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Graduation Rates and Contributing Factors in CTE Students Versus Traditional Academic Students

Young Bin Lim
Mississippi State University

Sean Owen, Ph.D.
Mississippi State University

Alexis Nordin
Mississippi State University

This study examined the impact of various career and technical education (CTE) programs and student demographics on the four-year graduation rate for a cohort of 15470 students entering secondary public school programs in Mississippi in the 2007-2008 academic year. Participation in one or more CTE classes increased the likelihood of on-time graduation, and a student's choice of College & Career Readiness Career Cluster™ affected graduation rate. Sex had a statistically significant impact on graduation rate overall, but when examined by Cluster, sex was only significant in the Agriculture, Food and Natural Resources Cluster (where females outperformed males). Race proved statistically significant overall to graduation rate as well, and in cases where socioeconomic status and family situation were controlled, Black students outperformed White students in select Career Pathways.

KEYWORDS: career and technical education, Career Clusters, dropout rate, graduation rate, student demographics

Introduction and Background

Like many other states, the Mississippi Department of Education (MDE) is exploring students' increasing interest in career and technical education (CTE) as a potentially powerful tool in reducing the state's high-school dropout rate, which the Mississippi Board of Education aims to

decrease to 13% by 2015 (Mississippi Board of Education, 2013). Nationwide, students' and their families' views about CTE appear to be changing, encouraging more secondary students to pursue CTE credits and more secondary CTE students to seek post-secondary educational opportunities or national certifications that they may use to secure family-sustaining positions and close the skills gap currently plaguing U.S. employers. This skills gap is particularly concerning in Mississippi, where job projections in 2018 show a majority of jobs will constitute middle-skills positions and the state will lack workers to fill them (Jordan & Dechert, 2012).

Reducing dropout rates while simultaneously boosting graduation rates and postsecondary enrollments among secondary students is an enigma currently challenging the U.S. public education system. The issue also presents a challenge to researchers, in large part because of the historic difficulty of determining and comparing each state's definition of a "graduate." Rumberger (2011) has observed that each state's previously insular ability to determine factors such as whether and how General Educational Development (GED) certificates and student transfers were applied toward high-school graduation rates impeded graduation-rate research, especially before some federal restrictions were imposed on states in 2011-2012. Rumberger (2011) further explains that "not dropping out of school is not the same as graduating" (p. 279), with various studies supporting his finding that "completing high school by earning a regular diploma and completing high school by earning an equivalency diploma ... are not equivalent" in terms of economic benefits to the student or his or her state of residence (p. 279).

Estimates of actual high school graduation and on-time graduation rates within the U.S. vary widely, with Heckman & LaFontaine (2007) finding a variation from 66% to 88%. The Organisation for Economic Co-operation and Development (OECD) calculated the U.S.

graduation rate in 2006 at 77%, well below the OECD countries' average of 83% (OECD, 2008).

The National Center for Education Statistics calculated the 2007-2008 averaged freshman graduation rate (AFGR) at 74.9% (Stillwell, 2010). For 2009-2010, the U.S. Department of Education estimated the AFGR at 78.2%, with Mississippi showing a statewide AFGR of 63.8% (Stillwell & Sable, 2013).

Public high schools' graduation rates calculated using U.S. Census data, or Current Population Survey (CPS), generally provide higher graduation rates (Barton, 2004; Barton, 2005; Warren & Halpern-Manners, 2009). Calculations based on self-reported CPS data provide the percentage of people who do not graduate from high school or are not registered in schools among those who are registered and who are between 16 and 24 years old (Warren & Halpern-Manners, 2009). These calculations tend to provide optimistic views about high school graduation rates, indicating that secondary school graduation rates are as high as 90% (Warren & Halpern-Manners, 2009). However, the primary drawbacks of using CPS data include reliance on self-reported educational data and the CPS's equation of a GED with a high school diploma (Rumberger, 2011), as well as the exclusion of prison and military populations (Warren & Halpern-Manners, 2009).

Scholars who use non-fiscal state surveys based on the U.S. Department of Education's Common Core of Data (CCD) tend to offer more conservative calculations of high school graduation rates (Barton, 2005; Greene & Winters, 2001; Swanson & Chaplin, 2003; Sum & Harrington, 2003; Seastrom et al., 2005) and typically show lower graduation rates (Barton, 2002; Greene & Winters, 2006; Haney et al., 2004; Heckman & LaFontaine, 2007; Seastrom et al., 2005; Swanson & Chaplin, 2003; Warren, 2005). Scholars who use CCD-based calculations

debate methodologies, such as those using cumulative promotion index (Swanson & Chaplin, 2003), AFGR (Seastrom et al., 2005), adjusted completion rate (Greene & Winters, 2006), and estimated completion rate (Warren, 2005; Warren & Halpern-Manners, 2009). Warren and Halpern-Manners (2009) have offered a comparison of CCD-based approaches to calculating graduation rate, most of which (AFGR, ACR, BCR, and CPI) offer biased results if student migration and/or grade retention are considered.

While their calculations vary, scholars do agree that the consequences of dropping out of high school are stark, not only for students and their families, but also for their states of residence, which experience negative repercussions such as increased crime (Pascopella, 2007), increased poverty rates (Aud, KewalRamani, & Frohlich, 2011), decreased health (Aud, KewalRamani, & Frohlich, 2011), and decreased tax revenue, resulting in an average lifetime loss to a state's economy of approximately \$240,000 (based on 2008 inflation rates) for each high school dropout (Chapman, Laird, & KewalRamani, 2010). Chapman, Laird, and KewalRamani (2010) reported on behalf of the National Center for Education Statistics that the average person in the U.S. aged 18 to 67 in 2009 without a high school degree earned a median annual income of \$25,000, and some estimates were much bleaker (Chow & Whitlock, 2010)—well short of the estimated “living wage” of approximately \$32,000 during that time period (Chow & Whitlock, 2010). Aud, KewalRamani, and Frohlich (2011) demonstrated that high school dropouts were at a significantly greater risk of living in poverty (31%) as young adults than those who graduated from high school (24%).

Further disheartening is the fact that those high school students who do graduate often do not succeed due to their inability to meet employers' specific skills and educational requirements

of at least some postsecondary education. Unfortunately, among OECD countries the U.S. ranked first as of 2005 in generating higher education dropouts, despite exorbitant spending on higher education compared to countries in the European Union (OECD, 2007).

As a result of the substantial economic gap for non-high school graduates and the long-term, negative repercussions that may result from a large population of un- or underemployed, impoverished residents, states are seeking creative ways to encourage secondary students to stay in school longer and pursue college or technical training. Several states are expanding CTE programs and CTE dual-enrollment offerings at the secondary level and have presented preliminary findings that indicate CTE courses are of growing interest to secondary students. Moreover, the National Association of State Directors of Career Technical Education Consortium (2013) has posited that secondary students who concentrate in CTE programs far exceed the national AFGR and that approximately 70% of students who concentrate in CTE pursue postsecondary educational opportunities, outpacing their traditional academic counterparts—news which has piqued states' interest.

