

A Pre- and Post-Pandemic Analysis of Ethnic/Racial Differences in the Mathematics Performance of Texas Grade 8 Emergent Bilingual Students: A Multiyear Comparison

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In this Texas multiyear investigation, the Grade 8 STAAR Mathematics performance of Emergent Bilingual students was examined by their ethnicity/race. Five years of data, two prior to the pandemic (i.e., 2017-2018 and 2018-2019) and three post-pandemic (i.e., 2020-2021, 2021-2022, and 2022-2023), were obtained from the Texas Education Agency Public Education Information Management System and analyzed to ascertain the effects of the COVID-19 pandemic. A higher percentage of Asian Emergent Bilingual students met the Approaches Grade Level standard, followed by White, Hispanic, and Black students in every year examined except for the 2021-2022 school year, in which White students had the highest percentage of meeting the Grade 8 STAAR Approaches Grade Level standard. For the Meets Grade Level standard, higher percentages of Asian students met the standard, before and after the pandemic, with Hispanic students having the lowest percentages. For the Masters Grade Level standard, in the years following the pandemic, a higher percentage of Asian Emergent Bilingual students met the standard, except for the 2021-2022 school year. Statistically significant differences were present for each of the five years examined on the Masters Grade Level standard.

Keywords: emergent bilingual students, grade 8 STAAR mathematics, ethnicity/race achievement gaps, COVID-19 pandemic effects, Texas public education data

In recent decades, a substantial increase has occurred in ethnic and racial diversity in the United States. In 1990, 69% of the child population was White. By 2022, however, the percentage of White students decreased to 49% and is projected to decline to 39% by 2050 (Federal Interagency Forum on Child and Family Statistics, 2023). Conversely, between 2010 and 2021, the percentage of Asian students increased slightly from 4% to 5% and the percentage of Black students remained steady at 15%. Of note is that the Hispanic population increased from 20% to 28% (National Center for Education Statistics, 2023a). Additionally, the number of Emergent Bilingual students, previously known as English Language Learners or Limited English Proficient, increased from 4.5 million to over 5 million (National Center for Education Statistics, 2023a).

The substantial growth in the number of students whose native language is not English, combined with their lower academic achievement levels, has prompted the enactment of various federal policies to reduce the achievement gaps for students who speak languages other than English (Gándara & Escamilla, 2017). The No Child Left Behind Act of 2001 required Emergent Bilingual students to participate in yearly assessments to measure their progress in meeting state-established language proficiency standards (Ortiz et al., 2022). In 2015, the Every Student Succeeds Act mandated that students of diverse ethnic and racial backgrounds, linguistic abilities, and economic statuses demonstrate progress in annual assessments determined by the individual states (U.S. Department of Education, 2023).

In the state of focus for this article, Texas, the diversity among the student population has expanded notably. Between 2010 and 2022, the White population decreased from 45% to 39% and this decline is expected to persist (USA Facts, 2023). Conversely, during the same timeframe, the percentage of Asian students increased marginally from 3.8% to 5.5% and the proportion of Black students increased slightly from 11.5% to 12.5% (USA Facts, 2023). In 2000, California held the top spot for the highest percentage of Emergent Bilingual students nationwide, whereas Texas ranked fifth at 14.1% (Office of English Language Acquisition, 2021). By 2023, however, Texas had surpassed all states with the highest percentage of students classified as Emergent Bilingual, exceeding 23% (Texas Education Agency, 2023a, 2023c). By the 2022-2023 school year, public schools in Texas enrolled 53% Hispanic students, 26% White students, 13% Black students, and 5% Asian students (Texas Education Agency, 2023a). Among the students classified as Emergent Bilingual, 2% are Black, 7% are Asian, 3% are White, and 87% are Hispanic (Texas Education Agency, 2023a). As student demographics evolve, with students of color becoming the majority, increased risks are present of exacerbating achievement gaps that persist if schools fail to transition effectively from outdated instructional methods to documented approaches that enhance student outcomes, specifically in mathematics (Hamilton, 2019).

Students in the United States are underperforming in mathematics compared to students in other developed nations (Peterson et al., 2011). Students in numerous countries take the Program for International Student Assessment every three years. This assessment measures a 15-year-old's abilities in mathematics, reading, and science literacy (National Center for Education Statistics, 2023b). Over the past two decades, the average Program for International Student Assessment score for students in the United States has declined from 483 in 2003 to 465 in 2022 (National Center for Education Statistics, 2023b). In addition to the Program for International Student Assessment, student achievement in the United States is

measured every two years in Grades 4, 8, and 12, through a national assessment called The National Assessment of Educational Progress. According to the 2022 administration of The National Assessment of Educational Progress, The Nation's Report Card (2023) determined that only 26% of United States Grade 8 students scored proficient on the mathematics assessment. Although this statistic represents an 11-point increase from 1990, it is a decrease of 7 points compared to 2019 (Nation's Report Card, 2023).

In a national study, Kotok (2017) examined the influence of ethnicity/race on advanced mathematics performance. Data were collected from the High School Longitudinal Study of 2009 for Black, Hispanic, White, and Asian students who had achieved the highest quintile in mathematics achievement. Asian students had the greatest increase in their mathematics scores with 35 points, White and Hispanic students experienced an increase of 30 points, and Black students had the least improvement, with an increase of 24 points from Grade 9 to Grade 11. Interestingly, over 33% of the Asian and Hispanic participants were labeled as Emergent Bilingual, whereas only 2% of White and Black students held that classification.

In another national investigation, Kuhfeld et al. (2018) investigated trends in student mathematics and reading achievement as a function of ethnicity/race and poverty status. Data were obtained for children between the ages 5-15 spanning from 1986 to 2012 from two longitudinal studies, the Early Childhood Longitudinal Study and the Children of the National Longitudinal Survey of Youth. Black students in poverty and Hispanic students in poverty consistently had lower achievement across both subjects than White students in poverty. Notably, these achievement gaps widened around the ages of seven and eight. White students not in poverty had the highest achievement across all the ages examined. In agreement with Morgan et al. (2023), considerable disparities in academic performance were evident as early as age five.

Commensurate with Morgan et al. (2023), considerable disparities in academic performance were evident as early as age five. In a recent national study, Paschall et al. (2018) addressed the influence of ethnicity/race (i.e., White, Black, and Hispanic) and poverty on student mathematics and reading performance across three age groups from 1986-2012. Data were collected from the National Longitudinal Study of Youth for students aged 5-6, 9-10, and 13-14. Results were that the disparities in mathematics and reading increased among White students experiencing poverty and Black and Hispanic students experiencing poverty as they progressed into the 9-10 and 13-14 age groups. Notably, White students in poverty consistently outperformed Black and Hispanic students in both subjects. White students not experiencing poverty outperformed Black and Hispanic students not experiencing poverty. Clearly established was that poverty had a greater influence on academic achievement than ethnicity/race.

