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College and Career Readiness: A Study of the Effects of HB 5 from the 83rd Texas Legislative Session

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Abstract
College and career readiness is important for the future of students (Conley, 2010). Texas leads the nation in the number of public policies aimed at improving college and career readiness, however, not all policies have been effective (Blume & Zumeta, 2013). This quantitative causal-comparative study examines the effect of House Bill (HB) 5 from the 2013 83rd Texas legislative session on college and career readiness. Specifically, 304 Texas high schools' participation rates in advanced courses and Career and Technical Education (CTE) coherent sequences were measured before and after the passage of HB 5 to determine if there was a significant change. While only one of the four analyses resulted in statistically significant findings, in all four cases the average participation rate for both advanced courses and CTE coherent sequences increased.

Keywords: College and Career Readiness, Career and Technical Education, Education Policy

Introduction

College and career readiness is an important outcome for high school graduates (Conley, 2010), and implies that a student can

> enroll and succeed—without remediation—in a credit bearing college course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program, or in a high-quality certificate

> program that enables students to enter a career pathway with potential future advancement. (Conley, 2010, p. 21)

Students completing high school college-ready are much more likely to complete college degrees than students who must take remedial courses (Perna & Jones, 2013). Students graduating from high school career-ready have a head start entering the workforce, possessing certification or training that has prepared them for employment that is high-skilled and high-wage. The purpose of this study was to examine the impact of a specific policy, House Bill 5 (HB 5) from the 83rd Texas legislative session, on college and career readiness for Texas students.

In 2013, Texas public schools reported record graduation rates, with 88% of seniors satisfying all completion requirements (Texas Education Agency, 2015). While such rates should be celebrated, there are some concerns about the future for recent Texas graduates. Only 56% of the graduating class of 2013 were ready for college in both math and English. Additionally, of the graduates from the classes of 2011 and 2012, less than 60% enrolled in an institution of higher education. Over 30% of these students enrolled in some type of college remediation class, which covers material they should have learned in high school (Texas Education Agency, 2015).

Not only does taking remedial classes in college cause students to spend additional resources, many do not realize they are not earning credit. In one study, researchers found that of 610 students taking remedial courses, 73% did not fully understand the non-credit bearing status of their classes. This continued with 70% of second year students still enrolled in remedial courses not fully understanding the non-credit bearing nature of their course work (Dell-Amen & Rosenbaum, 2002).

The problem guiding this study is the need for an effective public policy response to the low percentage of students who graduate from high school college or career ready. Texas is leading the nation in the number of policies addressing college and career readiness; however, it is not leading in quality (Blume & Zumeta, 2013). According to the College Board Report 2014, only 33.9% of Texas students scored college-ready on the SAT, considerably less than the national rate of 42.6% (College Board, 2014).

House Bill 5

During the 83rd legislative session of 2013, Texas legislators passed HB 5. One of the most notable aspects of this legislation was changing the assessment requirements for high school graduation from 15 end-of-course exams to five (TASA, 2013). The other major change from this piece of legislation was the change of graduation plans for high school students in Texas beginning with the class of 2018. As shown in Table 1, students graduating under the Recommended High School Program (RHSP) prior to HB 5 were required to take four years of English, math, science, and social studies. The Foundation High School Program (FHSP) replaced the RHSP under HB 5 and requires that students take four years of English, math, and science but only three years of social studies (Texas Education Agency, 2014b).

Table 1: *Texas High School Graduation Requirements Pre and Post HB 5*

Discipline	Pre-HB5 RHSP	Post-HB 5 FHSP

English Language Arts	Four Credits English I English II English III English IV	Four Credits English I English II English III Advanced Course
Mathematics	Four Credits Algebra I Algebra II Geometry Additional Course	Four Credits Algebra I Geometry Advanced Course Advanced Course
Science	Four Credits Biology Chemistry Physics Additional Course	Four Credits Biology IPC or Advanced Course Advanced Course Advanced Course
Social Studies	Four Credits U.S. History U.S. Government (1/2 credit) Economics (1/2 credit) World History World Geography	Three Credits U.S. History U.S. Government (1/2 credit) Economics (1/2 credit) World History or World Geography

Additionally, under HB 5 students are required to complete courses in order to earn an endorsement in either STEM (science, technology, engineering, and math), business and industry, public services, arts and humanities, or multidisciplinary studies as shown in Figure 1 (TASA, 2013). Furthermore, algebra II is no longer a required class for graduation (TEA, 2014a). A student has multiple options to satisfy the endorsement requirement; however, the first option is for the student to take "a coherent sequence of courses for four or more credits in CTE that consists of at least two courses in the same career cluster including at least one advanced CTE course" (TEA, 2014b, p. 24).