Purpose of Study

In this study, we examined 4-year graduation rate data for a cohort of 15470 students in Mississippi who entered secondary public school programs in the 2007-2008 academic year and were enrolled in one or more CTE courses during their academic careers, with two primary purposes: a) to calculate by Career Cluster and Pathway the impact of CTE involvement on graduation rates for the cohort of secondary students, and b) to measure the influence of student demographics and socioeconomic status on CTE graduation rates within the cohort.

The study informed the following questions:

1. What was the calculated 4-year graduation rate for Mississippi's CTE students in the 2007-2008 cohort, and how did it compare to the State-reported graduation rate for all students, including both academic and CTE students?
2. What was the 4-year graduation rate by Career Cluster and Pathway for Mississippi's CTE students in the 2007-2008 cohort?
3. Which Clusters and Pathways in Mississippi had 4-year graduation rates for CTE students in the 2007-2008 cohort that met or exceeded the national AFGR for 2007-2008 programs?
4. Which CTE Pathways for students in the 2007-2008 cohort defied typically observed achievement gaps for female and racial minority students?
5. What were the influences of sex, race, socioeconomic status, and family situation on 4-year graduation rates for CTE students?

Literature Review

CTE's Impact on Secondary Graduation: Three States

Rumberger (2011) noted that in 2004 the average high school graduate earned 3.5 CTE credits though only two states required CTE courses of their secondary students as of 2007, suggesting widespread participation in CTE. This finding may indicate that state-defined CTE courses are not limited to courses in the 16 nationally recognized CTE Career Clusters, meaning states may have a broader definition of which courses are designated as CTE (such as general health courses) than those officially defined as Career Pathway courses by the U.S. Department of Education's Office of Vocational and Adult Education; nevertheless, interest in CTE, or at least

certain Career Clusters, seems to be building. The National Center for Education Statistics reported that student participation in computer technology, health care, communications technology, child care and education, and protective services grew an average of 0.04–0.25 credits between 1990 and 2005 (NCES, 2013). Proponents of CTE programs in states such as California, Georgia, and Texas have taken note, exploring the potential of CTE to reduce student attrition.

California has instituted Linked Learning (formerly known as Multiple Pathways) as a CTE-based alternative to the comprehensive high school model. According to Rosin and Frey (2009), some students of traditional high schools “simply get lost and others see the curriculum as irrelevant” in a state where “[s]tudent disengagement is a problem, illustrated in part through high dropout rates,” with approximately 19% of secondary students dropping out (p. 2). In response, the Linked Learning model combines core academic and CTE components with work-based learning and support services. With encouragement from state legislators and local universities such as California State University and the University of California—which from 2003 to 2008 increased by more than threefold the number of secondary CTE classes that met the universities’ aligned admission eligibility requirements—the state has seen benefits from Linked Learning, with more students passing the mandatory state high school exit examination and fulfilling minimum entry requirements for universities in California (Rosin & Frey, 2009). Rosin and Frey (2009) cite as further evidence a recent study showing that students from 16 sites implementing Linked Learning approaches demonstrated better interpersonal and problem-solving skills. The study’s authors found additional benefits for high-risk males from CTE schools in long-term employment and earnings—a trend other states wish to emulate.

According to Chow and Whitlock (2010), Georgia's Central Educational Centers (CEC) have flourished across the state since 2000, when the state's first charter school based on Joe Harless's theory of human performance technology opened in Coweta County, with half of the county's graduating seniors in 2009 participating in a CEC program. The CEC programs promote dual-credit secondary CTE classes based on local employers' needs, encouraging students to apply their CTE credits to postsecondary pursuits. To date, Chow and Whitlock (2010) observed that the CEC programs seem to be succeeding, particularly in Coweta County, where local officials credit CEC with attracting more jobs and industries—such as Yamaha and the Cancer Treatment Centers of America—to the area, prompting officials in Baton Rouge to implement a similar model. Chow and Whitlock (2010) further noted that not only have dropout rates fallen in CEC schools, but “analysis suggests that the overall school district high school cost structure is lower, and high school student achievement higher, than other comparable communities without a CEC-type initiative” (p. 132).

Texas has also experienced success with using CTE courses as a method to improve graduation rates. A recent feature in *Education Week* lauded the Pharr-San Juan-Alamo Independent School District for reducing its secondary student dropout rate by almost 90% between 2006 and 2012 after establishing a new school that offered dual-credit CTE courses to recent dropouts. In five years, the school graduated over 1,000 students who had previously dropped out of high schools in the district, and the model has spread to other districts throughout Texas (Maxwell, 2013).

Clearly, states are taking note of the potential power of CTE not only to reduce dropout rates, but crucially to boost graduation rates. Our research indicates that not only does students'

choice of *whether* to participate in CTE courses encourage graduation, but also their choice of *which* specific CTE Career Cluster or Career Pathway to pursue may play a significant role in boosting graduation rates.

Student Demographics on Secondary Graduation Rates: Can CTE Mitigate the Impacts?

Much is currently known about the link between student demographics and secondary graduation rates, though less research is available about CTE's potential to mitigate such effects. This study examined the effects of sex, race, socioeconomic status, and family situation on the graduation rate of CTE versus academic students within the 2007-2008 cohort. Each of these factors has been shown to impact secondary graduation rates, and because individual family socioeconomics often reflect the larger socioeconomic trends at play in their communities, we chose to broaden the scope of our research to examine family socioeconomic status in a district-wide context.

Females in every state have lower secondary public school dropout rates than males, with a national average of 2.9% compared to 3.8% (Stillwell & Sable, 2013). Shadden (2011) found that females tended to outperform males among CTE completers in Tennessee. In a CTE context, however, most research examines discrepancies among the sexes related to non-traditional Pathways, especially the highest-paying CTE Pathways in science, technology, engineering, and mathematics (STEM). Females are far less likely to enroll and become completers in STEM Pathways, and they are overrepresented in Pathways such as cosmetology and childcare—a trend which has changed little in the past three decades (Toglia, 2013). Female students do comprise 86% of enrollment among the healthcare Pathways, which offer high-paying positions, but

research points to factors such as socioeconomic status that limit female students' decisions to enroll or concentrate in non-traditional Pathways (Toglia, 2013).

Pertaining to the impact of race on graduation rates, Yates (2008) cited various studies pointing to an alarmingly high risk of not graduating among secondary Black, Hispanic, and other racial minority students in 2006. Conservative estimates concluded that nationwide in 2006 Black and Hispanic students did not graduate at rates of approximately 11% and 22%, respectively, compared to 6% for White students. Yates (2008) pointed out that Black students were also more likely than White students to be placed in special education programs, lowering Black students' chances of graduating at all or with traditional degrees.

States with large Hispanic and immigrant student populations suffer an even greater disadvantage:

Although data for immigrant students were available for only 2 years (2002-2003), their attrition rates were significantly higher than all other groups, at 40%. Using cohort analysis procedures rather than annual data, some studies (Johnson, 2005) have reported that more than half of Hispanic students fail to complete high school. These are, of course, critical and tragic evidences of a failure to meet the educational needs of non-White, poor, and immigrant students. Moreover, these data indicate a crisis for the nation when considered in the context of the changing demography. (Yates, 2008, p. 7)

In 2009-2010, Stillwell and Sable (2013) found the 2009-2010 AFGR for White students was 83%, compared to approximately 71% for Hispanic students and 66% for Black students, a concern for Mississippi with a population consisting of approximately 37% Black residents (U.S. Census Bureau, 2013).