In a Texas study, Resilla (2017) investigated the mathematics, reading, and college-readiness of both subjects for Emergent Bilingual students as a function of their ethnicity/race. Archival data were collected from the Texas Education Agency for the 2004 through the 2011 school years. Asian Emergent Bilingual students outperformed the other ethnic/racial groups in reading college-readiness for five of the seven years examined. Black Emergent Bilingual students had the higher achievement for two of the seven years examined. Interestingly, White Emergent Bilingual students consistently had the poorest achievement in reading college-

readiness. In mathematics, Asian Emergent Bilingual students showed greater college-readiness for six of the seven years examined. Alarming, no White Emergent Bilingual students achieved the standard for mathematics college-readiness for any of the years examined. Similar outcomes were established for both subjects college-readiness, with Asian Emergent Bilingual students consistently outperforming all other ethnic/racial groups, and no White Emergent Bilingual students meeting college-readiness in both subjects.

In a more recent investigation, Flores (2019) addressed advanced course achievement of Texas students by their ethnicity/race. Archival data were obtained from the Texas Education Agency for the 2012 through the 2016 school years for high school students who had taken an advanced coursework exam and for students who had scored at or above the criterion. Similar to findings by Resilla (2017), Asian students consistently had higher achievement than the other ethnic/racial groups on the advanced coursework exams, followed by White students, Hispanic students, and Black students. Additionally, across all four years examined, Asian students consistently scored at or above the criterion, followed by White students, Hispanic students, and Black students.

In another Texas study, Anderson (2016) addressed the mathematics and science achievement of Grade 8 boys and girls as a function of their ethnicity/race (e.g., Asian, Black, White, and Hispanic). Archival data were obtained from the Texas Education Agency for the 2011 through the 2015 school years. Statistically significant differences were present by ethnicity/race for the four years examined. Moderate effect sizes were present in mathematics and science achievement by ethnicity/race. Among the ethnic/racial groups, Asian students had the highest achievement in both subjects, followed by White, Hispanic, and Black students.

In a more recent Texas study, Davenport (2021) addressed the mathematics achievement of Grade 3 students as a function of their ethnicity/race. State-mandated assessment data were collected from the Texas Education Agency for the 2016 through the 2019 school years. Statistically significant differences were observed across all Mathematics Reporting categories for all three years examined. Asian students consistently outperformed the other ethnic/racial groups in all three performance level standards and four Mathematics Reporting categories, followed by White, Hispanic, and Black students.

In a similar study, Argueta (2022) investigated the influence of ethnicity/race on the mathematics performance of Texas Grade 3 Emergent Bilingual students. Data were collected from the Texas Education Agency for the 2016-2017, 2017-2018, and 2018-2019 school years. Asian Emergent Bilingual students achieved the highest scores in all four Reporting Categories and all three performance level standards, followed by Hispanic Emergent Bilingual students. Over the three years examined, Emergent Bilingual Black students and Emergent Bilingual White students had the lowest achievement scores in all Mathematics Reporting Categories and performance standards.

Of note, Morgan et al. (2023) established the presence of racial and ethnic disparities in advanced mathematics and science before children entered first grade, particularly for students from impoverished backgrounds. He documented that White and Asian students were 10% to 13% more likely to perform better in advanced mathematics or science than their Black or Hispanic peers. Additionally, Carnoy and Garcia (2017) noted that language status adversely affected the mathematics performance of Black, Hispanic, and Asian students in high-poverty

schools. Addressed in this proposed investigation will be the gap in the literature that exists as it will be the first study on the mathematics performance of Grade 8 Emergent Bilingual students after the pandemic. For this article, the connections between language and ethnicity/race status will be examined, specifically the effects of the COVID-19 pandemic on the interconnectedness of language and race/ethnicity.

Theoretical Framework

The theoretical framework of this article is cultural-ecological theory (Ogbu & Simons, 1998), which was used to examine discrepancies in the academic performance of Emergent Bilingual students, with a focus on their ethnicity/race. As the national demographic composition of students evolves, with students of color becoming the majority, an increased risk is present of exacerbating existing achievement gaps that exist if schools do not effectively transition from outdated instructional methods to research-based approaches that improve student outcomes, particularly in mathematics (Hamilton, 2019). Researchers such as Argueta (2022), Davenport (2021), and Flores (2019) have identified substantial achievement disparities among various student subgroups. However, few researchers have acknowledged the diversity within the Emergent Bilingual student population, which is frequently categorized as a monolithic group (Francis, 2019). In this article, we evaluated how Emergent Bilingual students, classified as involuntary minorities, continuously encounter discriminatory educational policies that adversely affect their academic performance, including the problematic classification of their diverse linguistic repertoires into a single grouping. Previous researchers into Ogbu's theory have been primarily concerned with the achievement disparities of Black students. By considering how discriminatory practices negatively affect Emergent Bilingual students, findings from this article will expand the focus of the existing research literature to include this underrepresented group.

Statement of the Problem

Students in the United States are underperforming in mathematics compared to their peers in other developed countries (Peterson et al., 2011). Over the past two decades, scores from the Program for International Student Assessment in mathematics have declined from 483 in 2003 to 465 in 2022 (National Center for Education Statistics, 2023c). Additionally, The Nation's Report Card (2023a) established that only 26% of Grade 8 students in the United States reached proficiency in the most recent mathematics assessment. Numerous researchers (e.g., Argueta, 2022; Davenport, 2021; Davenport & Slate, 2019; Lee & Slate, 2014) have identified academic disparities in mathematics based on language status. Moreover, multiple researchers (e.g., Anderson, 2016; Davenport, 2021; Shockley, 2021) have also established ethnic/racial disparities on standardized assessments. However, a gap exists in the research literature on the mathematics performance of Grade 8 Emergent Bilingual students as a function of their ethnicity/race. As the diversity in schools continues to increase, it is critical to understand the relationship between ethnicity/race and mathematics performance. After a thorough review of the research, no published studies could be located about the mathematics performance of

Texas Grade 8 Emergent Bilingual students on the state-mandated assessment. This study is needed to address the gap in the literature regarding the influence of ethnicity/race on the mathematics performance of Emergent Bilingual students, particularly in the years following the pandemic.

Purpose of the Study

The purpose of this study was to examine the extent to which differences were present in the mathematics performance of Grade 8 Emergent Bilingual students as a function of their ethnicity/race. The primary objective was to examine the effects of ethnicity/race on the mathematics achievement of Emergent Bilingual students by performance standard (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level). The second purpose was to investigate the degree to which trends were present across five school years (i.e., 2017-2018, 2018-2019, 2020-2021, and 2022-2023) which includes three years before and two years after the pandemic.

