POLICY BRIEF

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Enhancing Math Education in Texas Through Blended Learning: The COVID Effect

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In 2018, the Texas Education Agency (TEA) launched a strategic competitive grant program aimed at supporting Local Education Agencies (LEA) in achieving Math Innovation Zone (MIZ) designation. This initiative's primary focus is to increase PreK – 8th grade math proficiency levels through the implementation of a blended learning model in math classrooms. Blended learning is a data-driven pedagogical technique that integrates specialized adaptive software with traditional in-person teaching. This software enhances a teachers' capacity to promptly evaluate student comprehension of content in real-time during the learning process, which enables the teacher to deliver targeted interventions and extensions as necessary. Coupled with direct teacher instruction and peer collaboration, blended learning empowers students to engage in their own learning process by increasing student agency.

This policy brief explores the relationship between MIZ implementation and student achievement, concentrating on the second implementation cohort. This cohort who began blended learning implementation in 2019, is particularly significant due to the impact of the COVID-19 pandemic in spring of 2020. It highlights how the initiative adapted and influenced education during a challenging period. Examining the influence of the blended learning initiative, despite the crisis, provides valuable insight for educational stakeholders.

Key Findings

Blended Learning has a positive effect on student learning despite COVID

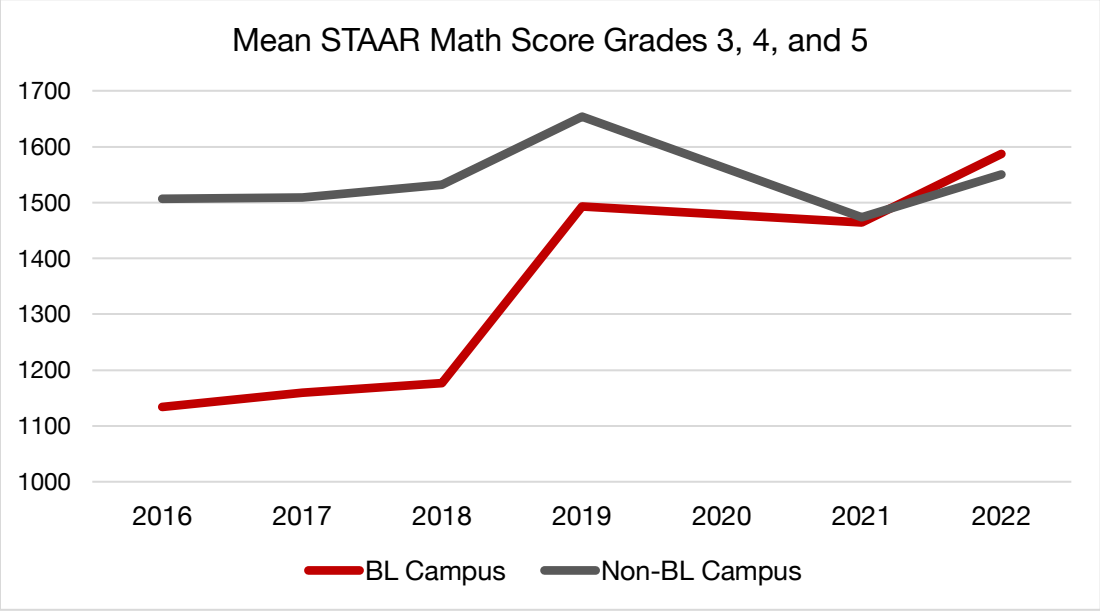
- Blended Learning districts had stronger gains in student achievement before COVID.
- Blended Learning districts experienced a more pronounced decline in student achievement during COVID, aligning with expectations as the pandemic disproportionately impacted low socioeconomic families.
- Blended Learning district student achievement scores showed a faster COVID recovery rate compared to the state average.
- Blended Learning grades have slightly more students achieving Approaching or higher based on STAAR proficiency levels than non-blended learning grades.