Along with sex and race, a student's family socioeconomic status, commonly measured by free or reduced price lunch eligibility and parental education, has been shown to affect graduation rates (Pascopella, 2007; Yates, 2008), and lower family income has been linked to higher CTE participation (Palmer & Gaunt, 2007). Pascopella (2007) surmised that poor students' conflicting views about how higher education pursuits stand to impact their families' social dynamics may impact their motivation to graduate from high school and pursue secondary education: "In poverty, people are mainly driven by survival and relationships, and maintaining relationships can interfere with achievement. For example, attending college can mean giving up time with friends and family members, and this can elicit the fear of losing others" (p. 38). Research also indicates that students' social living arrangements (whether they live with one or more parents, step-parents, or other adults) contribute to their likelihood of enrolling in CTE courses, with secondary CTE students less likely to live with both parents or either parent (Palmer & Gaunt, 2007) than traditional academic students. Additionally, district considerations, such as rurality, may play a role, as Kester (2008) indicated that CTE students from urban areas slightly outperform those from more rural areas. It makes sense that CTE students and their families do not exist in a vacuum—their prosperity is often directly tied to that of their communities.

Methodology

For this study, we focused on students in the 2007-2008 cohort that attended public secondary school districts in the state of Mississippi. The MDE supplied our group, housed at the Research and Curriculum Unit (RCU) at Mississippi State University, with one of the datasets for this study. The dataset contained student-level information consisting of demographic and socioeconomic characteristics and coursework characteristics of the individual students. The other

dataset was obtained from standardized assessment data from the Mississippi Career Planning Assessment System, Version 2 (MS-CPAS2) for the students in the cohort. The assessment is administered on behalf of the MDE by the RCU. The two datasets were combined internally by the Business Applications Systems department of the RCU for the purposes of clarity and efficiency.

For calculating graduation rate, we needed basic information such as the number of students in the cohort, the number of students who graduated on time (within four years), and the number of students migrating from or into other schools, districts, and states. Students comprising the cohort used in this study started 9th grade in the 2007-2008 academic year for the first time. For this study, we had access to a filtered view of the Mississippi Student Information System administered by the MDE. Our view was limited to only students who took CTE secondary courses from 2003 to present. It also did not include the students' total academic course records. The lack of availability of the full student dataset made determining which students should be included in the 2007-2008 cohort difficult. Thus, we needed an alternative way to determine the students who were included in the cohort.

To determine the 2007-2008 cohort, we first chose students who took CTE courses during the given year from our dataset. Next, we chose 9th grade students among those who took CTE courses in the 2007-2008 school year. We repeated this selection process for 10th grade students among students who took CTE courses in the 2008-2009 academic year, 11th grade students among students who took CTE courses in the 2009-2010 academic year, and 12th grade students among students who took CTE courses in the 2010-2011 academic year. Among that list of students, we removed data anomalies. Examples of these anomalies are students with grade level

data mismatches or those who appeared to graduate before the expected date. (Only 2.8% of students identified as CTE according to the MDE classification and who graduated from public secondary schools in Mississippi in 2011 qualified as gifted students. In our study, we assumed that the percentage of students who actually skipped a grade was fewer than 2.8%.)

Our dataset did contain information about the students' graduation year. Since we had information about cohort and graduation year provided by the MDE, we calculated basic graduation rate by dividing the number of students who graduated on time by the number of students in the cohort. For a more exact calculation, we also needed to consider but ultimately excluded intrastate and interstate student migration among schools, districts, or states using the Warren and Halpern-Manners (2009) method. Since we did not have the exact intrastate and interstate migration data, we used the number of students who were in the cohort and the number of students who graduated on time.

In Mississippi, CTE courses are identified in two ways. The MDE identifies a course as CTE if it is aligned to a Classification of Instructional Programs (CIP) code ("Career and Technical Education," 2013). For this study, we selected students who took courses that are included in the classification scheme for CTE education created by the RCU (RCU, 2013). The RCU classification scheme identifies CTE students as students enrolled in courses categorized in career and technical education Career Pathways. MDE identifies students as CTE students as students enrolled in courses that receive funding earmarked for CTE funds. These courses may or may not be courses categorized in career and technical education Career Pathways. An example of a Career Pathway CTE course is Concepts of Agriscience. An example of a non-Career Pathway CTE course is Family Dynamics (Table 1). To calculate the 4-year graduation rates for Mississippi's

CTE students in the 2007-2008 cohort for each scheme, we identified the courses designated as CTE by the MDE and by the RCU (the RCU designation comprising a subset of the MDE designation). Students in the 2007-2008 cohort were grouped according to those schemes for calculation purposes.

Students were also classified by Pathway and district to calculate the respective graduation rates for each Pathway and district. Once the graduation rates for each Pathway were computed, they were compared to the national AFGR (74.9%) for 2007-2008 programs (U.S. Department of Education, 2010). These rates were further separated by sex and race for each CTE Pathway for comparisons against the national graduation rate.

To determine the influence of a student's sex, race, socioeconomic status, and family situation on 4-year graduation rates for CTE students, we used logistic regression. Students who were enrolled for the academic year in one or more CTE courses within a Cluster Pathway were included as part of the Cluster's graduation rate. In the logistic regression analysis of CTE students' graduation rate, the logistic coefficients for each Pathway were calculated without control variables and with control variables for sex, race, socioeconomic status, and family situation. Control variables were used to explore to what degree they influenced students' graduation rate using these selected student characteristics.

Findings

After the dataset was cleaned for this study, the final number of students selected for the 2007-2008 cohort using the MDE CTE classification method was 28044. This number was inflated in our opinion due to methodological differences in the identification of CTE courses between the MDE and RCU. As stated in the methodology, we selected the RCU identification

scheme for CTE students. Based on our selection of the RCU identification scheme, the final number of students used for the 2007-2008 cohort was 15470. From this population, 12552 students graduated in the 2010-2011 academic year. From these numbers, we calculated the 4-year graduation rate for Mississippi CTE students in the 2007-2008 cohort in Mississippi at 81.1%. This result was calculated by dividing the CTE students who graduated by the total number of CTE students (Graduation rate: $12552/15470=81.1\%$) as summarized in Table 2.

This rate is considerably higher than the state-reported graduation rate of 73.7% for all students, including both academic and CTE students. It is also higher than that of students who took CTE courses as classified by MDE (M=77.5%) without taking courses that are classified by the RCU as CTE courses.

Table 3 separates students' graduation rates by sex, race, socioeconomic status, and family situation. Female students' graduation rate (M=84.4%) is higher than that of male students (M=78.0%). This difference is statistically significant ($p=.000$) at the $p < .05$ level as shown in Table 4. Reviewing graduation rate by race, Asian students' graduation rate is the highest, but the number of minority students is not large enough to compare to those of White and Black students. Comparing White and Black student groups, the graduation rate of White students (M=81.9%) is higher than that of Black students (M=80.4%). This difference is also statistically significant ($p=.023$) at the $p < .05$ level as shown in Table 4.

Regarding graduation rates by family background, the difference in graduation rates between single-parent students (M=80.2%) and non-single-parent students (81.2%) was not significant, even though non-single-parent students' graduation rate is higher. Regarding graduation rate by economic background measured by lunch status, free lunch status students

show the lowest graduation rate (M=76.3%), while reduced lunch status students show the same level of graduation rate as that of paid lunch status students (M=86.3%).

