

Differences in the Percentages of Students Enrolled in Dual Credit Courses over Time: A Texas, Multiyear Analysis

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ABSTRACT

This study aimed to determine the degree to which differences were present in the percentages of all students who enrolled in a dual-credit mathematics course in Texas public high schools by their economic status (i.e., economically disadvantaged and all students). The percentages for both groups of students were compared for the 2014-2015 and the 2015-2016 school years. Inferential statistical analyses revealed statistically significant differences in the percentages in dual-credit mathematics course enrollment for all students and students who were economically disadvantaged in both the 2014-2015 and the 2015-2016 school years. For both years, economically disadvantaged students had a lower enrollment rate in dual-credit mathematics courses than all students' percentage enrollment in dual-credit mathematics courses. Implications of these findings, as well as recommendations for future research, were discussed.

Keywords:

Dual-Credit Course; Dual Enrollment; Economic Status; Texas.

ABSTRAK

Tujuan dari penelitian ini adalah untuk menentukan sejauh mana perbedaan yang ada dalam persentase semua siswa yang terdaftar dalam kursus matematika kredit ganda di sekolah menengah umum Texas berdasarkan status ekonomi mereka (yaitu, kurang beruntung secara ekonomi dan semua siswa). Persentase untuk kedua kelompok siswa dibandingkan untuk tahun ajaran 2014-2015 dan 2015-2016. Analisis statistik inferensial mengungkapkan adanya perbedaan yang signifikan secara statistik dalam persentase pendaftaran mata kuliah matematika kredit ganda untuk semua siswa dan siswa yang kurang beruntung secara ekonomi pada tahun ajaran 2014-2015 dan 2015-2016. Untuk kedua tahun sekolah, siswa yang kurang beruntung secara ekonomi memiliki tingkat persentase yang lebih rendah

dari pendaftaran dalam kursus matematika kredit ganda daripada persentase tingkat pendaftaran semua siswa dalam kursus matematika kredit ganda. Implikasi dari temuan ini, serta rekomendasi untuk penelitian masa depan, telah dibahas.

Kata Kunci:

Kursus Kredit Ganda; Pendaftaran Ganda; Status ekonomi; Texas.

1. Introduction

According to the Texas Higher Education Coordinating Board (2018), dual-credit is a system wherein high school students enroll in college courses and receive credit for the courses at both the high school and postsecondary school. Dual-credit courses can be academic or technical and must be taught by an approved teacher or college campus on a high school campus. In the State of Texas, students who complete a dual-credit course and receive a grade higher than a C are eligible to receive course credit at a Texas public postsecondary institution. Additionally, Senate Bill 1091 requires dual-credit courses to be a part of the common core curriculum of a public institution of higher education, foreign language, or career and technology. These additional requirements ensure that high school students take dual-credit coursework related to specific degree plans on college campuses.

Dual-credit enrollment in Texas has increased tremendously in the past few decades. In the fall of 2017, the number of students participating in dual-credit courses was 151,669, an increase of 753% since 2000 (Moseley & Slate, 2021; Texas Higher Education Coordinating Board, 2018). Within the last ten years, dual-credit enrollment has continued to rise and has experienced an increase of 57%. Due to the greater demand for dual-credit enrollment, higher education institutions have increased their number of students in dual-credit courses. In 2017, dual-credit enrollment was 10% of all higher education enrollment (Texas Higher Education Coordinating Board, 2018). With these high participation rates, high school students are reaping many benefits by taking dual-credit courses. Some of these benefits are saving money on college tuition, completing a postsecondary degree faster, gaining experience with college-level course work, and obtaining a smoother transition between high school and college (Moseley & Slate, 2021; Texas Education Agency, 2019b).