Examining the relationship between MIZ participation and student achievement involves understanding the influence of decision-making by both TEA and LEAs in determining student exposure to the blended learning model. The process starts with LEAs initiating a letter of intent to TEA. TEA prioritizes grant funding for LEAs with a higher proportion of economically disadvantaged students. Once chosen, schools pilot the blended learning approach in specific grade(s) for varied reasons. Based on submitted Fidelity of Planning documentation, many schools perceive MIZ as an intervention strategy, directing their pilot funding towards grades encountering academic challenges. This perception, coupled with TEA's focus on economically disadvantaged students, aligns with the program's anticipated benefits. Recognizing the program's emphasis on students in need of increased academic support offers an impartial lens for analyzing collected data. It's worth noting that the benefits of blended learning often extend beyond specific grades, as professional development opportunities related to blended learning are commonly offered school-wide rather than being teacher-specific. This holistic approach ensures that all grades benefits from the enhanced instructional strategies and technology integration facilitated by blended learning.

Promising Relationships Between MIZ Implementation and Student Outcomes

Data in this brief pertains to the second implementation cohort aggregated to the district level. This cohort offers data both pre- and post-COVID coinciding with blended learning implementation. The 2020 STAAR data is missing from the dataset as Texas schools, like many across the United States, did not administer state achievement tests in 2020. STAAR test scores from Spring 2016, Spring 2017, and Spring 2018 were obtained prior to any MIZ implementation.

Figure 1. Mean STAAR Score Comparison



Before implementation, blended learning districts performed below other district's mean STAAR average, which aligns with expectations. The selection process for grant applications is primarily based on LEA initiative, the proportion of economically disadvantaged students, and perceived educational need. Although BL districts exhibit lower student achievement scores compared to non-BL districts in Spring 2016, 2017, and 2018 mean STAAR scores, our analysis indicates that BL districts experienced more significant gains and a steeper upward trend compared to state averages before the onset of COVID. This shift suggests a correlation to blended learning implementation.

The selection process for districts awarded the blended learning grant was significantly influence by the percentage of economically disadvantaged students within each district. Using the classification system established by the National Center for Educational Statistics (NCES), campus and district poverty levels were categorized based on the proportion of students receiving free and reduced lunch for both BL campuses and non-BL campuses. The criteria for classification include low poverty (less than 25% of students receiving free or reduced lunch), moderate poverty (26% to 50%), mid-high poverty (51% to 75%), and high poverty (over 75%). Notably, no districts categorized as low poverty received the blended learning grant, while 14% were classified as having moderate poverty, 17% as mid-high poverty, and a significant majority, 69%, were considered high poverty campuses. To provide a more comprehensive analysis, comparisons were drawn using mean STAAR scores for grades 3, 4, and 5, further disaggregated by poverty level as defined by NCES. This approach attempted to highlight the impact of blended learning initiatives across campuses with varying economic backgrounds.