The 4-year graduation rate by Career Cluster as defined by the National Association of State Directors of Career Technical Education Consortium (The Sixteen Career Clusters, 2013) for Mississippi's CTE students in the 2007-2008 cohort was calculated from the disaggregation of the overall group. Among all of the Career Clusters, Health Science shows the highest graduation rate (M=92.3%), as demonstrated in Table 5. The second is Information Technology (M=89.7%), and the third is Education & Training (M=89.6%). The 2007-2008 cohort students who took courses in the Agriculture, Food & Natural Resources Career Cluster had the lowest overall graduation rate (M=74.5%). The second lowest graduation rate was shown by the Manufacturing Career Cluster (M=79.2%). Some of the results for currently implemented Career Clusters were low due to initial implementation in the cohort year. For example, the Finance Cluster had 0 graduates, and the Education & Training Cluster had 60 graduates.

The 4-year graduation rate by secondary school district for Mississippi's CTE students in the 2007-2008 cohort was also calculated from the disaggregation of the overall group. Of the 151 school districts, 83.4% of the Mississippi school districts (n=126) had a graduation rate higher than the national AFGR (M=84.03%, SD=0.063). Results show that 16.6% of the school districts (n=25) were not higher than the national AFGR (M=65.76%, SD=0.144). Table 6 provides the complete results by school district for this cohort. Results from the spatial analysis (Figure 1) show that the majority of the districts with graduation rates below the national average reside in Mississippi Congressional District 2, which primarily encompasses the historically economically depressed and largely rural Mississippi Delta region.

The 4-year graduation rate by Pathway as defined by the National Association of State Directors of Career Technical Education Consortium (The Sixteen Career Clusters, 2013) for Mississippi's CTE students in the 2007-2008 cohort was calculated from the disaggregation of the overall group as shown in Table 5. Sex and race were also disaggregated from these groupings. In the Agriculture, Food and Natural Resources Career Cluster (Table 7), most Pathways showed higher graduation levels than the average graduate rate (M=81.1%), with three exceptions: Agriscience (M=77.6%), Agriscience Introduction (M=75.1%), and Concepts of Agriscience (M=70.4%). However, the numbers of students enrolled in Agriscience Introduction (n=1371) and Concepts of Agriscience (n=1953) Pathways had the highest graduation rates in the Cluster and had the most influence on the overall graduation rate of the Agriculture Cluster. In the two lowest graduation Pathways, female students had higher graduation rates than male students. This difference was the largest in the Concepts of Agriscience Pathway. However, the graduation rates of both Pathways were lower than that of the average graduation rate.

In the other Pathways, some had lower graduation rates per subcategory. For example, female students enrolled in the Food Products Pathway had a low graduation rate (M=50.0%). However, the number of students was small (n=1). In Forestry, the Black students' graduation rate (M=72.7%) was much lower than that of White students (M=91.9%). However, the number of Black students in Forestry was 22, while the number of White students in Forestry was 111. Thus, the graduation rate of Black students is not as influential on the level of graduation rate in the Agriculture Cluster. In Horticulture, female students had a lower graduation rate (M=73.0%) than male students (M=89.7%). The number of male students (n=39) and female students (n=37) is

similar. In Science of Agricultural Mechanization, Black students (n=34) had a lower graduation rate (M=70.6%) than that of White students (M=84.2%).

In the Manufacturing Cluster (Table 8), students in Furniture Manufacturing Upholstery showed a lower rate of graduation (M=69.7%) than average (81.1%). By sex, male students showed lower graduation rates (M=66.7%) than female students (M=83.3%). However, the number of male students in the Furniture Pathway was 27, while the number of female students was 6.

Female students showed lower graduation rates in Machine Tool Operation (M=71.4%) and Welding (M=72.1%). The number of female students was 49 in Machine Tool Operation and 43 in Welding. Graduation by race in Manufacturing was similar between White and Black students.

The results of chi-square analysis showed that, when considering overall graduation rate by cohort, sex (p=.000) and race (p=.023) were statistically significant at the $p < .05$ level as shown in Table 4, yet analysis results *within* the majority of the Career Clusters were statistically insignificant. However, in the Agriculture, Food, and Natural Resources Cluster, female students' graduation rate (M=76.9%, p=.008) was statistically significantly higher than male students' graduation rate (M=73.2%). Race (p=.000) was also statistically significant in this Cluster at the $p < .05$ level. Black students' graduation rate (M=71.7%) was lower than that of White students (M=76.3%). In the Architecture Construction Cluster, Black students' graduation rate (M=76.8%) was also significantly lower than that of White students (M=84.4%), although Black students' graduation rate was higher than the statewide average. Table 9 shows all Pathway graduation rates for students by sex and race.

In the logistic regression analysis of CTE students' graduation rate as shown in Table 10, the logistic coefficient of the Health Science Career Cluster was the highest, while that of the Agriculture Career Cluster was the lowest. When the dummy variable (female sex level) was added, the coefficients of Career Cluster variables increased in Agriculture, Information Technology, Manufacturing, STEM, and Transportation. These increased coefficients mean that female students have positive effects on graduation rate in these Clusters. When the dummy variable (Black race level) was added, the logistic coefficients of Clusters increased in Business Management, Education Training, Hospitality Tourism, and Human Services Career Clusters. In these Clusters, the Black student race variable has a positive effect on the graduation rate of CTE students. When the dummy variables (female sex level and Black race level) were added, the logistic coefficients of Information Technology, Manufacturing, Science Technology, and Transportation increased. When the dummy variable for family situation was added, most logistic coefficients of Cluster variables did not change. This means that the single-parent level of the family situation independent variable did impact graduation rates of CTE students.

When lunch status variables were added, the logistic coefficients of Cluster variables of Agriculture, Business Management, Education Training, Manufacturing, Science Technology, and Transportation increased compared to those of Model 1 (all comparison models are based on Model 1). In these areas, the coefficients on the reduced lunch and free lunch variable were positive and statistically significant at the $p < .05$ level towards the graduation rate of CTE students. The magnitude of logistic coefficients of free lunch was much lower than that of reduced lunch. Thus, we can assume that the most positive effects come from reduced lunch students. One significant finding was that the logistic coefficient of Black students changed from a negative sign

to a positive sign, meaning that Black students may show a higher level of graduation than White students when economic and family background are controlled.

Conclusions

Although the study's dataset was more limited than its initial vision, this study was still able to achieve its original objectives. We were able to identify the graduation rate for CTE students in Mississippi for the 2007-2008 cohort; 4-year graduation rates for students in Career Clusters and Pathways; and graduation rates disaggregated by sex, race, socioeconomic status, and family situation. The 4-year graduation rate for a cohort of 15,470 Career Pathway CTE students entering secondary public school programs in Mississippi in the 2007-2008 academic year (M=81.1%) is high compared to the national freshman graduation rate (M=74.9%) and the Mississippi graduation rate (M=73.7%). Other findings of the study point to the influence of students' choice of CTE courses on on-time graduation, with students in the Health Science (M=92.3%) and Information Technology (M=89.7%) Career Clusters showing the top two graduation rates. This influence is very positive news coupled with the National Association of State Directors of Career Technical Education Consortium (2013) statements that approximately 70 percent of CTE students pursue postsecondary degrees, which further promotes the anecdotal opinion that CTE courses in secondary programs promote college and career readiness in students. The CTE graduation rate of the 2007-2008 cohort also emphasizes the findings of Maxwell (2013) and Chow & Whitlock (2010) that CTE programs of study increase student engagement and reduce dropout rates.