Endorsements	A student may earn an endorsement by successfully completing • curriculum requirements for the endorsement • a total of four credits in mathematics • a total of four credits in science • two additional elective credits
STEM	A coherent sequence or series of courses selected from one of the following: • CTE courses with a final course from the STEM career cluster • Computer science • Mathematics • Science • A combination of no more than two of the categories listed above
Business and Industry	A coherent sequence or series of courses selected from one of the following: • CTE courses with a final course from the Agriculture, Food, & Natural Resources; Architecture & Construction; Arts, Audio/Video, Technology & Communications; Business Management & Administration; Finance; Hospitality & Tourism; Information Technology; Manufacturing, Marketing; Transportation, or Distribution & Logistics CTE career cluster • The following English electives: public speaking, debate, advanced broadcast journalism including newspaper and yearbook • Technology applications • A combination of credits from the categories listed above
Public Services	A coherent sequence or series of courses selected from one of the following: • CTE courses with a final course from the Education & Training; Government & Public Administration; Health Science, Human Services; or Law, Public Safety, Corrections, and Security career cluster • JROTC
Arts and Humanities	A coherent sequence or series of courses selected from one of the following: • Social studies • The same language in Languages Other Than English • Two levels in each of two language in Languages Other Than English • American Sign Language (ASL) • Courses from one or two categories (art, dance, music, and theater) in fine arts • English electives that are not part of Business and Industry
Multidisciplinary Studies	A coherent sequence or series of courses selected from one of the following: • Four advanced courses that prepare a student to enter the workforce successfully or postsecondary education without remediation from within one endorsement area or among endorsement areas that are not in a coherent sequence • Four credits in each of the four foundation subject areas to include English IV and chemistry and/or physics • Four credits in AP, IB, or dual credit selected from English, mathematics, science, social studies, economics, languages other than English, or fine arts
	Total Credits w/endorsement - 26
Distinguished Level of Achievement	• A total of four credits in math, including credit in Algebra II • A total of four credits in science • Completion of curriculum requirements for at least one endorsement
Performance Acknowledgments	▪ For outstanding performance • in a dual credit course • in bilingualism and biliteracy • on an AP test or IB exam • on the PSAT, the ACT-Plan, the SAT, or the ACT ▪ For earning a nationally or internationally recognized business or industry certification or license

Figure 1. TEA Graduation Endorsements. This figure shows the ways a student can earn an endorsement after the passage of HB 5 (Texas Education Agency, 2014b).

The emphasis on Career and Technical Education (CTE) is a major shift for high schools across the state of Texas. This shift has created a need for mutually beneficial partnerships between school districts and local businesses. For example, a STEM pathway in Somerset, Texas was created in conjunction with Toyota. Farmer (2016) observed that this pathway enables students to work directly with Toyota industries nearby and learn firsthand what it takes to work in a STEM field:

> STEM/CTE is a natural fit in districts like Somerset that have low percentages of students who are deemed college-ready, though college preparation is still emphasized as is evidenced by the recent opening of an early college high school in the area. Skills that students acquire through CTE courses can often lead to high-paying careers with companies such as Toyota Motor Manufacturing Texas, which operates a plant just up the highway from Somerset. (p. 36)

HB 5 also afforded much greater freedom to school districts in creating their own locally developed courses. These courses are to be designed in partnership with local

business and industry for the purpose of providing students an opportunity to work towards an industry-recognized credential (TASA, 2013).
HB 5 also required the State Board of Education to create at least six different CTE courses that could be substituted for an advanced math credit (TASA, 2013). These courses included statistics and risk management, engineering math, robotics programing and design, and mathematical applications in agriculture food and natural resources (TEA, 2014a). The changes under House Bill 5 represent a significant shift from the previous Recommended Graduation Plan that only allowed for traditional math courses to count for math credits.