Figure 3. Grade 3, 4, and 5 Mean STAAR Score Comparison – Moderate Poverty

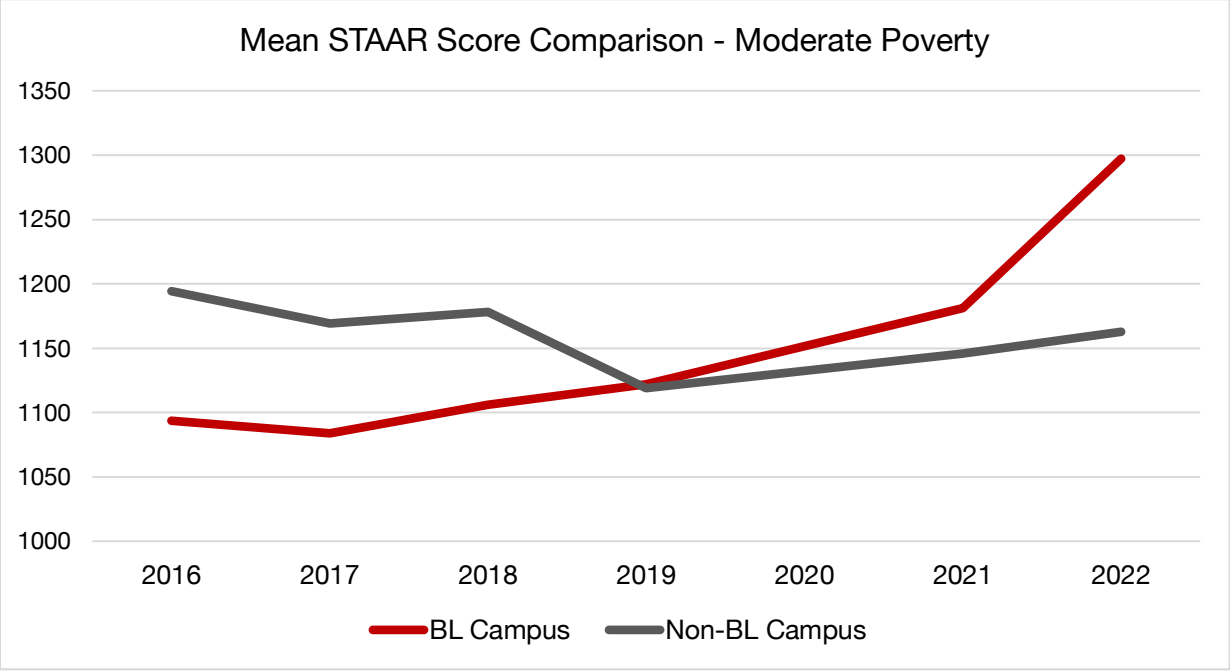


Figure 4. Grade 3, 4, and 5 Mean STAAR Score Comparison – Mid-High Poverty

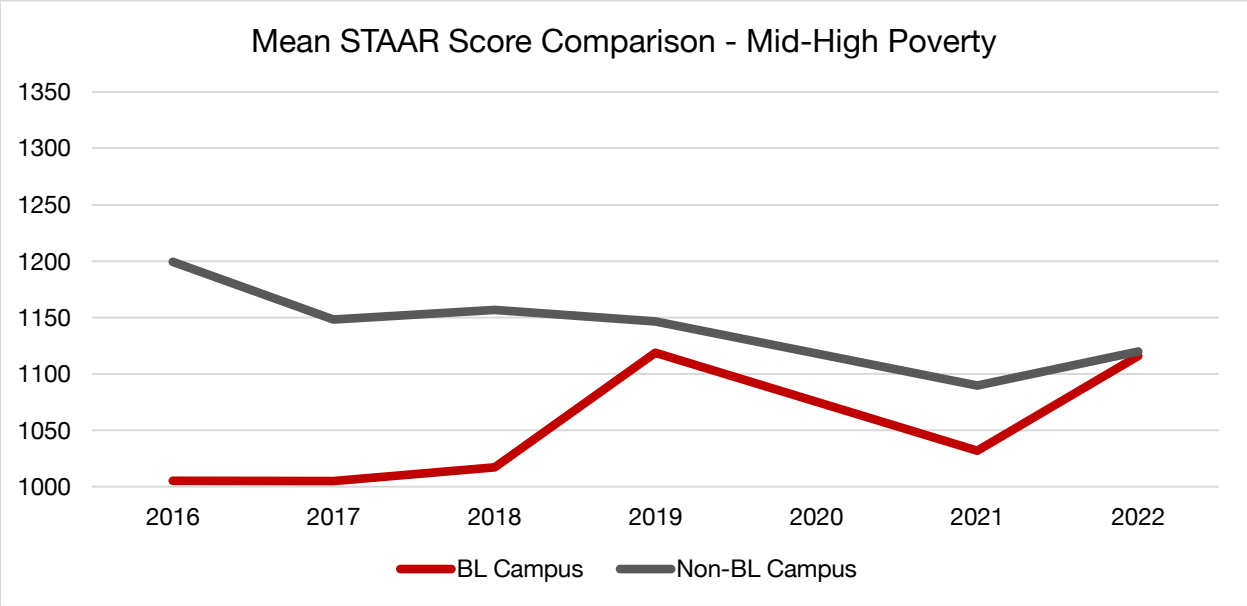
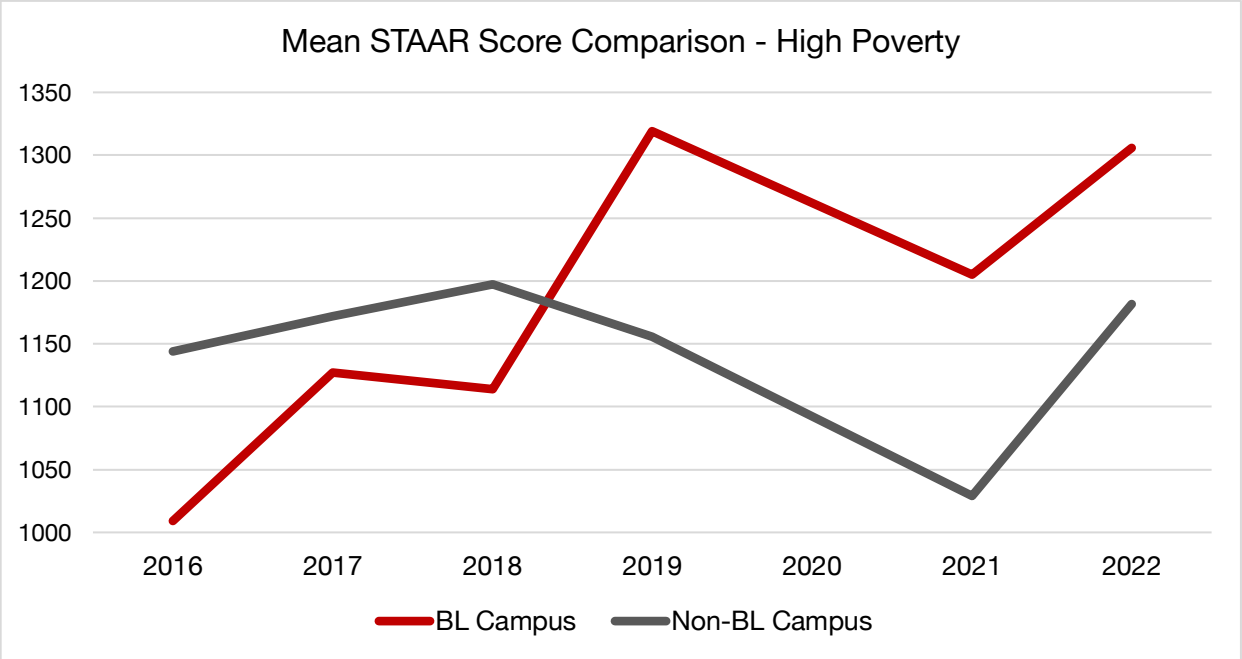