Significance of the Study

The significance of this study was to determine the extent of differences that existed in the mathematics performance of Grade 8 students by their ethnicity/race. Argueta (2022), Resilla (2017), and Resilla and Slate (2023) have established the influence of language status on academic achievement. Furthermore, multiple researchers (e.g., Argueta, 2022; Davenport, 2021; Flores, 2019; Shockley, 2021) have also documented disparities in performance as a function of ethnicity/race. However, a lack of published studies is present on the mathematics performance of Emergent Bilingual students by their ethnicity/race. The existing gap in the research necessitates further investigation into how ethnicity/race influences the mathematics achievement of Emergent Bilingual students. Of importance to the reader is that the Texas Education Agency (2023c) redesigned the assessment in the 2022-2023 school year as mandated by House Bill 3906 to ensure alignment between the assessment and classroom instruction. The redesign included the following components: new question types, online testing and accommodations, evidence-based writing, and cross-curricular passages. This investigation will provide three years of data before the COVID-19 pandemic and for two years after the pandemic.

Research Questions

The overarching research question that was addressed in this study was: What is the difference in the mathematics performance of Texas Grade 8 Emergent Bilingual students as a function of their ethnicity/race (i.e., Black, White, Asian, Hispanic)? Specific sub questions will be: (a) What is the difference in the Approaches Grade Level standard by the ethnicity/race of Emergent Bilingual students?; (b) What is the difference in the Meets Grade Level standard by the ethnicity/race of Emergent Bilingual students?; (c) What is the difference in the Masters Grade Level standard by the ethnicity/race of Emergent Bilingual students?; and (d) What trend is

present in grade level standard performance by the ethnicity/race of Emergent Bilingual students across the five school years?

Method

Research Design

Present in this investigation was a causal-comparative research design due to the presence of pre-existing data (Johnson & Christensen, 2020). Data obtained from the Texas Education Agency Public Education Information Management System for the 2017-2018, 2018-2019, 2020-2021, 2021-2022, and 2022-2023 school years were examined. The achievement data were analyzed across three performance standards to determine the extent of differences that might exist by the ethnicity/race of Emergent Bilingual students. The independent variable was student ethnicity/race (i.e., Asian, White, Black, and Hispanic) of Grade 8 Emergent Bilingual students in Texas. Dependent variables were the three performance levels on the STAAR Mathematics exam (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) for the specified school years.

Participants and Instrumentation

Participants in this study were Texas Grade 8 students who were assessed on the STAAR Mathematics exam in the 2017-2018, 2018-2019, 2020-2021, 2021-2022, and 2022-2023 school years. In this article, Emergent Bilingual refers to students who are “in the process of acquiring English and have another language as the primary or home language” (Texas Education Agency, 2023a, p. 2). This term was used to refer to all the previous labels. Data were acquired from the Texas Education Agency Public Education Information Management System. A Public Information Request was submitted to the Texas Education Agency requesting: (a) grade level, (b) STAAR Mathematics performance levels, (c) Emergent Bilingual indicator, and (d) ethnicity/race.

As delineated in Table 1 and Figure 1, the total number of Emergent Bilingual students who participated in the Grade 8 Mathematics STAAR test, increased from 55,152 in 2017-2018 to 87,717 in 2022-2023. The White, Hispanic, Black and Asian participation rate relative to the entire population remained stable throughout the five-year analysis. As of note, the total number of Emergent Bilingual students by race/ethnicity also steadily increased. The number of Black Emergent Bilingual students increased from 794 (1.4%) from 2017-2018 to 1,404 (1.6%). The percentage of Hispanic Emergent Bilingual students remained above 90% every year studied in this investigation, increasing from 50,991 in 2017-2018 to 80,168 in 2022-2023. Lastly, White Emergent Bilingual students were the smallest group in this study.

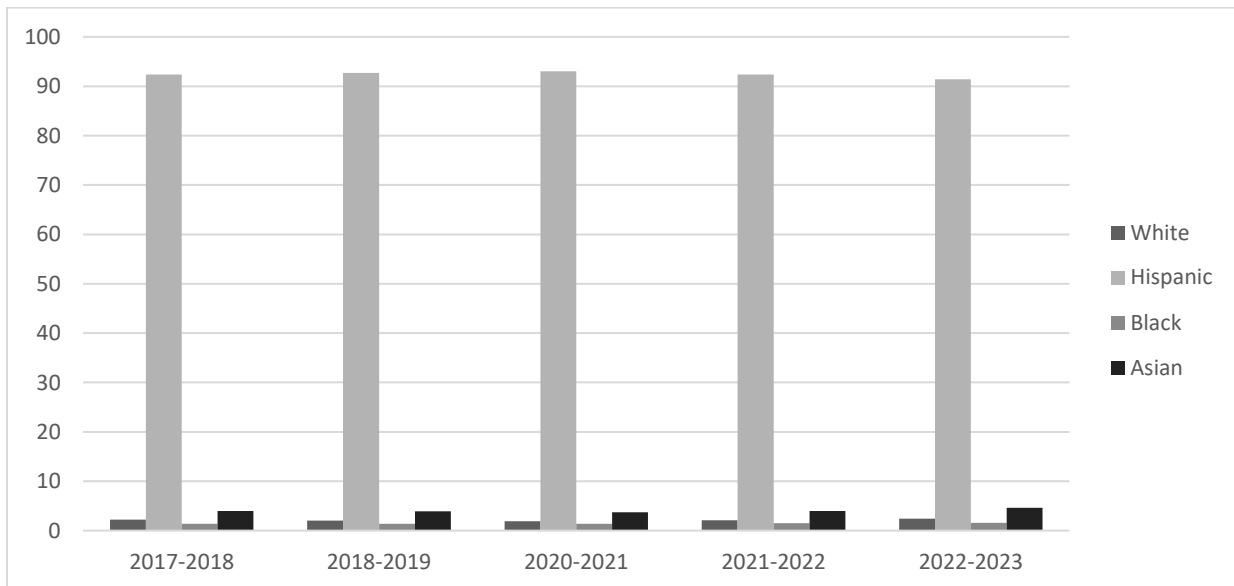
Three performance measures are assessed on the STAAR Mathematics assessment. Students who attain the Approaches Grade Level performance standard are expected to advance successfully to the next grade or course with focused academic intervention. Generally, these students can demonstrate skills in familiar contexts (Texas Education Agency, 2017). Achievement in the Meets Grade Level standard indicates students who are likely to be

successful in the next grade level or course but may still require short-term, targeted academic intervention. Students in this category generally demonstrate the ability to think critically and apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017). Students who achieve the Masters Grade Level performance are expected to succeed in the

Table 1
Percentages and Frequencies of Texas Emergent Bilingual Students and Their Race/Ethnicity for All Five School Years

