum Unit.

[20] National Conference of State Legislators, «No Time Left to Lose: How to Build a World-Class Education System State-by-State», 2016.

[21] Gary Hoachlander and Christopher Steinhauser, «*Career And Technical Education Must Be Integrated With Academic Coursework*», p.10, *EdSource*, November 24, 2015.

b) **Awarding dual credit**

An increasingly popular reform that both encourages and eases the transition between public schools and colleges is allowing dual, or concurrent, enrollment. Eligible students in secondary courses that meet higher education standards can receive credit toward both high school graduation and a college degree.

Since future entry-level jobs in most career fields are likely to require some level of post-secondary education, an articulated relationship between the Office of CTE and the state's community college system is vital. About 80 percent of Mississippi's students that have taken CTE enroll first in a community college, but 66 percent enroll in liberal arts associate degree programs. Only 8.5 percent of CTE graduates enroll in a two-year associate of science program. About 20 percent plan to work toward a four-year bachelor's degree. In 2016, however, only 3.3 percent of CTE participators received any dual credit towards a college degree. That tracks national efforts; in 2015-16, only 97 programs were accredited for concurrent-enrollment nationwide.

These factors point to a need for an expanded coherent, statewide approach to dual enrollment and dual credit for CTE courses that will align career pathways from secondary to postsecondary education. Currently, dual credit and dual enrollment in the state is largely based on institution-to-institution agreements and not yet widely used by CTE in high schools or community colleges except in those colleges that host secondary CTE centers on their campuses. The lack of a seamless pathway remains a barrier for employers who need a pool of applicants and require an additional two years of postsecondary education to qualify for employment.

c) **Preparing for entrepreneurship**

Nearly 20 percent of Mississippi's non-farm private sector workforce is self-employed, a fraction likely to grow larger as the economy and the professional interests of Millennials change. A larger share of the Millennial cohort compared to previous similar age cohorts is less willing to trade its autonomy for a highly structured work environment and more likely to be thinking about future entrepreneurial and freelance options.

The most common approaches to preparation for entrepreneurship are (1) treating entrepreneurship as a distinctive career pathway and self-contained discipline, as a few schools now do; (2) addressing entrepreneurship generically through business and economics courses; and (3) embedding entrepreneurial skills into the curriculum of career programs via problems and projects that involve broad-based management and business skills.

Mississippi's most recent approach to entrepreneurship has been concentrating it in its business curricula, primarily through the Mississippi Council on Economic Education's Master Teacher of Entrepreneurship program hosted by Millsaps College. Other forms of preparation for entrepreneurship are the result of projects of career pathway student organizations. Every agricultural education student, for ex-

ample, is required to complete a supervised occupational experience, which historically has been forming and managing a business enterprise. More recently, similar enterprise-based projects have expanded to other career pathways. These include embedding skills and knowledge needed to nurture and support entrepreneurship, including self-employment, into the subject matter across CTE careers. Future plans include setting up dedicated spaces within school settings, e.g., Makerspaces and Fab Labs that encourage students to operate real and simulated businesses.

d) **Getting certified**

Although government efforts to establish national skill standards in the U.S. have failed, some sectors, working closely with state or national industry associations, have developed their own standards. These standards have been integrated into CTE curricula to produce certifications based on rigorous assessments recognized by the employers of that industry. In some cases these are as important as degrees. In Mississippi, the certification that are most widely used in secondary CTE programs are in auto repair/technicians, construction, food services, and information technology. Some of the certifications are extended into postsecondary CTE programs at community college, adding to the employability of the completer.

e) **Learning «all aspects of the industry»**

The goal of integrating «All Aspects of the Industry» (AAI) into career and technical education was incorporated into the federal legislation in 1984 to provide students with a comprehensive understanding of the industry associated with a career path, to give employees an appreciation for the context of their work and possible career opportunities. Such contextual knowledge is often requested by business cluster and sector–based organizations that seek employees who understand not only their primary job skills but also the upstream and downstream implications of the work they perform so that they might identify and avert systemic problems. The smaller and less specialized the business, the more likely an employee needs to be flexible and assume multiple responsibilities, and needs broader skills.