Other findings of the study from the logistic regression analysis suggest that student sex and race had a statistically significant impact on graduation rates for the cohort. However, these

variables were not statistically significant for the majority of Clusters from the chi-square analysis. This significance echoes the results from other studies in this area (Johnson, 2005; Yates, 2008). However, the reader should use caution with this result, noting the scope of this study was limited to a single cohort. Further exploration will occur in this area with other cohorts in future studies. Other results from the logistic regression analysis indicated that socioeconomic status and family situation do impact graduation rates, which was expected from the literature review of other studies in this area (Pascopella, 2007; Yates, 2008). This influence affected disaggregation results based on race when those variables were controlled.

The results of this study should prove useful in the promotion of CTE's influence on students in the state of Mississippi. It points to the unrealized potential that purposeful programs of study in career and technical education at the secondary level can not only increase graduation rates, but also create a college and career ready individual (Achieve, 2011). Curriculum specialists should take note from the study that the quality of the CTE Career Cluster or Career Pathway, as with any curriculum design, does play a significant role in boosting graduation rates for students (Hill, 2012). Further research in this area should occur to validate further the results for policymakers who drive the future development, design, and integration of CTE curricula and academic curricula.

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About the Authors

Young Bin Lim is currently employed as a Graduate Assistant by the Research & Curriculum Unit at Mississippi State University and is pursuing a doctorate in sociology. **Sean Owen, Ph.D.**, is the Data Manager for the Research and Curriculum Unit's Mississippi Assessment Center at Mississippi State University and is an Associate Research Professor at Mississippi State University. **Alexis Nordin** is currently employed as a Research Associate III by the Research & Curriculum Unit at Mississippi State University.

Table 1
Course List Not Included in the RCU Classification

Course Name
BASIC VOC. SKILLS - BUSINESS & COMMERCE (VOCATIONAL)
CHILD DEVELOPMENT (VOCATIONAL)
CLOTHING APPAREL AND TEXTILE MGT. - PRODUCTION AND SERVICES I (VOC)
CLOTHING APPAREL AND TEXTILE MGT. - PRODUCTION AND SERVICES II (VOC)
COSMETOLOGY I
COSMETOLOGY II
CUSTODIAL/CARETAKER SERVICES I (VOCATIONAL)
DC - ALLIED HEALTH CLUSTER I (VOCATIONAL)
DC - ALLIED HEALTH CLUSTER II (VOCATIONAL)
DC - BODY STRUCTURE AND FUNCTION (VOCATIONAL)
DC - BUILDING TRADES I
DC - BUILDING TRADES II
DC - BUSINESS & COMPUTER TECHNOLOGY I (VOCATIONAL)
DC - BUSINESS & COMPUTER TECHNOLOGY II (VOCATIONAL)
DC - COOPERATIVE EDUCATION I (VOCATIONAL)
DC - COOPERATIVE EDUCATION II (VOCATIONAL)
DC - DRAFTING- GENERAL I
DC - DRAFTING- GENERAL II
DC - FUNDAMENTALS OF NURSING (VOCATIONAL)
DC - FUNDAMENTALS OF NURSING LAB (VOCATIONAL)
DC - INDUSTRIAL MAINTENANCE TRADES I
DC - METAL TRADES I
DC - METAL TRADES II
DC - WELDING I
DC - WELDING II
ELECTRONIC COMMUNICATION PRODUCTION I- GRADES 10-12
ELECTRONIC COMMUNICATION PRODUCTION II- GRADES 10-12
FAMILY AND INDIVIDUAL HEALTH (VOCATIONAL)
FAMILY DYNAMICS (VOCATIONAL)
LIFE CONNECTIONS I (VOCATIONAL)
LIFE CONNECTIONS II (VOCATIONAL)
NUTRITION & WELLNESS (VOCATIONAL)
PERSONAL DEVELOPMENT (VOCATIONAL)
RESOURCE MANAGEMENT (VOCATIONAL)

Table 2
CTE Graduation Rate Among 2007-2008 Cohort in Mississippi

	4-Year Graduates	Percentage	Total
Career Pathway CTE students using RCU classification	12552	81.1%	15470
Non-Pathway CTE students using MDE classification	9184	73.0%	12574
Overall	21736	77.5%	28044

Table 3
Comparison of Graduation Rates Between All Students and CTE Students in Mississippi

		Both (Academic + CTE)	CTE
	Total	73.7%	81.1%
Sex	Female	79.5%	84.4%
	Male	68%	78.0%
Race	White	80.2%	81.9%
	Black	68.1%	80.4%
	Hispanic	72.2%	83.0%
	Native American	72.9%	75.0%
	Asian	87.7%	84.7%
Family Background	Single Parent		80.2%
	Non-Single Parent		81.2%
Economic Background	Free Lunch	69.0%	76.3%
	Reduced Lunch	(Economically Disadvantaged Students)	86.3%
	Paid Lunch		86.3%

Table 4
Graduation Rate of CTE Students by Cluster by Sex and Race in Mississippi (x² Test)

	Sex	N	Grad Rate	Race	N	Grad Rate	Total
Total	Female	7585	84.4%	White	6870	81.9%	81.1%
	Male	7885	78.0%	Black	8276	80.4%	
			P=.000			P=.023	
Agriculture Food Natural Resources	Female	1549	76.9%	White	2640	76.3%	74.5%
	Male	2738	73.2%	Black	1589	71.7%	
			P=.008			P=.001	
Architecture Construction	Female	378	82.3%	White	780	84.4%	80.0%
	Male	1678	79.5%	Black	1226	76.8%	
			P=.255			P=.000	
Arts AV Technology Communications	Female	179	89.4%	White	170	87.1%	87.6%
	Male	176	85.8%	Black	177	88.1%	
			P=.336			P=.871	
Business Management Administration	Female	1230	84.2%	White	471	82.0%	84.2%
	Male	450	84.0%	Black	1180	84.9%	
			P=.940			P=.137	
Education Training	Female	59	88.1%	White	10	90.0%	89.6%
	Male	8	100.0%	Black	57	89.5%	
			P=.586			P=1.000	
Health Science	Female	2045	92.1%	White	1088	94.0%	92.3%
	Male	308	93.2%	Black	1215	90.9%	
			P=.569			P=.006	
Hospitality Tourism	Female	571	83.7%	White	257	86.4%	84.5%
	Male	247	86.2%	Black	540	83.1%	
			P=.401			P=.255	
Human Services	Female	1007	82.2%	White	284	83.8%	82.3%
	Male	52	84.6%	Black	758	82.2%	
			P=.852			P=.582	
Information Technology	Female	12	91.7%	White	39	89.7%	89.7%
	Male	56	89.3%	Black	28	89.3%	
			P=1.000			P=1.000	
Manufacturing	Female	353	81.9%	White	1041	80.5%	79.2%
	Male	1998	78.7%	Black	1266	78.0%	
			P=.200			P=.150	
Marketing	Female	556	85.3%	White	313	86.3%	84.8%
	Male	226	83.6%	Black	442	83.7%	
			P=.584			P=.356	
Science Technology Engineering Math	Female	50	86.0%	White	101	85.1%	85.0%
	Male	164	84.8%	Black	107	84.1%	
			P=1.000			P=.850	
Transportation Distribution Logistics	Female	122	90.2%	White	462	87.2%	84.8%
	Male	999	84.2%	Black	628	83.3%	
			P=.084			P=.073	