School Year	White <i>n</i> (%age)	Hispanic <i>n</i> (%age)	Black <i>n</i> (%age)	Asian <i>n</i> (%age)
2017-2018	<i>n</i> = 1,194 (2.2%)	<i>n</i> = 50,991 (92.4%)	<i>n</i> = 794 (1.4%)	<i>n</i> = 2,173 (4%)
2018-2019	<i>n</i> = 1,242 (2%)	<i>n</i> = 58,972 (92.7%)	<i>n</i> = 924 (1.4%)	<i>n</i> = 2,469 (3.9%)
2020-2021	<i>n</i> = 1,348 (1.9%)	<i>n</i> = 67,632 (93%)	<i>n</i> = 1,024 (1.4%)	<i>n</i> = 2,662 (3.7%)
2021-2022	<i>n</i> = 1,675 (2.1%)	<i>n</i> = 73,350 (92.4%)	<i>n</i> = 1,165 (1.5%)	<i>n</i> = 3,200 (4%)
2022-2023	<i>n</i> = 2,074 (2.4%)	<i>n</i> = 80,168 (91.4%)	<i>n</i> = 1,404 (1.6%)	<i>n</i> = 4,071 (4.6%)

Figure 1
Percentages of Emergent Bilingual Students by Their Ethnicity/Race for All Five School Years



next grade or course with little or no academic intervention. Students in this category demonstrate the ability to think critically and apply the assessed knowledge and skills in varied contexts, both familiar and unfamiliar (Texas Education Agency, 2017).

Regarding the validity and reliability of the STAAR assessment, the Texas Education Agency commissioned the Human Resources Research Organization to conduct an independent evaluation of the STAAR test (Texas Education Agency, 2016). The alignment of the mathematics assessment to intended expectations was determined to be 97.7% and 96.3%, respectively (Texas Education Agency, 2016). For additional information about the reliability and validity of the STAAR reading assessment, the reader is advised to consult the Technical Manuals on the Texas Education Agency website.

Results

Data Analysis

To determine whether differences were present in the mathematics performance of Texas Grade 8 Emergent Bilingual students by their race/ethnicity (i.e., White, Hispanic, Black, and Asian) at the Approaches Grade Level standard, Meets Grade Level standard, and Masters Grade Level standards, Pearson chi-square analyses were conducted. Pearson chi-square procedures are the most appropriate statistical procedure to use when the independent variable and dependent variables are dichotomous. Hence, chi-squares are the statistical procedure of choice when both variables are categorical (Slate, 2023). Prior to calculating Pearson chi-square procedures, its underlying assumptions were checked, and they were met.

Approaches Grade Level Analyses Across All Three School Years

For the first research question on the Approaches Grade Level standard for the 2017-2018 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(3) = 132.99$, $p < .001$, Cramer's V was below small, .05 (Cohen, 1988). As revealed in Table 2, more than 67% of Asian Emergent Bilingual students met the Approaches Grade Level standard followed by White Emergent Bilingual students, Hispanic Emergent Bilingual students, and Black Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Approaches Grade Level standard was eight percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Approaches Grade Level standard was three percentage higher than Hispanic Emergent Bilingual students and 11 percentage points higher than Black Emergent Bilingual students.

With respect to 2018-2019 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(3) = 100.49$, $p < .001$, Cramer's V was below small, .04 (Cohen, 1988). As delineated in Table 2, almost 71% of Asian Emergent Bilingual students met the Approaches Grade Level standard followed by White Emergent Bilingual students, Hispanic Emergent Bilingual students, and Black Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Approaches Grade Level standard was seven

percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Approaches Grade Level standard was two percentage points higher than Hispanic Emergent Bilingual students and 12 percentage points higher than Black Emergent Bilingual students.

Table 2

Percentages and Frequencies of Approaches Grade Level Standard by Student Ethnicity/Race for All Five School Years

School Year and Ethnicity/Race	Did Not Meet <i>n</i> and %age of Total	Met <i>n</i> and %age of Total
2017-2018		
White	(<i>n</i> = 485) 40.68%	(<i>n</i> = 709) 59.4%
Hispanic	(<i>n</i> = 22,263) 43.7%	(<i>n</i> = 28,728) 56.3%
Black	(<i>n</i> = 410) 51.6%	(<i>n</i> = 384) 48.4%
Asian	(<i>n</i> = 705) 32.4%	(<i>n</i> = 1,468) 67.6%
2018-2019		
White	(<i>n</i> = 452) 36.4%	(<i>n</i> = 790) 63.6%
Hispanic	(<i>n</i> = 22,917) 38.9%	(<i>n</i> = 36,055) 61.1%
Black	(<i>n</i> = 388) 42%	(<i>n</i> = 536) 58%
Asian	(<i>n</i> = 721) 29.2%	(<i>n</i> = 1,478) 70.8%
2020-2021		
White	(<i>n</i> = 858) 63.6%	(<i>n</i> = 490) 36.4%
Hispanic	(<i>n</i> = 46,981) 69.5%	(<i>n</i> = 20,651) 30.5%
Black	(<i>n</i> = 666) 65%	(<i>n</i> = 358) 35%
Asian	(<i>n</i> = 1,315) 68.6%	(<i>n</i> = 1347) 50.6%
2021-2022		
White	(<i>n</i> = 651) 38.9%	(<i>n</i> = 1,024) 61.1%
Hispanic	(<i>n</i> = 34,396) 46.9%	(<i>n</i> = 38,954) 53.1%
Black	(<i>n</i> = 542) 46.5%	(<i>n</i> = 623) 53.5%
Asian	(<i>n</i> = 852) 26.6%	(<i>n</i> = 2,348) 54.1%
2022-2023		
White	(<i>n</i> = 640) 30.9%	(<i>n</i> = 1,434) 69.1%
Hispanic	(<i>n</i> = 29,788) 37.2%	(<i>n</i> = 50,380) 62.8%
Black	(<i>n</i> = 489) 34.8%	(<i>n</i> = 915) 65.2%
Asian	(<i>n</i> = 710) 17.4%	(<i>n</i> = 3,361) 82.6%

Concerning the 2020-2021 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(3) = 500.12$, $p < .001$, Cramer's *V* was below small, .08 (Cohen, 1988). A little more than 50% of Asian Emergent Bilingual students met the Approaches Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Approaches Grade Level standard was 14 percentage points higher than