In social studies, a student only needs to earn three credits and can take either world history or world geography (TEA, 2014a), whereas students were previously required to earn four credits and take both world history and world geography. In science, students were provided greater freedom by adding courses that count for science credit as well as removing requirements for physics. Additionally, in English, students can now take several different courses instead of English IV, including research and technical writing and creative writing (TEA, 2014a). This increased flexibility provides students more opportunities to take courses that will prepare them for a future career.

Theoretical Framework

Situated cognition theory states that one learns not in isolation but rather through the context in which the learner experiences the learning. Learning then is a process of "enculturation" and inseparable from doing *in situ* (Irby, Brown, Lara-Alecio, & Jackson, 2013). According to this theory, students learn more effectively when they become part of a community of learning in which they develop the ability to solve relevant problems (Irby et al., 2013). When students are taught abstractions isolated form real world settings, they may be able to repeat a process or algorithm, however, they may not be able to use the idea or skill in context. Situated cognition theorists believe that learning in context, much like an apprentice, allows the learner to fully develop an understanding of the content or skill (Brown, Collins, & Duguid, 1989).
Students participating in CTE coherent sequences are experiencing learning in context and develop better problem-solving abilities (Association for Career and Technical Education, 2014). For example, a student in a welding class is actually able to use the tools that a welder would use in the field. Furthermore, in a good welding class, the instructor would ensure that the student works on projects or tasks that are the same as one would work on in the field. Likewise, a student in clinical rotations of a health science class is able to apply key content knowledge and skills in the clinical setting.

Students who participate in multiple advanced academic courses have learned more than just content that helps them to be successful in college. Students who participate in Advanced Placement and Dual Enrollment courses are more likely to persist and be successful after high school (Fraenkel, Wallen, & Hyun, 2011; Warne, Larsen, Anderson, & Odasso, 2015). While advanced courses do not align with situated cognition theory to the same degree as CTE coherent sequence courses, they do give students access to the content and rigor they need in order to be better prepared for the academic demands of college (Conley, 2010).

Research Method and Design

The sample for this quantitative, causal-comparative study was selected from high schools across Texas who were classification as either 2A (small), 4A (mid-sized), or 6A (large) during the 2016–2017 school year. Schools were then classified as either belonging to property wealthy or property poor school districts based upon wealth per student status during the 2016–2017 school year. Property wealthy school districts, also called Chapter 41 districts, are subject to the local revenue recapture provision delineated in Chapter 41 of the Texas Education Code (TEC); property poor districts, also called Chapter 42 districts, lack sufficient property wealth to exceed the local revenue recapture threshold. Chapter 42 is the section of the TEC that explains the finance rules for these districts (Foundation School Program, 2015). Every two years the state legislature establishes the relative wealth per student that divides districts into property wealthy or property poor status (Equalized Wealth Level, 2015). Schools in this study were grouped by school size and wealth per student status in recognition that school size and local district wealth both affect the quantity and quality of academic choices offered to students (Lesley, 2013).

The statistical method used to analyze the research questions guiding this study was a paired samples *t* test with the alpha level for all research questions set at $p < 0.05$. By setting this alpha level, the researcher limited the risk of a Type I error to 5%. A Type I error occurs when a researcher rejects the null hypothesis when the null hypothesis is, in fact, true (Creswell, 2012).

The advanced course completion rate, the dependent variable for two of the four research questions, represents the number of students in either 11th or 12th grade who completed at least one course from the advanced course list, as defined by the Texas Education Agency (TEA), divided by the number of students in 11th or 12th grade who earned at least one credit. The advanced course list from TEA is published annually in the Texas Academic Performance Report Glossary. The CTE coherent sequence rate, the dependent variable for the other two research questions, was calculated by dividing the number of students identified as a CTE coherent sequence graduate by the number of total graduates in the class. To be a CTE coherent sequence graduate a student must have a four-year plan of study and take two or more CTE courses for three or more credits (Texas Education Agency, 2016). CTE courses are defined by TEA in either Chapter 127 or 130 of the Texas Administrative Code (TAC). A coherent sequence of study is defined by local school districts. The independent variable for all research questions in this study was the passage of HB 5.