Table 5
Graduation Rate of Career Clusters in Mississippi

	Total	Graduate	Percentage
Agriculture, Food & Natural Resources	4287	3195	74.5%
Architecture & Construction	2056	1645	80.0%
Arts, AV Technology & Communications	355	311	87.6%
Business Management & Administration	1680	1414	84.2%
Education & Training	67	60	89.6%
Finance	0	0	0.0%
Health Science	2353	2171	92.3%
Hospitality & Tourism	818	691	84.5%
Human Services	1059	872	82.3%
Information Technology	68	61	89.7%
Manufacturing	2351	1862	79.2%
Marketing	782	663	84.8%
Science, Technology, Engineering & Mathematics	214	182	85.0%
Transportation, Distribution & Logistics	1121	951	84.8%

Table 6
CTE Students' Graduation Rate by School District in Mississippi

District	Cohort	Graduates	Graduation Rate	
0130	Natchez-Adams School District	121	105	86.8%
0200	Alcorn School District	193	154	79.8%
0220	Corinth School District	17	12	70.6%
0300	Amite County School District	66	48	72.7%
0400	Attala County School District	39	28	71.8%
0420	Kosciusko School District	44	33	75.0%
0500	Benton County School District	57	44	77.2%
0611	West Bolivar School District	66	50	75.8%
0613	North Bolivar School District	38	25	65.8%
0614	Cleveland School District	136	108	79.4%
0615	Shaw School District	26	24	92.3%
0616	Mound Bayou Public Schools	42	35	83.3%
0700	Calhoun County School District	127	101	79.5%
0800	Carroll County School District	76	57	75.0%
0900	Chickasaw County School District	12	12	100.0%
0920	Houston School District	89	74	83.1%
0921	Okolona Sep Schools District	40	32	80.0%
1000	Choctaw County Schools	97	75	77.3%
1100	Claiborne County School District	73	57	78.1%
1211	Enterprise School District	29	28	96.6%
1212	Quitman School District	78	66	84.6%
1320	West Point School District	185	124	67.0%
1400	Coahoma County School District	21	20	95.2%
1402	Coahoma AHS	68	56	82.4%
1420	Clarksdale Municipal Schools District	108	76	70.4%
1500	Copiah County School District	88	72	81.8%
1520	Hazlehurst City School District	36	33	91.7%
1600	Covington County Schools	132	106	80.3%
1700	Desoto County School District	341	305	89.4%
1800	Forrest County School District	57	50	87.7%
1802	Forrest County A.H.S.	102	81	79.4%
1820	Hattiesburg Public Schools	107	89	83.2%
1821	Petal School District	206	190	92.2%
1900	Franklin County School District	57	50	87.7%
2000	George County School District	188	140	74.5%
2100	Greene County Schools	114	93	81.6%
2220	Grenada School District	179	135	75.4%
2300	Hancock County Schools	155	143	92.3%
2320	Bay St Louis Waveland School District	40	37	92.5%
2400	Harrison County School District	200	171	85.5%

Graduation Rates of CTE Students

District	Cohort	Graduates	Graduation Rate	
2420	Biloxi Public Schools	130	119	91.5%
2421	Gulfport Schools	126	110	87.3%
2422	Long Beach School District	16	12	75.0%
2423	Pass Christian Public School District	23	23	100.0%
2500	Hinds County Schools District	83	65	78.3%
2502	Hinds County AHS	51	28	54.9%
2520	Jackson Public Schools	596	500	83.9%
2521	Clinton Public Schools	179	152	84.9%
2561	MS School For The Deaf	10	7	70.0%
2562	MDHS Division Of Youth Services	1	0	0.0%
2600	Holmes County School District	137	93	67.9%
2620	Durant Public School District	14	13	92.9%
2700	Humphreys County School District	98	80	81.6%
2900	Itawamba County Schools District	164	136	82.9%
3000	Jackson County School District	169	139	82.2%
3020	Moss Point Schools	131	113	86.3%
3021	Ocean Springs School District	146	130	89.0%
3022	Pascagoula Schools	257	238	92.6%
3111	East Jasper Consolidated School District	40	29	72.5%
3112	West Jasper Consolidated School District	47	41	87.2%
3200	Jefferson County School District	115	105	91.3%
3300	Jefferson Davis County Schools	134	116	86.6%
3400	Jones County School District	266	222	83.5%
3420	Laurel School District	102	66	64.7%
3500	Kemper County School District	58	44	75.9%
3600	Lafayette County Schools	106	79	74.5%
3620	Oxford School District	35	32	91.4%
3700	Lamar County Schools	181	153	84.5%
3711	Lumberton Public	7	7	100.0%
3800	Lauderdale County Schools	277	231	83.4%
3820	Meridian Public School	178	147	82.6%
3900	Lawrence County School District	121	92	76.0%
4000	Leake County School District	121	106	87.6%
4100	Lee County School District	271	194	71.6%
4111	Nettleton School District	65	51	78.5%
4120	Tupelo Public School District	136	115	84.6%
4200	Leflore County School District	108	90	83.3%
4220	Greenwood Public School District	124	100	80.6%
4300	Lincoln County Schools	85	71	83.5%
4320	Brookhaven School District	76	64	84.2%
4400	Lowndes County School District	115	91	79.1%
4420	Columbus Municipal Schools	169	140	82.8%

District		Cohort	Graduates	Graduation Rate
4500	Madison County School District	256	227	88.7%
4520	Canton Public Schools	133	108	81.2%
4600	Marion County Schools	143	107	74.8%
4620	Columbia School District	59	45	76.3%
4700	Marshall County School District	154	106	68.8%
4720	Holly Springs School District	87	71	81.6%
4800	Monroe County School District	157	134	85.4%
4820	Aberdeen Schools District	14	14	100.0%
4821	Amory School District	77	62	80.5%
4900	Montgomery County School District	7	6	85.7%
4920	Winona Separate School	80	66	82.5%
5000	Neshoba County School District	104	84	80.8%
5020	Philadelphia Public Schools	39	32	82.1%
5100	Newton County School District	63	56	88.9%
5130	Newton Municipal School District	83	72	86.7%
5131	Union Public School District	18	17	94.4%
5200	Noxubee County School District	89	70	78.7%
5300	Oktibbeha County School District	15	12	80.0%
5320	Starkville Public School District	104	97	93.3%
5411	North Panola Schools	100	75	75.0%
5412	South Panola Schools	153	115	75.2%
5500	Pearl River County School	132	110	83.3%
5520	Picayune	93	79	84.9%
5530	Poplarville School District	88	73	83.0%
5600	Perry County School District	74	56	75.7%
5620	Richton School District	5	4	80.0%
5711	North Pike School District	75	63	84.0%
5712	South Pike School District	118	81	68.6%
5720	McComb School District	123	75	61.0%
5800	Pontotoc County School	95	84	88.4%
5820	Pontotoc City Schools	58	48	82.8%
5900	Prentiss County School District	87	68	78.2%
5920	Baldwyn Public Schools	37	29	78.4%
5921	Booneville School District	51	45	88.2%
6000	Quitman County School District	75	62	82.7%
6100	Rankin County School District	296	243	82.1%
6120	Pearl Public School District	50	43	86.0%
6200	Scott County School District	105	88	83.8%
6220	Forest Municipal School District	50	47	94.0%
6312	South Delta School District	76	52	68.4%
6400	Simpson County School District	249	191	76.7%
6500	Smith County School District	189	145	76.7%