Figure 5. Grade 3, 4, and 5 Mean STAAR Score Comparison – High Poverty



Each of the above graphs use data from campuses classified according to the NCES descriptions. The most substantial increases for BL campuses occur in Spring 2019 following initial implementation of the blended learning initiative for this cohort of campuses. Campuses designated as high poverty appear to experience the greatest positive effect of the blended learning initiative.

The COVID Effect

The COVID pandemic had a direct impact on Spring 2020 instruction, leading to repercussions that extended into the subsequent school year and beyond. Consequently, Spring 2021 mean STAAR scores significantly decreased for all student groups highlighted in the brief, with the most vulnerable groups experiencing the greatest negative effects. This outcome was anticipated, as most BL districts are in low socioeconomic areas and comprise lower-performing schools.

Post-COVID, there is a positive trend in BL district student achievement, showing notable improvements in mean STAAR scores for BL campuses as compared to non-BL campuses in each of the highlighted categories above. Blended learning campuses appear to demonstrate a more resilient rebound immediately post-COVID. This observation aligns with the flexibility and personalization of blended learning strategies, especially the integration of adaptive technology to formatively assess student understanding which allows teachers to better meet the unique needs of students in real time providing interventions when needed.

Comparing Proficiency Levels Within MIZ Districts

Analyzing specific grades where blended learning was introduced, as compared to other grades within the schools, highlights findings from qualitative survey data. These findings suggested that schools opted to introduce blended learning in a grade(s) where there was a substantial need for intervention. Program managers perceived blended learning in math classrooms as a method to enhance student achievement since it provides a data-driven approach for teachers to intervene and extend learning based on individual student need, using district selected software, aligning with the intended goals of the grant initiative.