Increased dual-credit enrollment gives high school students more opportunities to save money and earn college credit before high school. For students in poverty, the ability to take college courses at a reduced price or for free while in high school could lead to substantial long-term cost savings for postsecondary degrees. Few researchers have specifically isolated students in poverty in the published articles about dual-credit enrollment. In a recent study, An (2013a) investigated dual-credit enrollment for economically disadvantaged students and the college degree attainment rate. The college degree attainment rate was higher in economically disadvantaged students enrolled in a dual-credit course. In a separate investigation, An (2013b) examined first-year GPA and the need for remediation in the first semester of college. Based on this study, dual-credit students who were economically disadvantaged had a higher first-year GPA and were less likely than students who did not take a dual-credit course to participate in a remediation class upon enrollment in college.

Further, dual-credit students who were not economically disadvantaged also encountered the same benefits concerning a higher first-year GPA and the lack of need for a remediation course upon entering college (An, 2013b). Hodara (2015) analyzed the effects of dual-credit enrollment in Oregon high school graduates and the need for remediation courses in college. The sample included over 101,000 public high school graduates enrolled in one of Oregon's state community colleges. Over 65% of the high school graduates had to enroll in at least one remediation course. In this study, students enrolled in dual-credit courses were less likely than those who did not take a dual-credit course to register in a developmental English or mathematics course in community college (Hodara, 2015). Finally, Dixon et al. (2020) analyzed the relationship between dual credit enrollment and GPAs for Texas community college students. She and colleagues established the presence of statistically significantly higher GPAs for community college students who had completed a dual-credit enrollment course while in high school than for their peers who had not taken such a course (Dual Credit Requirements, 2019).

Dual-credit programs can include academic courses and career and technical education courses. In a study by Karp et al. (2007), the effectiveness of dual-credit enrollment programs was analyzed in the state of Florida and New York City, along with an emphasis on participation in career and technical dual-credit courses. Within Florida, dual-credit enrollment for students was positively related to future enrollment in college, ability to persist through the second semester, higher college GPAs, and an increased number of college credits. In New York City, dual-credit enrollment for students was related to a higher likelihood of pursuing a bachelor's degree, higher first-semester GPAs, and higher progress towards a degree (Karp et al., 2007). In a later study, Giani, Alexander and Reyes (2014) also addressed the effects of dual-credit course work on access to postsecondary colleges, first-to-second year persistence, and college degree attainment. In this study, dual-credit course work in the core academic subjects of English Language Arts, mathematics, science, and social studies increased the chances of enrolling in college, persistence in their second year of college, and attaining a college degree (Giani et al., 2014).

Though the transition to a 4-year postsecondary setting is the focus of dual-credit studies, other researchers have investigated the transition from high school to a 2-year college. Young, Joyner, and Slate (2013) addressed first-semester GPAs for dual-credit students, and non-dual credit students enrolled in a Texas community college. Based on their results, students who were enrolled in dual-credit courses had higher first-term GPAs than their non-dual credit peers (Young Jr. et al., 2013). Another researcher, Speroni (2012), analyzed the effects of dual-credit enrollment on academic achievement, and more specifically, he examined dual-credit enrollment in college algebra. High school students who were enrolled in college algebra were likelier to enroll in college and obtain a college degree (Speroni, 2012). Based on these studies, students are provided advantages in their future college experiences through dual-credit enrollment. As a result, school districts must continue offering these types of programs to their high school students.

1.1 Purpose of the Study

This study aimed to determine the degree to which differences were present in the percentages of students who enrolled in a dual-credit mathematics course in Texas public high schools as a

function of their economic status. Percentages for two groups of students were compared: students who were economically disadvantaged and all students. Students identified as economically disadvantaged met the State of Texas criteria regarding family income. More information is provided in the Method section. The All Students group includes economically disadvantaged students and students who were not in poverty. Two school years of Texas statewide data, specifically the 2014-2015 school year and the 2015-2016 school year, of data were analyzed herein. At the time of the study, these two years of high school data represented the most recent data available.

1.2 Significance of the Study

Provided by the results of this study is information about the degree to which differences were present in dual-credit enrollment percentages for high school students in the state of Texas as a function of their economic status. With the increased pressure for high school students to seek postsecondary education after high school completion, dual-credit enrollment in mathematics coursework is important to current school administrators, school board members, community members, and community college administrators. Further, with the focus on economically disadvantaged students as a part of campus performance ratings within school districts, school administrators might consider additional resources to offer students more opportunities for dual-credit enrollment courses, especially dual-credit mathematics courses.