Separate Chapter 41 and Chapter 42 samples were developed to include 61 6A schools, 46 4A schools, and 45 2A schools (n = 152). The sample of Chapter 41 schools represents the total number for each size classification for the school year 2013-2014, the year before HB 5. The Chapter 42 sample was randomly selected to yield equivalent numbers for each size classification. An *a priori* power analysis revealed that a minimum sample size of n = 38 was needed to reach a power of .85 for each of the research question analyses; .80 is generally considered a minimal threshold for statistical power (Cohen, 1992). The *a priori* power analysis assumed a moderate effect size, an alpha of 0.05 and a two-tailed test. By achieving a power of greater than .85, the researchers reduced the risk of a Type II error to 15% or

less. A Type II error occurs when a researcher fails to reject the null hypothesis when an effect has actually occurred in the population (Creswell, 2012). The four research questions and corresponding null hypotheses that guided this study are provided below:

R1: What is the difference in advanced course completion for Texas Chapter 41 high schools before and after HB 5?
$H_0$1: There is no difference in advanced course completion for Texas Chapter 41 high schools before and after House Bill 5.
R2: What is the difference in advanced course completion for Texas Chapter 42 high schools before and after HB 5?
$H_0$2: There is no difference in advanced course completion for Texas Chapter 42 high schools before and after House Bill 5.
R3: What is the difference in CTE coherent sequence completion for Texas Chapter 41 high schools before and after HB 5?
$H_0$3: There is no difference in CTE coherent sequence completion for Texas Chapter 41 high schools before and after House Bill 5.
R4: What is the difference in CTE coherent sequence completion for Texas Chapter 42 high schools before and after HB 5?
$H_0$4: There is no difference in CTE coherent sequence completion for Texas Chapter 42 high schools before and after House Bill 5.

Findings

There was little change in the average advanced course completion from the sample of Chapter 41 high schools. The average during the 2013–2014 school year was 54.1% (*SD* = 13.1%), which increased slightly to 54.3% (*SD* = 13.1%) during the 2015–2016 school year. This change was insignificant ($t(151) = 0.261$, $p > 0.05$); therefore, the null hypothesis was retained. Advanced course completion averages for Chapter 42 high schools increased from 48.7% (*SD* = 12.8%) to 51.9% (*SD* = 12.7%). This transformation was significant ($t(151) = 3.676$, $p < 0.001$). Since the change was significant the null hypothesis was rejected. With a Cohen's effect size value of ($d = .29$), a small to medium practical significance was suggested.

The Chapter 41 high schools sampled showed a slight increase in the average CTE Coherent Sequence rate: 53.4% (*SD* = 27.3%) to 55.3% (*SD* = 27.3%). This change was not significant ($t(151) = 1.179$, $p > 0.05$). For Chapter 42 high schools, there was an increase in the average CTE coherent sequence completion from 56% (*SD* = 27.4%) to 59% (*SD* = 26.7%). This change was also not a significant increase ($t(151) = 1.830$, $p > 0.05$); therefore both analyses resulted in the retention of the null hypothesis. Descriptive statistics for R1 through R4 are shown in Table 2 and the results of the *t* test are shown in Table 3.