3.4. **Programs and pedagogy**

Mississippi Office of CTE has supported and encouraged a variety of organizations and approaches to better prepare students for the world of work. These systems span a wide variety of institutional structures and arrangements, relationships between schools and industries, and forms of work-based learning.

a) **Institutional arrangements**

The state public educational system is divided into 148 different school districts, each of which typically has multiple high schools. The 148 districts also include spe-

cial schools for math and science, agriculture, the arts, and the deaf. Each district choose which CTE programs to offer and where. It may offer programs within its comprehensive high schools along with academic programs –where agriculture, business, and education and training career pathways plus CTE exploratory courses are most often located. Most districts choose to send other career pathway students to a consolidated area vocational school. These centers use a variety of names. About 35 are called career, career and technical, and/or technology centers, while 50 other centers retain the term vocational schools or centers. The latter, however, serves to reinforce the outmoded image of CTE as «vocational education».

Other increasingly popular institutional settings for CTE, but available only in a few locations, are career academies, early colleges, and community college campus-based CTE centers. Career academies, common and proven effective in California as Linked Learning, are smaller industry cluster based institutions operated as learning communities. They work closely with industry, combining workplace learning with rigorous academics aimed at postsecondary education and/or high-wage employment[22]. Although still experimental in Mississippi, successful examples are under development at innovative school districts with business associations, such as the Maritime Academy sponsored by the Gulf States Ship Building Consortium serving three school districts in southern Mississippi.

Early Colleges, also still in an early stage of development in Mississippi, also integrate career and academic skills but are more focused on college tracks than career academies. Vicksburg Warren School District in Southern Mississippi received an innovation grant from the state (Senate Bill 2191) to create a new and different educational experience by establishing River City Early College in 2016. Finally, positioning CTE centers on the campuses of community colleges, as Hinds Community College does, provides the prestige of a college environment and emphasizes a more advanced technical curriculum.

These models all serve to expand the primary focus –and image– of CTE from preparation for immediate employment to an equivalent readiness for postsecondary education. Each recognizes a deeper and more formalized integration of career and college pathways, drawing on a particular career pathway to contextualize the academics. As such, these models articulate secondary education with postsecondary requirements and offer high school students opportunities for college credit.

b) **Work-based learning**

Interest in work-based learning (WBL) in Mississippi, and across the U.S., is periodically advanced as an effective form of career and technical education. Yet it has

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[22] The first career academies opened in Philadelphia in the 1970s, then in California in the 1980s as the California Partnership Academies. Laurie Stern, «Career Academies: A new twist on vocational», *American Radioworks*, Sept 10, 2014.

never even approached the level of intensity or scale of European dual systems. For more than three decades, European school-based apprenticeship systems –particularly those in Germany, Austria, Switzerland, and Denmark– have been studied and promoted by American educators and policy makers[23] (Lerman & Rein, 2015). But neither Mississippi –nor any other state– has yet embraced the European approach. The decentralization of American education, absence of social partnerships, lack of national employer associations, employment regulation for anyone under the age of 18, unwillingness of enough U.S. employers to devote the time or resources needed, and lack of interest within the U.S. Department of Education all limit full-scale apprenticeship efforts

The strongest interest in participating in apprenticeship programs in Mississippi as elsewhere in the U.S. emerges from European-based companies where it has been part of their business culture. But that interest is aimed predominantly at community college, not high school students.

If WBL is to become mainstream in the U.S., it will have to be modified to fit America's business culture and social structure, and Mississippi is investing in models that do just that, using a variety of approaches shown in Table 3. A pilot project goal is to make some form of WBL an integral part of every program for the skilled trades. The state's new Office of Business & Industry has been designated to establish new or expand existing programs across the state, by establishing arrangements with employers. Ingalls shipbuilding, for example, created 25 apprenticeships last year for an on-site simulated work experience and hired 23 of the 25. In some instances, employer association standards establish standards for certification. For example, the National Restaurants Association requires 400 hours of WBL.

Other forms of WBL include cooperative education (students working in a business a few hours a week) and semester or summer internships for school credit. Some career clusters have developed their own requirements. Mississippi depends on about 60 full-time WBL coordinators across the state plus teachers' relationships with local businesses to help arrange and monitor WBL experiences.

Another type of WBL in Mississippi's CTE programs that does not depend on a business partner is to create school-based workplaces that emulate real world experiences, e.g., school cafeterias, auto repair shops, computer services, and community construction projects. One of the newest, already in use in schools in many states and under consideration in Mississippi, is the MakerSpace, rooms equipped with tools for small-scale production ranging from basic hand tools to 3D printers and desktop CNC machines. Such spaces are also becoming more common in Europe where apprenticeship positions are becoming more scarce.

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[23] Robert I. Lerman and Volker Rein. (2015). *Building a Robust U.S. Work-Based Education and Apprenticeship System at Scale: Can Lessons fron Europe Help?*. Baltimore: Johns Hopkins University, American Institute for Contemporary German Studies.