1.3 Research Questions

The following research questions were addressed in this study: (a) What is the difference in the percentage of students who enroll in a dual-credit mathematics course as a function of their economic status in the 2014-2015 school year?; and (b) What is the difference in the percentage of students who enroll in a dual-credit mathematics course as a function of their economic status in the 2015-2016 school year?

2. Methods

2.1 Research Design

A nonexperimental research design with two dependent variables was used for the study. The two dependent variables were the percentage of dual-credit mathematics enrollment for all students and economically disadvantaged students. Johnson and Christensen (2017) described this type of design as a causal-comparative relationship to be investigated between the two variables. With the need to investigate the differences in the percentages of dual-credit mathematics enrollment as a function of economic status, a nonexperimental research design was the best choice.

2.2 Participants and Instrumentation

Data from all Texas public high schools for the 2014-2015 and 2015-2016 school years were used in this study. The Texas Academic Performance Report was used as the source for the archival data. In Texas, the Texas Academic Performance Report offered an array of information on student performance at the campus and the district levels. In addition, the report provided specific information

on student groups, including economic status. In Texas, an economically disadvantaged student was eligible for free or reduced-price meals under the National School Lunch and Child Nutrition Program.

The Texas Academic Performance Report Master Reference File was the source for data in this study. For the 2014-2015 and the 2015-2016 school years, data from public high schools were downloaded electronically from the Texas Academic Performance Report and converted to Excel. Then, the data were converted to SPSS and analyzed. The total number of high schools for the 2014-2015 school year was 1,661, and the total number for the 2015-2016 school year was 1,717. For the study, two variables for high school campuses were used for each research question. The first variable was Campus Advanced Math Courses for Grades 11-12, Economically Disadvantaged Rate. The second variable was Campus Advanced Math Courses for Grades 11-12, All Students Rate. The variables represented the percentage of students in high school enrolled in a dual-credit mathematics course.

3. Results and Discussion

Before conducting inferential statistics to determine whether statistically significant differences were present in the percentages of students who enrolled in a dual-credit mathematics course as a function of their economic status, checks were conducted to determine the extent to which the data were normally distributed. Of the standardized skewness coefficients (i.e., the skewness value divided by its standard error) and the standardized kurtosis coefficients (i.e., the kurtosis value divided by its standard error), two of the four coefficients for each research question were within the limits of normality, ± 3 (Onwuegbuzie & Daniel, 2002). Because the percentage of students who enrolled in a dual-credit mathematics course was normally distributed in two out of the four coefficients, parametric dependent samples *t*-tests were conducted to answer the research questions. Dependent samples *t*-tests are an appropriate inferential statistical procedure to calculate when the variables (i.e., all students and students who were economically disadvantaged) are related (Slate & Rojas-LeBouef, 2011). In this investigation, the percentages of students who enrolled in a dual-credit mathematics course as a function of their economic status were present for the same students. They were at the interval/ratio level.

The parametric dependent samples *t*-test analysis yielded a statistically significant difference between the percentages of all students and students who were economically disadvantaged who were enrolled in a dual-credit mathematics course for the 2014-2015 school year, $t(1660) = -29.76$, $p < .001$, Cohen's $d = 0.33$, a small effect size (Cohen, 1988). In the 2014-2015 school year, all students had a statistically higher average percentage of enrollment in a dual-credit mathematics course, 6.18% higher, than economically disadvantaged students. Revealed in Table 1 are the descriptive statistics for this analysis. Depicted in Figure 1 is a comparison of these percentages by group membership.