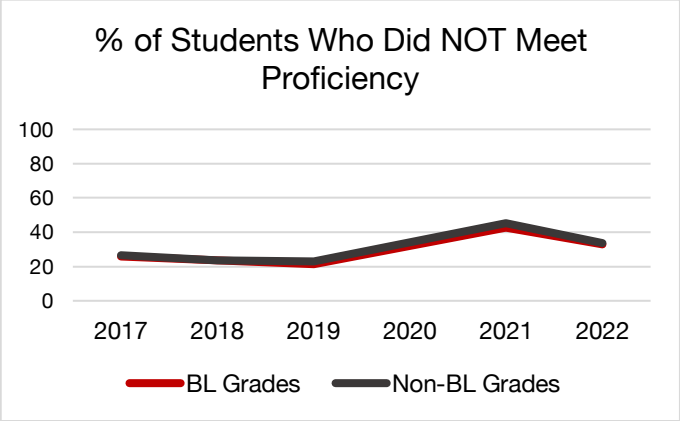
Student performance on the STAAR test is classified into four district performance categories: Masters Grade Level, Meets Grade Level, Approaches Grade Level, and Did Not Meet Grade Level. Attaining Approaches Level or higher is considered a passing result, while achieving Did Not Meet Grade Level indicates a non-passing performance. STAAR scores significantly impact the school or district's academic standing and accountability, influencing factors such as school ratings, funding allocation, and overall perceptions. Higher percentages of students achieving passing scores contribute to a positive image for the school or district, while lower scores may result in challenges regarding school performance assessments and resource distribution. As noted, many MIZ schools and districts show lower performance on the STAAR test compared to the state average, with approximately 30% of the student population not achieving proficiency from 2017-2022. However, findings indicate a shift in performance trends: although BL grades had a slightly lower percentage of students not meeting proficiency in 2017 compared to non-BL grades, the situation has reversed, with BL grades now exhibiting a slightly higher percentage of students meeting the STAAR proficiency criteria of Approaching or higher as exhibited by less students in the "Do Not Meet Proficiency" category. This is likely due campus

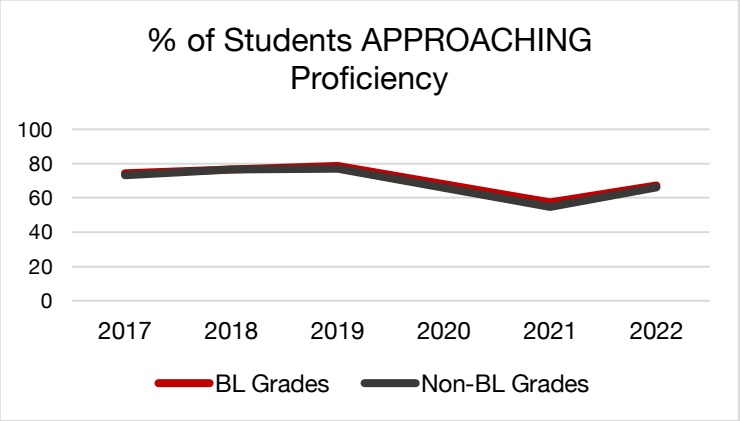
implementation of blended learning having a positive effect on all students at the campus level.

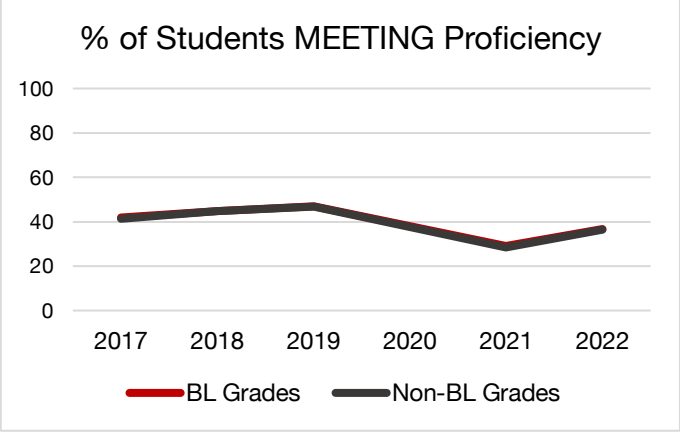
Table 1. Percentage of Students Who Did Not Meet Proficiency