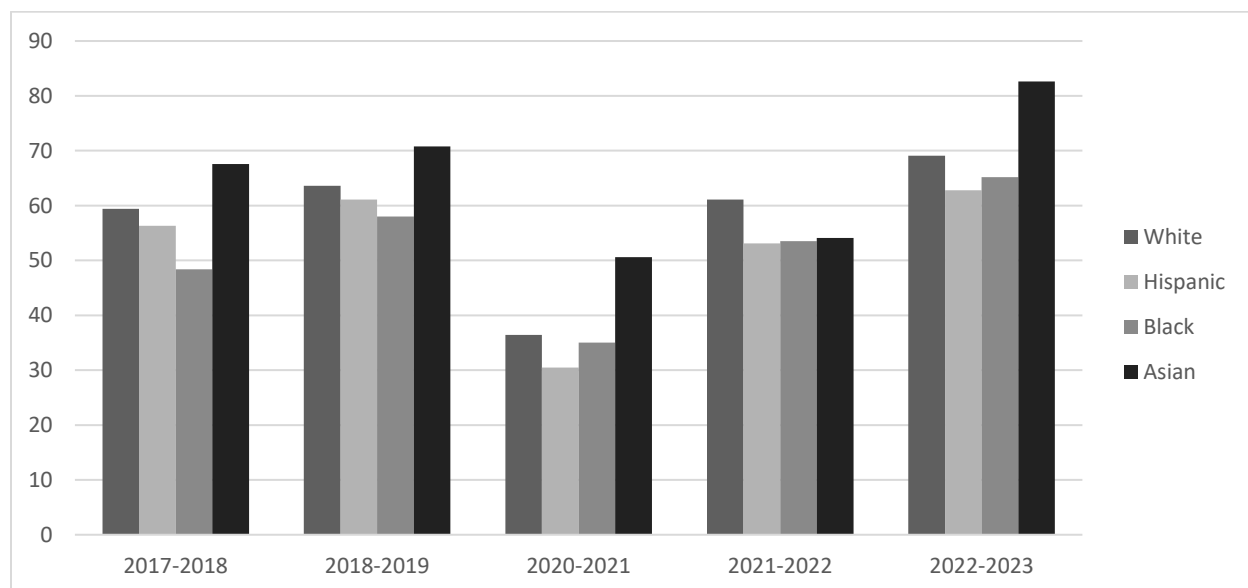
White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Approaches Grade Level standard was one percentage higher than Black Emergent Bilingual students and six percentage points higher than Hispanic Emergent Bilingual students. Descriptive statistics for this analysis are contained in Table 2.

Regarding the 2021-2022 school year, a statistically significant difference was yielded, $\chi^2(3) = 541.46, p < .001$, Cramer's V was less than small, .08 (Cohen, 1988). Sixty one percent of White Emergent Bilingual students met the Approaches Grade Level standard followed by Asian Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Approaches Grade Level standard was seven percentage points higher than Asian Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Approaches Grade Level standard was half a percentage point higher than Black Emergent Bilingual students and one percentage points higher than Hispanic Emergent Bilingual students. Descriptive statistics for this analysis are contained in Table 2.

With respect to the 2022-2023 school year, a statistically significant difference was revealed, $\chi^2(3) = 679.26, p < .001$, Cramer's V was less than small, .09 (Cohen, 1988). As presented in Table 2, more than 82% of Asian Emergent Bilingual students met the Approaches Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Approaches Grade Level standard was 13 percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Approaches Grade Level standard was four percentage higher than Black Emergent

Figure 2

Average Percentages of Emergent Bilingual Students by Their Ethnicity/Race Who Met Grade 8 STAAR Mathematics Approaches Grade Level Standard for All Five School Years



Bilingual students and seven percentage points higher than Hispanic Emergent Bilingual students. These percentages across all five school years are depicted in Figure 2.

Meets Grade Level Analyses Across All Five School Years

For the first research question on the Meets Grade Level standard for the 2017-2018 school year, the result was statistically significant, $\chi^2(3) = 492.37, p < .001$. The effect size for this finding, Cramer's V, was less than small, .09 (Cohen, 1988). As presented in Table 3, almost 46% of Asian Emergent Bilingual students met the Meets Grade Level standard followed by White Emergent Bilingual students, Hispanic Emergent Bilingual students, and Black Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the

Table 3

Percentages and Frequencies of Meets Grade Level Standard by Student Ethnicity/Race for All Five School Years

School Year and Ethnicity/Race	Did Not Meet <i>n</i> and %age of Total	Met <i>n</i> and %age of Total
2017-2018		
White	(<i>n</i> = 829) 69.4%	(<i>n</i> = 365) 30.6%
Hispanic	(<i>n</i> = 38,306) 75.1%	(<i>n</i> = 12,685) 24.9%
Black	(<i>n</i> = 619) 78%	(<i>n</i> = 175) 22%
Asian	(<i>n</i> = 1,180) 54.3%	(<i>n</i> = 993) 45.7%
2018-2019		
White	(<i>n</i> = 770) 62%	(<i>n</i> = 472) 38%
Hispanic	(<i>n</i> = 40,642) 68.9%	(<i>n</i> = 18,330) 31.1%
Black	(<i>n</i> = 642) 69.5%	(<i>n</i> = 282) 30.5%
Asian	(<i>n</i> = 1,,227) 49.7%	(<i>n</i> = 1,242) 50.3%
2020-2021		
White	(<i>n</i> = 1,094) 81.2%	(<i>n</i> = 254) 18.8%
Hispanic	(<i>n</i> = 59,443) 87.9%	(<i>n</i> = 8,189) 12.1%
Black	(<i>n</i> = 863) 84.3%	(<i>n</i> = 161) 15.7%
Asian	(<i>n</i> = 1,841) 69.2%	(<i>n</i> = 821) 30.8%
2021-2022		
White	(<i>n</i> = 1,184) 70.7%	(<i>n</i> = 491) 29.3%
Hispanic	(<i>n</i> = 57,658) 78.6%	(<i>n</i> = 15,692) 21.4%
Black	(<i>n</i> = 907) 77.9%	(<i>n</i> = 258) 22.1%
Asian	(<i>n</i> = 1,660) 51.9%	(<i>n</i> = 1,540) 48.1%
2022-2023		
White	(<i>n</i> = 1,244) 60%	(<i>n</i> = 730) 40%
Hispanic	(<i>n</i> = 57,578) 71.8%	(<i>n</i> = 22,590) 28.2%
Black	(<i>n</i> = 975) 69.4%	(<i>n</i> = 429) 30.6%
Asian	(<i>n</i> = 1,605) 39.4%	(<i>n</i> = 2,466) 60.6%

Approaches Grade Level standard was 15 percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Approaches Grade Level standard was six percentage higher than Hispanic Emergent Bilingual students and eight percentage points higher than Black Emergent Bilingual students.

With respect to 2018-2019 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(3) = 424.71$ $p < .001$. The effect size for this finding, Cramer's V, was less than small, .08 (Cohen, 1988). As presented in Table 3, Just about half of Asian Emergent Bilingual students met the Meets Grade Level standard followed by White Emergent Bilingual students, Hispanic Emergent Bilingual students, and Black Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Meets Grade Level standard was 12 percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Meets Grade Level standard was seven percentage higher than Hispanic Emergent Bilingual students and eight percentage points higher than Black Emergent Bilingual students.