Table 1. Descriptive Statistics for the Percentage of Students Enrolled in a Dual-Credit Mathematics Course by Their Economic Status in the 2014-2015 School Year

Student Group	<i>n</i> of high schools	<i>M</i> %	<i>SD</i> %
Economically Disadvantaged	1,661	31.82	19.01
All Students	1,661	38.00	18.98

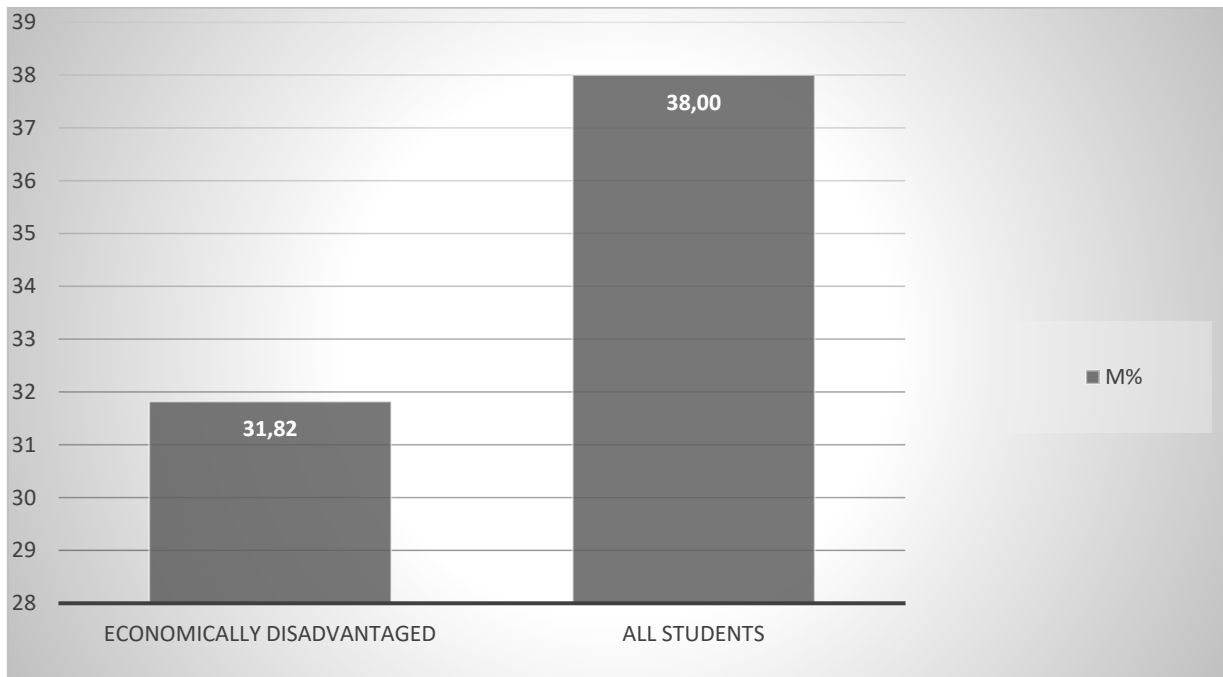


Figure 1. Descriptive statistics for the percentage of students enrolled in a dual-credit mathematics course by their economic status in the 2014-2015 school year.

The parametric dependent samples *t*-test analysis yielded a statistically significant difference between the percentages of all students and students who were economically disadvantaged who were enrolled in a dual-credit mathematics course for the 2015-2016 school year, $t(1716) = -29.54, p < .001$, Cohen’s $d = 0.30$, a small effect size (Cohen, 1988). In the 2015-16 school year, all students had a statistically higher average percentage of enrollment in a dual-credit mathematics course, 5.80% higher, than economically disadvantaged students. Descriptive statistics for this analysis are delineated in Table 2. Depicted in Figure 2 is a comparison of these percentages by group membership.