Table 3. **CLASSES OF CTE WORK-BASED LEARNING IN MISSISSIPPI 2018**

Class	Form
Apprenticeships	Multi-year sponsored by employer
Business simulation	Scenarios in school that simulate business environment
Industry-driven projects	Complex projects for and with support from industry
Internships	Work for limited period of time in an industry or occupation
Community service	Volunteer participation in community-based work projects
Embedded activities	WBL within existing classroom-based course work
Virtual WBL	Interaction with online community of industry professionals
School-based enterprises	Business within a school
Entrepreneurship	Students plan and manage start-up company

Source: Office of CTE, Mississippi Department of Education, RCU, 2018.

Even more extensive use of WBL is constrained by the lack of government funding, business support, and government regulations and liability issues that apply to minors. A national survey found that 62 percent of respondents named lack of funding as a primary challenge[24] (Colburn & Jenkins, 2015).

c) **Collaborative relationships among schools and with higher education**

Formal relationships among secondary schools provides students with access to a wider range of career pathways and more sophisticated resources, especially in the state's poorer school districts where it is often difficult recruit qualified faculty for programs. Articulation agreements between secondary and postsecondary schools allow students to seamlessly move from one level of education to another under a common set of standards. Many of Mississippi's secondary schools are already part of consortia that enable students to spend part of their school day at a larger, better equipped, CTE Center that can more efficiently engage with business and industry.

Mississippi has a statewide agreement concerning articulation of credit between secondary and postsecondary institutions that specifies conditions for credit transfer between high schools and community colleges. The majority of articulation agreements, however, are established by specific institutions. For example, Hinds and Itawamba Community Colleges host secondary CTE programs on their college campuses and award credit towards both high school graduation and associate degrees.

[24] John Colburn and Nneka Jenkins, *Recasting American Apprenticeship: A Summary of Barriers to Apprenticeship Expansion Research Project.* Washington, DC: Aspen Institute, November 2015.

Statewide standards ensure the portability of credits across an even wider set of institutions. Although an agreement exists between Mississippi's 15 community colleges and its secondary schools for accepting approved courses, it is not known how many students take advantage of articulated credits or if they are even aware of the possibility. The majority of CTE students enroll in only one or two CTE classes as electives with no intention of completing a career pathway. And most CTE «completers» later enroll in postsecondary programs that do not match their CTE career pathway, looking ahead instead to transferring from community colleges to four-year colleges or universities.

d) **Industry and business relationships**

In Mississippi every program is required to establish an advisory committee consisting of experts representing the sector. But it often proves difficult to recruit business people, especially from the small and mid-sized businesses that dominate Mississippi's economy. Ultimately, relationships between business and industry and CTE programs are determined by individual faculty members' personal relationships with local businesses, including through former students who have become employees of local companies.

In most communities, the school system's CTE director is not well known to state, regional, or local business and industry associations, chambers of commerce, and is not on the workforce development council. Very few of the state economic development leaders interviewed indicated strong, if any, relationships with secondary CTE centers in general. Most reported that their primary relationships with education and training institutions were with the president or vice president of the community colleges and sometimes local school superintendent—but never CTE.

4. REFORMS UNDERWAY IN MISSISSIPPI AND ACROSS AMERICA

Despite recent reforms in national CTE policy, it has been extremely difficult to change the historical image and reputation of CTE as a less rigorous and less financially rewarding education track. To many parents, students, and employers, CTE remains yesterday's vocational education, intended for those with less academic ability and aimed at immediate entry-level employment. It is particularly difficult for populations that have been historically underserved by public education to accept programs that they believe to be low status and of limited career potential.

Another challenge is adapting to structural and technological changes in the economy and workplace and adjusting programs to match the competencies that are most likely to promote and sustain growth and equality. While programs still focus on technical skills, more than 60 percent of all technical jobs now require non-routine, interpersonal, and analytical skills. Further, employers expect more versatility

and creativity from employees, which involves an understanding and appreciation of operations and functions throughout the industry, not just a single occupation.

The reality is that CTE has undergone a fundamental change in content, rigor, and goals to match the rising skill demands of the workplace and growing desire of students for career ladders and higher education. Secondary CTE has become much more integrated with academic curricula and an alternative path to college, especially for students who learn more effectively experientially than theoretically, by doing rather than sitting in a classroom. It prepares young people not just for jobs but also for career paths that more likely than not require postsecondary education and lifelong learning.

Many of the issues Mississippi is facing and attempting to resolve are similar to other states. Various reforms are underway in Mississippi and elsewhere as a result of local innovation and initiative. But few have been adopted as policy and funded and thus are not yet common practice across the U.S. The following selection of recommendations for Mississippi is based on concepts and innovations that have proven effective enough to consider as standard state-wide practice and/or policy.