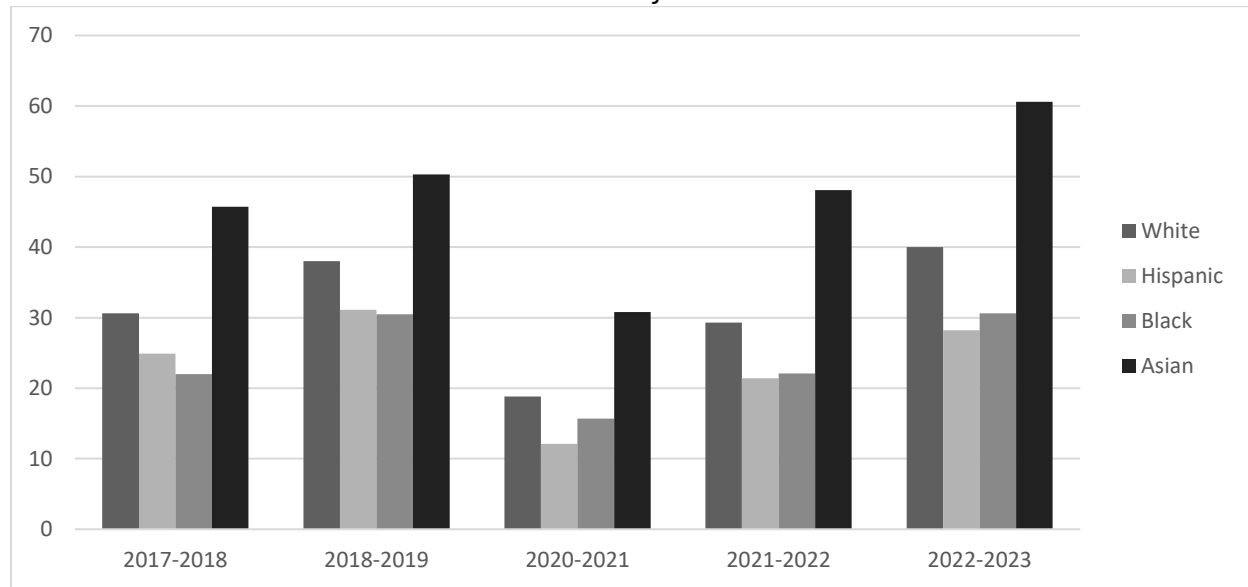
Regarding the 2020-2021 school year, the Pearson chi-square revealed the presence of a statistically significant result, $\chi^2(3) = 845.76$, $p < .001$. The effect size for this finding, Cramer's V, was below small effect size, .11 (Cohen, 1988). Just about 31% of Asian Emergent Bilingual students met the Meets Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Meets Grade Level standard was 12 percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Meets Grade Level standard was three percentage points higher than Hispanic Emergent Bilingual students and six percentage points higher than Black Emergent Bilingual students

Concerning the 2021-2022 school year, a statistically significant difference was yielded, $\chi^2(3) = 1294.14$, $p < .001$, Cramer's V of .13, below small effect size (Cohen, 1988). As delineated in Table 3, 48% of Asian Emergent Bilingual students met the Meets Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Meets Grade Level standard was nine percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Meets Grade Level standard was seven percentage points higher than Hispanic Emergent Bilingual students and eight percentage points higher than Black Emergent Bilingual students.

For the 2022-2023 school year, a statistically significant result was revealed, $\chi^2(1) = 2038.25$, $p < .001$, Cramer's V of .15, a below small effect size (Cohen, 1988). As presented in Table 3, more than 60% of Asian Emergent Bilingual students met the Meets Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Meets Grade Level standard was 20 percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Meets Grade Level standard was 10 percentage points higher than Hispanic Emergent Bilingual students and 12 percentage points higher than Black Emergent Bilingual students. These percentages across all five school years are depicted in Figure 3.

Figure 3

Average Percentages of Emergent Bilingual Students by Their Ethnicity/Race Who Met Grade 8 STAAR Mathematics Meets Grade Level Standard for All Five School Years



Masters Grade Level Analyses Across All Five School Years

For the first research question on the Masters Grade Level standard for the 2017-2018 school year, the result was statistically significant, $\chi^2(3) = 525.84$, $p < .001$. The effect size for this finding, Cramer's V , was below small, .1 (Cohen, 1988). As revealed in Table 4, 14% of Asian Emergent Bilingual students met the Masters Grade Level standard followed by White Emergent Bilingual students, Hispanic Emergent Bilingual students, and Black Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Masters Grade Level standard was double the percentage points than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Masters Grade Level standard was two percentage points higher than Hispanic Emergent Bilingual students and three percentage points higher than Black Emergent Bilingual students.

With respect to the 2018-2019 school year, a statistically significant difference was yielded, $\chi^2(3) = 676.96$, $p < .001$, Cramer's V of .1, below small effect size (Cohen, 1988). Sixteen percent of Asian Emergent Bilingual students met the Masters Grade Level standard followed by White Emergent Bilingual students, Hispanic Emergent Bilingual students, and Black Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Masters Grade Level standard was seven percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Masters Grade Level standard was a little less than five percentage points higher than Hispanic Emergent Bilingual students and five percentage points higher than Black Emergent Bilingual students. Descriptive statistics for this analysis are contained in Table 4.

Concerning the 2020-2021 school year, a statistically significant result was revealed, $\chi^2(3) = 930.79$, $p < .001$, Cramer's V of .11, below small effect size (Cohen, 1988). As delineated

in Table 4, 10% of Asian Emergent Bilingual students met the Masters Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Masters Grade Level standard was six percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Masters Grade Level standard was two percentage points higher than Black Emergent Bilingual students and three percentage points higher than Hispanic Emergent Bilingual students.

Table 4

Percentages and Frequencies of Masters Grade Level Standard by Student Ethnicity/Race for All Five School Years