Graduation Rates of CTE Students

District	Cohort	Graduates	Graduation Rate	
6600	Stone County School District	107	90	84.1%
6700	Sunflower County School District	10	7	70.0%
6721	Indianola School District	107	84	78.5%
6811	East Tallahatchie Consolidated School District	67	51	76.1%
6812	West Tallahatchie School District	51	41	80.4%
6900	Tate County School District	143	110	76.9%
6920	Senatobia City Schools	37	37	100.0%
7011	North Tippah School District	20	15	75.0%
7012	South Tippah School District	85	67	78.8%
7100	Tishomingo County Spec.	170	136	80.0%
7200	Tunica School District	120	77	64.2%
7300	Union County School District	47	43	91.5%
7320	New Albany Schools	104	93	89.4%
7400	Walthall County School District	133	107	80.5%
7500	Vicksburg Warren School District	193	117	60.6%
7611	Hollandale School District	6	4	66.7%
7612	Leland School District	81	76	93.8%
7613	Western Line School District	24	23	95.8%
7620	Greenville Public Schools	174	131	75.3%
7700	Wayne County Schools	137	110	80.3%
7800	Webster County School District	58	45	77.6%
7900	Wilkinson County School District	120	104	86.7%
8020	Louisville Municipal School District	140	111	79.3%
8111	Coffeeville School District	42	33	78.6%
8113	Water Valley School District	25	18	72.0%
8200	Yazoo County Schools	19	15	78.9%
8220	Yazoo City Schools	71	62	87.3%

Table 7
**Graduation Rate of Pathways in Agriculture, Food & Natural Resources Cluster
 by Sex and Race**

Pathway	Total	Graduate	Graduation Rate	Female	Male	White	Black
Aging Services	7	6	85.7%	85.70%	0	75.00%	100.00%
Agribusiness and Entrepreneurship	227	213	93.8%	92.10%	94.90%	96.40%	86.90%
Agriculture and Natural Resources	500	436	87.2%	89.50%	86.70%	87.80%	84.50%
Agriculture Business and Management	1	0	0.0%				
Agriculture Power and Machinery	206	168	81.6%	81.80%	81.50%	82.40%	78.90%
Agriculture Production	7	7	100.0%				
Agriscience	286	222	77.6%	82.60%	73.90%	81.20%	71.10%
Agriscience Introduction	1371	1029	75.1%	75.30%	74.90%	74.60%	75.80%
Aquaculture							
Concepts of Agriscience	1953	1374	70.4%	74.50%	67.80%	73.40%	65.90%
Food Products	33	28	84.8%	50.00%	87.10%	84.40%	100.00%
Forestry	134	119	88.8%	82.80%	90.50%	91.90%	72.70%
Horticulture	76	62	81.6%	73.00%	89.70%	82.00%	80.00%
Science of Agricultural Animals	271	231	85.2%	89.10%	82.20%	85.20%	87.80%
Science of Agricultural Environment	311	276	88.7%	88.70%	88.80%	89.70%	86.90%
Science of Agricultural Mechanization	217	178	82.0%	93.30%	79.10%	84.20%	70.60%
Science of Agricultural Plants	522	431	82.6%	85.90%	80.60%	86.90%	78.00%

Table 8
Graduation Rate of Pathways in Manufacturing Cluster by Sex and Race

Pathway	Total	Graduate	Graduation Rate	Female	Male	White	Black
Furniture Manufacturing Upholstery	33	23	69.7%	83.30%	66.70%	75.00%	70.00%
Industrial Maintenance Installation Service	1228	968	78.8%	82.80%	77.90%	82.00%	76.80%
Machine Tool Operation Manufacturing Metal Fabrication	415	345	83.1%	71.40%	84.70%	82.80%	83.60%
Metal Trades Welding	729	575	78.9%	85.70%	78.10%	79.00%	78.60%
Welding	368	301	81.8%	72.10%	83.10%	80.80%	83.40%
Precision Machine	0	0	0	0	0	0	0

Table 9
 Graduation Rate of CTE Students by Pathway, Sex, and Race in Mississippi

	Total	Female	Male	White	Black
Aging Services	85.7%	85.7%	0	75.0%	100.0%
Agribusiness / Entrepreneurship	93.8%	92.1%	94.9%	96.4%	86.9%
Agriculture and Natural Resources	87.2%	89.5%	86.7%	87.8%	84.5%
AgriPower / Machinery	81.6%	81.8%	81.5%	82.4%	78.9%
Agriscience (Introduction)	75.1%	75.3%	74.9%	74.6%	75.8%
Agriscience	77.6%	82.6%	73.9%	81.2%	71.1%
Architecture and Drafting	91.1%	86.2%	93.2%	93.8%	78.8%
Automotive Service Tech	87.5%	90.7%	87.1%	89.2%	86.4%
Basic Electronics	79.5%	75.0%	80.3%	87.1%	74.5%
Brick Block Stone Masonry	69.7%	50.0%	71.9%	75.0%	68.8%
Building Trades	78.8%	82.8%	77.9%	82.0%	76.7%
Business Computer Technology	84.1%	84.2%	84.1%	82.0%	84.9%
Collision Repair	81.4%	96.9%	79.6%	82.8%	80.3%
Computer Graphics Technology	87.6%	90.9%	85.3%	83.3%	91.3%
Computer Programming Technology	69.2%	66.7%	70.0%	63.6%	100.0%
Computer Systems Technology	84.1%	88.2%	83.1%	84.7%	82.6%
Concepts Of Agriscience	70.4%	74.5%	67.8%	73.4%	65.9%
Cooperative Education	92.2%	92.1%	92.3%	93.8%	90.0%
Culinary Arts	84.2%	83.3%	86.2%	86.1%	82.8%
Design Tech Fashion Interiors	80.9%	81.4%	66.7%	85.7%	80.1%
Diesel Service Tech	90.9%	9.1%	90.9%	100.0%	85.7%
Digital Media Technology	96.1%	98.2%	93.6%	94.2%	100.0%
Early Childhood Education	82.8%	82.5%	88.4%	83.3%	82.9%
Electrician	84.3%	86.7%	83.8%	87.5%	83.9%
Engineering	94.6%	84.6%	100.0%	100.0%	89.5%
Food Products	84.8%	50.0%	87.1%	84.4%	100.0%
Forestry	88.8%	82.8%	90.5%	91.9%	72.7%
Furniture Manufacturing	69.7%	83.3%	66.7%	75.0%	70.0%
Graphic Print Communications	75.3%	78.4%	68.2%	78.6%	72.1%
Health Sciences	92.3%	92.1%	93.2%	94.0%	90.9%
Heating AC Installation Service	77.0%	66.7%	77.6%	86.7%	66.7%
Horticulture	81.6%	73.0%	89.7%	82.0%	80.0%
Hotel Restaurant Tourism	87.0%	87.1%	86.7%	92.3%	85.9%
Industrial Maintenance Installation	78.8%	82.8%	77.9%	82.0%	76.8%
Information Technology	89.7%	91.7%	89.3%	89.7%	89.3%
Machine Tool	83.1%	71.4%	84.7%	82.8%	83.6%
Management	90.9%	92.3%	85.7%	75.0%	93.1%
Marketing	84.8%	85.3%	83.6%	86.3%	83.7%
Metal Trades Welding	78.9%	85.7%	78.1%	79.0%	78.6%
Outboard Marine Engine Mechanics	81.3%	0.0%	86.7%	85.7%	77.8%
Residential Carpentry Construction	81.4%	82.7%	81.2%	81.3%	80.6%
Science of Agricultural Animals	85.2%	89.1%	82.2%	85.2%	87.8%
Science of Agricultural Environment	88.7%	88.7%	88.8%	89.7%	86.9%
Science of Agricultural Mechanization	82.0%	93.3%	79.1%	84.2%	70.6%
Science of Agriculture Plants	82.6%	85.9%	80.6%	86.9%	78.0%
Small Engine Repair	91.7%	8.3%	91.7%	8.3%	91.7%
Teacher Academy	89.6%	88.1%	100.0%	90.0%	89.5%
Vehicle Mobile Equipment Tech	78.9%	80.0%	78.8%	82.6%	77.6%
Welding	81.8%	72.1%	83.1%	80.8%	83.4%