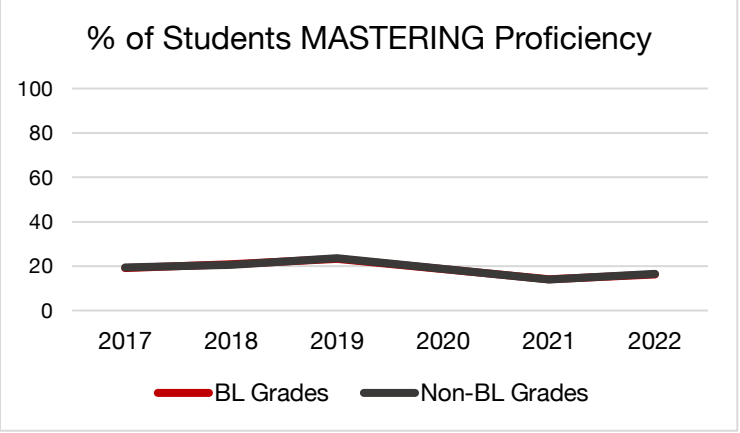
	BL Grade	Non-BL Grade
2017	25.69	26.68
2018	23.41	23.59
2019	21.35	22.97
2020	No Data	
2021	42.67	45.26
2022	32.80	33.70

Figure 6. Percentage of Students Per STAAR Proficiency Level









Celebrations and Conclusion

Analyzing STAAR student achievement from 2017-2022 showcases positive trends post-implementation of blended learning that can be celebrated by schools and districts. The initiative's adaptability and positive impact highlights the hallmark design of the program, merging high-quality in-person teaching with a data-driven approach using adaptive software to tailor interventions to specific student need. Despite pandemic-related educational challenges, findings suggest that blended learning continued to drive student learning in a positive direction. Pre-COVID, blended learning districts performed below the state average, yet displayed stronger pre-COVID gains. During the pandemic, these districts experienced a sharper decline but recovered faster than the state average. Moreover, BL grades exhibited a slightly higher number of students meeting STAAR proficiency levels compared to non-BL grades. These findings accentuate the positive trajectory of student achievement following blended learning implementation and the program's resilience amid educational disruption.

Methodology

We use data obtained from the Data Interaction for Texas Student Assessment Portal, TXSchools.gov, and through communication with TEA officials, as well as survey data administered to Program Managers through Qualtrics by Texas Tech University and TEA. In addition, using publicly available information from the Texas Education Agency website, districts which received the Math Innovation Zone grant were identified at a district level for the cohort highlighted for this study and anonymized in the brief.

Research Team Bio

Kristin E. Mansell, Ph.D., is an Assistant Professor of Practice in Curriculum and Instruction at Texas Tech University. Her research is broadly focused on STEM education policy, the teacher workforce, increasing teacher efficacy through targeted professional learning communities, and the impact of blended learning and personalized learning on both student outcomes and teacher retention.

Heather Greenhalgh-Spencer, Ph.D., is an Associate Dean in the TTU Graduate School and an Associate Professor in Curriculum and Instruction. Her research emerges at the intersection of Educational Technology, Pedagogical Innovation, Personalized Learning, Engagement, and Global uses of Technology in STEM. Greenhalgh-Spencer explores practices of using technology and pedagogical innovation to create engaged learning in both formal and informal learning spaces, and in both national and global contexts. She explores issues in the STEM pipeline, and researches embodied and transdisciplinary learning practices that increase engagement for all populations in STEM courses. Greenhalgh-Spencer also researches blended / personalized learning (BL/PL) and the ways that BL/PL can create diverse pathways and increased opportunities for all students. This has, most recently, translated into an increased focus on teacher retention and student support in areas where teacher turnover is an issue.

The Center for Innovative Research in Change, Leadership, and Education (CIRCLE) provides empirical research, training, and evaluation in collaboration with community partners, using interdisciplinary approaches, on issues that influence educational experiences and outcomes of students, leadership, and policy throughout the PK-20 system. Located in the College of Education at Texas Tech University, CIRCLE research and evaluation activities focus on three core areas: PK-12 Education, Higher Education, and Research-to-Practice.