School Year and Ethnicity/Race	Did Not Meet <i>n</i> and %age of Total	Met <i>n</i> and %age of Total
2017-2018		
White	(<i>n</i> = 1,114) 93.3%	(<i>n</i> = 80) 6.7%
Hispanic	(<i>n</i> = 48,846) 95.8%	(<i>n</i> = 2,145) 4.2%
Black	(<i>n</i> = 769) 96.9%	(<i>n</i> = 25) 3.1%
Asian	(<i>n</i> = 1,855) 85.4%	(<i>n</i> = 318) 14.6%
2018-2019		
White	(<i>n</i> = 1,130) 91%	(<i>n</i> = 112) 9%
Hispanic	(<i>n</i> = 56,254) 95.4%	(<i>n</i> = 2,718) 4.6%
Black	(<i>n</i> = 886) 95.9%	(<i>n</i> = 38) 4.1%
Asian	(<i>n</i> = 2,073) 84%	(<i>n</i> = 396) 16%
2020-2021		
White	(<i>n</i> = 1,285) 95.3%	(<i>n</i> = 63) 4.7%
Hispanic	(<i>n</i> = 66,422) 98.2%	(<i>n</i> = 1,210) 1.8%
Black	(<i>n</i> = 999) 97.6%	(<i>n</i> = 25) 2.4%
Asian	(<i>n</i> = 2,386) 89.6%	(<i>n</i> = 276) 10.4%
2021-2022		
White	(<i>n</i> = 1,536) 91.7%	(<i>n</i> = 139) 8.3%
Hispanic	(<i>n</i> = 69,732) 95.1%	(<i>n</i> = 3,618) 4.9%
Black	(<i>n</i> = 1,103) 94.7%	(<i>n</i> = 62) 5.3%
Asian	(<i>n</i> = 2,517) 78.7%	(<i>n</i> = 4,502) 5.7%
2022-2023		
White	(<i>n</i> = 1,773) 85.5%	(<i>n</i> = 301) 14.5%
Hispanic	(<i>n</i> = 75,323) 94%	(<i>n</i> = 4,845) 6%
Black	(<i>n</i> = 1,308) 93.2%	(<i>n</i> = 96) 6.8%
Asian	(<i>n</i> = 2,885) 70.9%	(<i>n</i> = 1,186) 29.1%

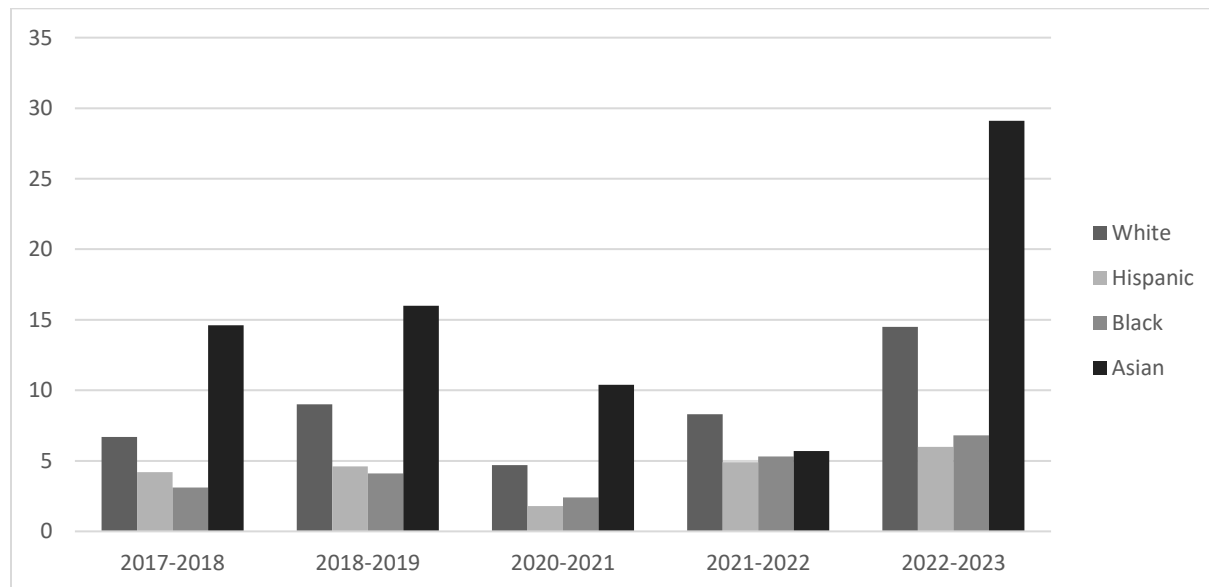
Regarding the 2021-2022 school year, the Pearson chi-square revealed the presence of a statistically significant difference, $\chi^2(3) = 1566.11$, $p < .001$. The effect size for this finding, Cramer's *V* of .14, was below small (Cohen, 1988). As delineated in Table 4, 8% of White Emergent Bilingual students met the Masters Grade Level standard followed by Asian Emergent

Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Masters Grade Level standard was almost 4 percentage points higher than Asian Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Masters Grade Level standard was less than a percentage point higher than Black Emergent Bilingual students and just about one percentage point higher than Hispanic Emergent Bilingual students.

Lastly, for the 2022-2023 school year, a statistically significant difference was yielded, $\chi^2(3) = 3203.07$, $p < .001$, Cramer's V of .19, below small effect size (Cohen, 1988). Twenty-nine percent of Asian Emergent Bilingual students met the Masters Grade Level standard followed by White Emergent Bilingual students, Black Emergent Bilingual students, and Hispanic Emergent Bilingual students. The percentage of Asian Emergent Bilingual students who met the Masters Grade Level standard was 15 percentage points higher than White Emergent Bilingual students. The percentage of White Emergent Bilingual students who met the Masters Grade Level standard was eight percentage higher than Hispanic Emergent Bilingual students and Black Emergent Bilingual students. Descriptive statistics for this analysis are contained in Table 4. These percentages across all five school years are depicted in Figure 4.

Figure 4

Average Percentages of Emergent Bilingual Students by Their Ethnicity/Race Who Met Grade 8 STAAR Mathematics Masters Grade Level Standard for All Five School Years



Discussion

In this Texas, multiyear investigation, the mathematics performance of Texas Grade 8 Emergent Bilingual students was examined by their ethnicity/race (i.e., Asian, White, Black, Hispanic) at three grade level standards. Two of the years analyzed were before the pandemic, while three years analyzed were after the pandemic. During the 2017-2018 and 2018-2019 school year, a

higher percentage of Asian Emergent Bilingual students met the Approaches Grade Level standard, followed by White, Hispanic, and Black. However, after the pandemic, in the 2021-2022 school year, a higher percentage of White Emergent Bilingual students met the Grade 8 STAAR Approaches Grade Level standard, followed by Asian, Black, and Hispanic. In the most recent data available, 2022-2023, Asian Emergent Bilingual students had the highest percentage of meeting the standard, followed by White, Black, and Hispanic. Hispanic Emergent Bilingual students had the lowest percentage of meeting the standard, at 62.8%, nearly 20 percentage points lower, than Asian Emergent Bilingual students.

With respect to the Meets Grade Level standard, in the two years before the pandemic, a higher percentage of Asian Emergent Bilingual students met the grade level performance standard, followed by White, Hispanic, and Black. For the three years following the pandemic, a higher percentage of Asian Emergent Bilingual students met the standard, followed by White, Black, and Hispanic. Notably, Hispanic Emergent Bilingual students had the lowest percentage of meeting the grade level performance standard over the three years, with 12.1%, 21.4%, and 28.2%, respectively. These percentages indicate a 19-32% disparity when compared to Asian Emergent Bilingual students.