- Eliminate, or at least reduce, the use of the term «vocational» in the names of CTE schools. Some 45 of the state's schools offering CTE still use «vocational» in their names, and the state still offers a Vocational Instructor Program. This serves to reinforce the outdated view of CTE as an inferior education option.
- Increase the integration of academic and career curricula. Team teaching across disciplines, contextualizing academic curricula, and rewarding creative and innovative efforts all lead to closer integration. This requires enrolling more academic students in CTE, expanded use of dual enrollment, counselors who recognize the value and demands of further education and understand emerging career paths, and increased investments in sector-targeted «career academies» that link academic to career education and students to employers.
- Revise and expand CTE pathways and curricula aimed at emerging economic opportunities. Programs ought to reflect (a) long-term interests and needs of employers for more versatile and creative workers, (b) new and emerging career paths, and (c) students' interests and desire for occupational mobility. This will require access to data and information about sectors and occupations not yet classified by the government and the cooperation of business and industry.
- Expand entrepreneurial education and work-based learning. Both WBL and entrepreneurial education are more important than ever before given the increasing portion of the labor market entering into contract and freelance work, employers investing less in the training of new workers, and emerging industries depending more on creativity and entrepreneurship. Strategies in-

clude expanding simulated work-based learning, starting and operating school-based enterprises, providing staff time to arrange WBL opportunities, and monitoring and assessing the WBL process.

These recommendations suggest expanded opportunities for innovation throughout the state's CTE system—for teachers, administrators, and support staff. Innovation requires a supportive environment, latitude to experiment, and rewards. Innovation can be facilitated by exposure to other places that are facing similar problems and addressing similar issues.

Some changes require little more than revising current procedures, methods, and reward systems, but others require new investments. Resources are always a mediating force, affecting rates and directions of changes. Yet the persistent belief that everyone needs a four-year college education to succeed, and of 21st century CTE as 20th century vocational education remain deterrents to public investments in secondary CTE in Mississippi and across the nation. Mississippi CTE must compete for state funding with other education agencies.

The changes that CTE needs, such as providing hands-on learning in simulated workplace environments, are more costly than standardized classroom education and will require, innovative partnerships with business and industry and economic development agencies. Mississippi is fortunate to have a large international industrial base that is accustomed to investing in education.

Finally, Mississippi is a state that still has persistent pockets of poverty, particularly in the Delta Region along the Mississippi River. Such regions lack the resources and support structures needed by students from disadvantaged homes and communities and the ability to attract faculty and provide meaningful workplace learning experiences. These regions will need additional support for both students and schools.

5. THE FUTURE FOR CTE

Reforms in Mississippi's CTE, similar to those in most of America, are not really new. Many were formulated a century ago by John Dewey, one of America's preeminent progressive educators and philosophers[25] (Dewey, 1917). In 1917 he argued, though largely unsuccessfully, against separating vocational and academic education. Vocational education, he wrote, should not be trade education to secure technical efficiency, and should not concentrate on a single line of work («nothing could be more absurd than to educate individuals with an eye towards only one line of work»). In his view, the only adequate training for occupations was training through occupations.

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[25] John Dewey (1917). *Democracy and Education.* New York: Macmillan Company Free Press.

Policies for CTE in America's public schools finally include adopting his theories, moving away from specialization and CTE programs that limit aspirations and career possibilities. Current CTE programs are becoming more integrated with academic programs and less specialized. The best programs promote continual learning and prepare graduates for higher education, entrepreneurship, employment in current or emerging industries, and/or changing career paths. More than 88 percent of students taking CTE courses plan to pursue postsecondary education within one year of high school graduation[26] (Association for Career and Technical Education, 2016).

Mississippi's master plan is expressed in the State Board of Education's most recent five-year plan, which includes the goal of every student graduating high school ready for college *and* (no longer *or*) career. Its objectives include increasing participation in workplace learning, advanced coursework, dual credit enrollment, STEM-related career pathways, and national certifications.

In Mississippi CTE is addressing this by (a) shifting the focus of CTE from primarily job preparation to more comprehensive learning that incorporates contextual and work-based learning, (b) raising educational outcomes, and (c) targeting all students («participators») and not just those selecting specific career pathways («concentrators»).

[26] Association for Career and Technical Education (2016). https://www.acteonline.org/uploadedFiles/Assets_and_Documents/Global/files/Policy/Funding%20Infographic%202016.pdf

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