Table 10
 Logistic Regression Analysis of CTE Students' Graduation Rates

	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)
AFNR	-0.24	0.05	0.00	0.79	-0.23	0.05	0.00	0.79	-0.28	0.05	0.00	0.75	-0.28	0.05	0.00	0.76	-0.28	0.05	0.00	0.76	-0.25	0.05	0.00	0.78
Arts AV	0.72	0.17	0.00	2.06	0.70	0.17	0.00	2.02	0.71	0.17	0.00	2.04	0.69	0.17	0.00	2.00	0.70	0.17	0.00	2.01	0.68	0.17	0.00	1.97
Business Mgmt.	0.44	0.08	0.00	1.56	0.38	0.08	0.00	1.47	0.48	0.08	0.00	1.62	0.42	0.08	0.00	1.52	0.42	0.08	0.00	1.52	0.47	0.08	0.00	1.59
Education	0.93	0.40	0.02	2.54	0.85	0.40	0.04	2.33	1.01	0.40	0.01	2.74	0.92	0.40	0.02	2.50	0.92	0.40	0.02	2.51	1.06	0.40	0.01	2.88
Health Science	1.28	0.09	0.00	3.61	1.20	0.09	0.00	3.31	1.28	0.09	0.00	3.60	1.19	0.09	0.00	3.29	1.19	0.09	0.00	3.29	1.16	0.09	0.00	3.19
Hospitality	0.44	0.10	0.00	1.56	0.39	0.11	0.00	1.48	0.47	0.10	0.00	1.61	0.42	0.11	0.00	1.52	0.42	0.11	0.00	1.52	0.43	0.11	0.00	1.54
Human Services	0.32	0.09	0.00	1.38	0.22	0.09	0.02	1.25	0.37	0.09	0.00	1.44	0.26	0.09	0.01	1.30	0.26	0.09	0.01	1.30	0.26	0.10	0.01	1.30
Information Tech.	0.85	0.40	0.03	2.34	0.88	0.40	0.03	2.42	0.82	0.40	0.04	2.28	0.86	0.40	0.03	2.36	0.86	0.40	0.03	2.37	0.73	0.41	0.07	2.08
Manufacturing	0.15	0.06	0.02	1.16	0.19	0.06	0.00	1.21	0.16	0.06	0.01	1.17	0.20	0.06	0.00	1.22	0.20	0.06	0.00	1.22	0.26	0.06	0.00	1.30
Marketing	0.48	0.11	0.00	1.62	0.43	0.11	0.00	1.53	0.49	0.11	0.00	1.64	0.43	0.11	0.00	1.54	0.43	0.11	0.00	1.54	0.41	0.11	0.00	1.50
STEM	0.50	0.20	0.01	1.66	0.53	0.20	0.01	1.70	0.51	0.20	0.01	1.66	0.53	0.20	0.01	1.70	0.53	0.20	0.01	1.70	0.53	0.20	0.01	1.70
Transportation	0.55	0.09	0.00	1.74	0.59	0.09	0.00	1.81	0.56	0.09	0.00	1.75	0.61	0.09	0.00	1.83	0.61	0.09	0.00	1.83	0.66	0.09	0.00	1.93
Female					0.17	0.05	0.00	1.19					0.18	0.05	0.00	1.20	0.19	0.05	0.00	1.21	0.21	0.05	0.00	1.23
Black									-0.23	0.04	0.00	0.79	-0.24	0.04	0.00	0.79	-0.23	0.04	0.00	0.79	0.13	0.05	0.01	1.14
Single Parent																	-0.17	0.13	0.19	0.84	-0.10	0.13	0.45	0.91
Free lunch																					-0.80	0.06	0.00	0.45
Reduced lunch																					-0.05	0.07	0.51	0.95
Constant	1.19	0.04	0.00	3.29	1.13	0.05	0.00	3.10	1.32	0.05	0.00	3.74	1.26	0.05	0.00	3.52	1.26	0.05	0.00	3.52	1.49	0.06	0.00	4.44

(Reference variables: Architecture & Construction in Clusters, male in sex, White in race, non-single parent in living arrangement, and paid-lunch in lunch status)

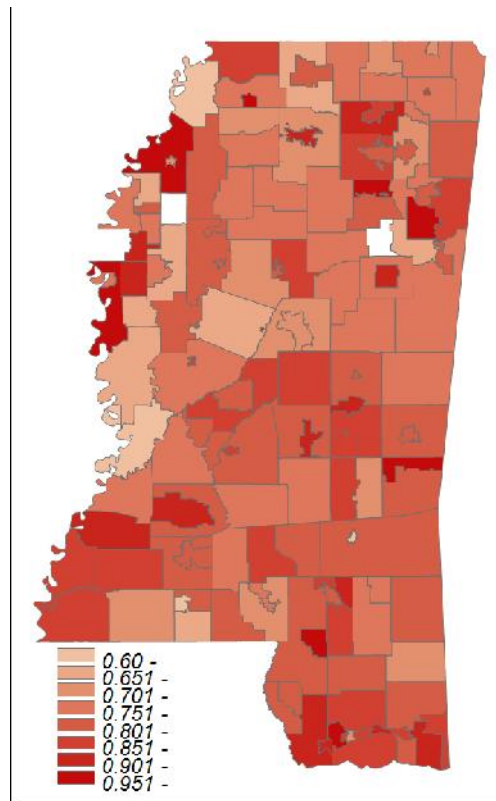


Figure 1
CTE Students' Graduation Rate by School District in Mississippi
(Note: Data was unavailable for districts in white.)