Table 2. Descriptive Statistics for the Percentage of Students Enrolled in a Dual-Credit Mathematics Course by Their Economic Status in the 2015-2016 School Year

Student Group	<i>n</i> of high schools	<i>M</i> %	<i>SD</i> %
Economically Disadvantaged	1,717	31.86	19.57
All Students	1,717	37.66	19.47

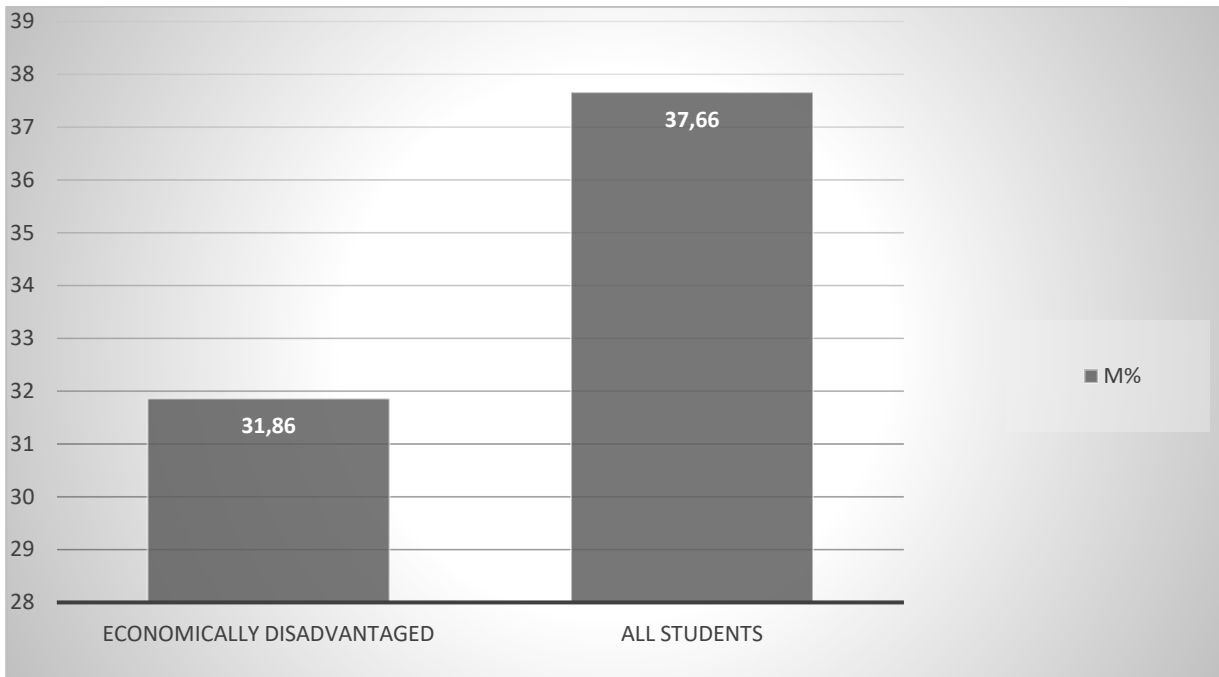


Figure 2. Descriptive statistics for the percentage of students enrolled in a dual-credit mathematics course by their economic status in the 2015-2016 school year.

In this study, economically disadvantaged students had a statistically significantly lower percentage of students enrolled in a dual-credit mathematics course in Texas in both the 2014-2015 and the 2015-2016 school years. The mean difference in the percentages between the two years was close to each other, which showed the consistency of the difference over time. In a study by An (2013a), economically disadvantaged students who took a dual-credit course had a higher rate of college degree attainment. In another study by An (2013b), economically disadvantaged students revealed participation in dual-credit enrollment increased first-year GPA. Additionally, within a recent study, Giani and Reyes (2014) discovered that dual-credit course work increased the likelihood of students completing a college degree. Based on these prior studies, students who enroll in a dual-credit course might have a higher rate of college degree attainment and a higher first-year GPA. With these types of benefits, school districts and school campuses might want to consider strategies to encourage economically disadvantaged students to enroll in dual-credit courses. Otherwise, the gap between all students and economically disadvantaged students might continue for future high school students.