Table 2

Research Questions 1–4 Descriptive Statistics

			M	*n*	*SD*
R1	Chapter 41	2013–2014 Advanced Course Completion	54.1%	152	13.1%

		2015–2016 Advanced Course Completion	54.3%	152	13.1%
R2	Chapter 42	2013–2014 Advanced Course Completion	48.7%	152	12.8%
		2015–2016 Advanced Course Completion	51.8%	152	12.7%
R3	Chapter 41	2013–2014 CTE Coherent Sequence	53.4%	152	27.3%
		2015–2016 CTE Coherent Sequence	55.2%	152	27.3%
R4	Chapter 42	2013–2014 CTE Coherent Sequence	56.0%	152	27.4%
		2015–2016 CTE Coherent Sequence	59.1%	152	26.7%

Table 3

Research Questions 1–4 Paired Samples t test

	Wealth Per Student Status	Difference between 2015–2016 and 2013–2014 Mean	*t*	*df*	Sig. (2-tailed)	Cohen's *d*
R1	Chapter 41	0.2%	0.261	151	0.794	n/a
R2	Chapter 42	3.2%	3.676	151	0.000	0.29
R3	Chapter 41	1.8%	1.179	151	0.24	n/a
R4	Chapter 42	3.1%	1.830	151	0.069	n/a

The results of the analyses of the four research questions showed an increase in the average participation in all four groupings after the passage of HB 5. However, only

advanced course completion for Chapter 42 high schools saw a statistically significant increase with a small to moderate effect size. Overall, the analysis shows a general trend of increasing participation in both advanced courses and CTE coherent sequence completion by Texas students, the lack of statistical significance in three of the analyses notwithstanding.

Recommendations for Future Research

The purpose of this causal-comparative study was to examine the effect of a specific policy, HB 5 from the 83rd Texas legislative session, on college and career readiness for Texas students. The data collected in this study included students' course taking patterns from the graduating classes of 2014 and 2016. While the review of literature and study findings provide evidence that school leaders in Texas accommodated HB 5 with significant curricular changes, students from the class of 2018 will be the first required to satisfy HB 5 graduation criteria. The class of 2014 produced no graduates satisfying the requirements associated with HB 5, while the class of 2016 produced 26,882 HB 5 compliant graduates (Texas Education Agency, 2015, 2017). With significant growth in participation rates taking place prior to full implementation of HB 5, another study in the fall of 2019 with data from the graduating class of 2018 might provide additional findings of interest to educators and legislators alike.

Another consideration for future research includes exploring the impact of funding inequities on the implementation of state level policies like HB 5. Since increases in participation by Chapter 42 schools was greater (significant for R2) than Chapter 41 schools, HB 5 seems to have had a larger influence on Chapter 42 high schools than on Chapter 41 high schools. A qualitative study focused on HB 5 implementation decisions made by both Chapter 41 and Chapter 42 school leaders might provide some context for understanding that surprising finding.

Another recommendation is to conduct a study focused on the actual effect of HB 5 on students' college and career readiness. This recommendation is made in recognition that completing a course of study designed to increase college or career readiness does not necessarily equate to college or career readiness. A quantitative, longitudinal study following students from high school graduation to college or career would provide meaningful data related to the most important HB 5 outcome. Additionally, a qualitative study focused on the perspectives of students, teachers, parents, and school leaders might provide some insight into the pros and cons of HB 5 that are not attainable through quantitative studies. Research questions could inquire about 4-year plans, increased CTE coherent sequences, the value of advanced courses, and barriers to each.

Conclusion

The results from this research study are inconclusive in regards to the effect that HB 5 has had on the college and career readiness of Texas students. However, the results did show a positive trend with increasing participation rates in all four analyses, the lack of statistical significance in three of the four analyses notwithstanding.

Based on increasing rates for both advanced course completion and CTE coherent course completion, it is recommended that Texas legislators retain HB 5 for the next

legislative biennium as state level policy and for school leaders to continue to implement it with fidelity. Future studies should be conducted to determine if HB 5 should be retained for the long term.

Educators in Texas should strive for college and career readiness for all their graduates. Students who enroll in developmental coursework are less likely to persist and succeed in college (Perna & Jones, 2013). Students entering the workforce need the same skills in math and reading as entering college freshmen (ACT, 2006). Due to these needs, it is critically important that public policy support college and career readiness efforts effectively. To effectively support college and career readiness for all, Texas education policies and funding efforts should be designed to help all students achieve at similar levels. In this early analysis of HB 5, there is evidence that college and career readiness is improving for Texas students. Educators and public policy makers should continue to watch these trends. College and career readiness is vital to students' and the state's future well-being; educators and policy-makers must continue to work together to ensure sustained progress.

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