Concerning the Masters Grade Level standard, in the two years before the pandemic a higher percentage of Asian Emergent Bilingual students met the standard, followed by White, Hispanic, and Black. In the years following the pandemic, a higher percentage of Asian Emergent Bilingual students met the standard, except for the 2021-2022 school year. During that year, 8.3% of White Emergent Bilingual students met the standard, the highest among the other ethnic/racial groups. Notably, Hispanic Emergent Bilingual students had the lowest percentages of meeting the Masters grade level standard in the post-pandemic years, with 1.8%, 4.9%, and 6%, respectively.

Connections to Existing Literature

Similar to this multiyear, statewide investigation, considerable research studies (e.g. Paschall et al., 2018; Flores, 2019; Anderson, 2016; Argueta, 2022; Morgan et al., 2023) have been conducted on the educational gaps within the race/ethnicity (i.e., White, Black, and Hispanic) of Emergent Bilingual students. Notably, White students, whether in poverty or not in poverty outperformed Black and Hispanic students in both reading and mathematics. Clearly established was that poverty had a greater influence on academic achievement than ethnicity/race.

Considerable disparities in academic performance are evident as early as age five. Kuhfeld et al. (2018) and Morgan et al. (2023) investigated trends in student mathematics and reading achievement as a function of ethnicity/race and poverty status. Mathematics achievement gaps widened around the ages of seven and eight among Black students in poverty and Hispanic students in poverty compared to White students in poverty. Ethnicity/race also has a profound effect on the mathematics college-readiness of Emergent Bilingual students. In a Texas study, Resilla (2017) investigated the mathematics, reading, and college-readiness of both subjects for Emergent Bilingual students as a function of their ethnicity/race. In mathematics, Asian Emergent Bilingual students showed greater college-

readiness than did White, Black or Hispanic Emergent Bilingual students for six of the seven years examined. The information provided will address the gap in the existing literature on the mathematics performance of Emergent Bilingual students based on their race/ethnicity, particularly after the COVID-19 pandemic.

Implications for Policy and for Practice

Based on the findings from this multiyear pre- and post-pandemic investigation, several recommendations to policy and practice are suggested. As demonstrated in this study, ethnicity/race and the pandemic negatively influenced student mathematics performance. To address this issue, the state must provide additional funding for targeted interventions and support staff to recover from the learning loss. In March 2020, the federal government distributed the Elementary and Secondary School Emergency Relief funds, allocating more than \$19 billion to Texas to combat the pandemic-related disruptions (Flores-Peña et al., 2023). These funds will expire in 2024 and will not be replaced with resources from the state (Texas Education Agency, 2023). Many students, particularly Emergent Bilingual students, continue to suffer the lasting effects of the pandemic, with statewide post-pandemic performance on the STAAR Mathematics assessment below pre-pandemic levels. To close the achievement gaps, the state legislature must increase funding to support students who are still struggling academically.

In terms of practice, as Texas has adopted a redesigned STAAR test for the 2022-2023 school year, educational leaders must have access to resources and strategies that eliminate barriers to learning for Emergent Bilingual students. District-level staff should collaborate with neighboring districts to exchange innovative ideas and effective practices. Campus leaders should provide culturally relevant and linguistically responsive professional development for staff working with Emergent Bilingual students, as it has been shown to improve student outcomes (Ortiz et al., 2022). Additionally, teachers and staff should be trained to have a collective understanding of the impact of poverty on students to ensure equitable instruction by teachers.

Connections to Theoretical Framework

The findings from this pre- and post-pandemic multiyear investigation support Ogbu's cultural-ecological theory, which asserts that a minority group's status is determined by its societal power (Worrel, 2014). As the demographic makeup of students nationwide evolves, with students of color becoming the majority, there is an increased risk of exacerbating existing achievement gaps. Researchers such as Argueta (2022), Davenport (2021), and Flores (2019) have identified substantial achievement disparities among various student subgroups. However, few researchers have acknowledged the diversity within the Emergent Bilingual student population, often categorizing it as a monolithic group (Francis, 2019).

Emergent Bilingual students frequently encounter discriminatory educational policies that adversely affect their academic performance, including the problematic classification of their diverse linguistic repertoires into a single grouping. The education system in the United

States was already facing significant equity issues before the pandemic, with a system that produces varying educational outcomes based on student demographics (Garcia & Weiss, 2020). The disproportionate effects of the pandemic on Emergent Bilingual students and other minority groups further widened the existing achievement gap (Sahakyan & Cook, 2021). Challenges included a shortage of technology and resources, intermittent and unreliable internet access, food and housing insecurities, and discontinued language support. Consequently, the underperformance of Emergent Bilingual students in mathematics, particularly by ethnicity/race, was exacerbated in the years following the pandemic.

Recommendations for Future Research

Based on the findings of this investigation, several recommendations for future research are proposed. First, since only mathematics performance was addressed, future studies should focus on other subjects such as reading. Second, as this study focused solely on Grade 8 students, it is recommended that researchers examine the performance of Emergent Bilingual students in other grade levels. Another recommendation is to conduct a qualitative study to capture various stakeholder's perceptions of learning loss caused by the pandemic. As a final recommendation, researchers are encouraged to replicate this study considering other demographic variables, such as special education status and economic status.

Conclusion

In this Texas, multiyear investigation, the mathematics performance of Texas Grade 8 Emergent Bilingual students was examined by their ethnicity/race (i.e., Asian, White, Black, and Hispanic) for the three grade level performance standards in the two school years before the pandemic (i.e., 2017-2018, 2018-2019), and three years after the pandemic (i.e., 2020-2021, 2021-2022, and 2022-2023). Statistically significant differences were documented in the Grade 8 STAAR Mathematics assessment across all five school years. In the 2017-2018 and 2018-2019 school years, a higher percentage of Asian Emergent Bilingual students met the Approaches Grade Level standard, followed by White, Hispanic, and Black students. However, in the 2021-2022 school year, White students had the highest percentage of meeting the Grade 8 STAAR Approaches Grade Level standard, followed by Asian, Black, and Hispanic students. In the most recent data, 2022-2023, Asian students again had the highest percentage of meeting the Approaches Grade Level standard, with Hispanic students having the lowest percentage. For the Meets Grade Level standard, higher percentages of Asian students met the standard, before and after the pandemic, with Hispanic students having the lowest percentages, indicating a 19-32% disparity compared to Asian students. For the Masters Grade Level standard, in the years following the pandemic, a higher percentage of Asian Emergent Bilingual students met the standard, except for the 2021-2022 school year. During that year, 8.3% of White Emergent Bilingual students met the standard, the highest among the other ethnic/racial groups. Notably, Hispanic Emergent Bilingual students had the lowest percentages of meeting the Masters grade level standard in the post-pandemic years, with 1.8%, 4.9%, and 6%, respectively.

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