For this study, the variables came directly from the Texas Academic Performance Report Master File. The variables were the Campus Advanced Math Courses for Grades 11-12, Economically Disadvantaged Rate, and the Campus Advanced Math Courses for Grades 11-12, All Students Rate. One limitation of the study was due to the All Students Rate variable. Within this variable, economically disadvantaged students were counted in the total number of all students with respect to enrollment in dual-credit courses. The Texas Academic Performance Report Master File does not have a variable that allows for comparison between economically disadvantaged students and students who are not economically disadvantaged. Therefore, the differences between the percentages

of dual-credit enrollment between all students and students who were economically disadvantaged are larger than the differences calculated in this study.

3.1 *Implications for Policy and Practice*

The number of all students in Texas during the 2018-2019 school year was 5,431,910, and the number of economically disadvantaged students was 3,289,468, which was 60.5% of the total student population (Texas Education Agency, 2019c). With many students and families struggling financially in Texas, school districts need to find additional ways for economically disadvantaged students to take advantage of the lower costs associated with dual-credit courses in high school. As high school students look at postsecondary options, college costs have doubled over the past 20 years for students attending in-state public 4-year colleges. The cost of private colleges has increased by over 58% after adjusting for inflation (Pitsker, 2019). As a result, high school students can benefit from lowered tuition and fees through partnerships between their high schools and their local 2-year or 4-year colleges. Hopefully, school districts in Texas can expand their community partnerships with their local 2-year and 4-year colleges and continue increasing their dual-credit course offerings.

Another implication for school districts is the impact of economically disadvantaged students on Texas state accountability ratings. The new system for accountability is broken down into three domains: (a) Student Achievement, (b) School Progress, and (c) Closing the Gaps (Texas Education Agency, 2019a). Within these domains, students who are economically makeup over 60% of the overall student population. As a result, their success within these domains can raise or lower their school district's accountability rating. Regarding dual-credit course work at a high school, the Student Achievement domain contains the college, career, and military component, which includes a measurement for completion of at least three credit hours in English Language Arts or mathematics or at least nine credit hours in any other subjects (Texas Education Agency, 2019a). State accountability ratings are important to Texas school districts and depict the overall health of a school district. Therefore, school districts should try to increase the number of economically disadvantaged students in dual-credit coursework to improve their overall state accountability ratings.

3.2 *Recommendations for Future Research*

Examined in this study were the percentages of dual-credit students in mathematics in Texas for two academic school years, 2014-2015 and 2015-2016. One idea for a future study would include additional years from the Texas Academic Performance Report to show trend data regarding dual-credit students in mathematics. Additionally, the most recent Texas Academic Performance Report includes data from the 2017-2018 and 2018-2019 school years, which includes new variables involving the completion of dual-credit courses. Therefore, another researcher could compare all students and students who are economically disadvantaged with the variable that measures completion of at least three credit hours in English Language Arts or mathematics or at least nine credit hours in any other subjects.

For this study, dual-credit courses in mathematics were the only type of dual-credit course considered. Investigations for other dual-credit courses in English Language Arts, social studies, or

science could be additional topics for future studies. Further, the Texas Academic Performance Report offers variables for all students and those who are economically disadvantaged in each subject area. Additionally, a researcher might include ethnicity/race variables and gender in dual-credit coursework in all subject areas. Lastly, special populations such as English Language Learners and students in special education would be another group of demographic characteristics to consider in dual-credit course work.

4. Conclusion

Economically disadvantaged students are underrepresented in mathematics dual-credit course work compared to all Texas students. Based on the Texas Academic Performance Report data from the 2014-2015 and the 2015-2016 school years, economically disadvantaged students have approximately 6% lower average percentage of enrollment in a dual-credit mathematics course than all students. If this trend continues, economically disadvantaged students will continue to have fewer opportunities than their peers to attain college course credit before graduating from high school. Additionally, economically disadvantaged students will not be able to partake of the cost savings that dual-credit courses offer at the high school level, which can impact their overall cost of postsecondary education. Therefore, school districts need to work with their local high schools and college campuses on finding additional ways to increase dual-credit course enrollment for economically disadvantaged students.

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