State of Texas
Transition to Online Assessments Feasibility Study

A Report to the
87th Texas Legislature
from the Texas Education Agency
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Lieutenant Governor, Speaker of the House of Representatives, and the Members of the
87th Texas Legislature

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Section 1. Executive Summary

Over the last two decades, the rapid development and adoption of new digital technologies has amplified communication and information exchanges across economic, social, and educational contexts (Pellegrino, 2017). Correspondingly, educational organizations, researchers, and policy-makers have increasingly recognized the need for policies and practices that support the development of 21st century skills for all students. Paralleling the transition of traditional learning environments to 21st century digital contexts, assessment of student learning has also shifted to digital formats that more closely mirror the environments in which students increasingly are learning. Specifically, the number of electronic assessments administered for grades 3–8 students nationally has grown exponentially over the last 15 years, and the number of online tests surpassed the number of paper-based tests for the first time in the 2015–16 school year (EdTech Strategies, LLC, 2016). This is due in large part to the advantages afforded to students by the electronic testing environment.

As an outgrowth of the priority that the state of Texas places on 21st century learning, the 86th Texas Legislature passed House Bill (HB) 3906 requiring the Texas Education Agency (TEA), in consultation with the State Board of Education, to develop a transition plan to electronically administer all assessment instruments required under Texas Education Code (TEC), §39.023, beginning no later than the 2022–23 school year. The transition to online testing includes the State of Texas Assessments of Academic Readiness (STAAR®) grades 3–8 and end-of-course (EOC) assessments, as well as STAAR Spanish assessments in grades 3–5. A fully accommodated STAAR online assessment was first made available in the 2016–17 school year, and since then, the majority of Texas students requiring accommodation supports have participated in online testing. Although the goal is stated as 100 percent STAAR online testing, it should be noted that this will include exceptions to electronic administration for students in extenuating circumstances that prevent them from testing online (e.g., visual impairments, educational placement does not permit online access), which represents less than 1 percent of the student population. Additionally, given the unique needs of students with significant cognitive disabilities, the STAAR Alternate 2 assessment should be excluded from the electronic testing requirement and should be permitted to be administered in the format that is most appropriate for each student.

To inform the transition plan, the TEA commissioned an evaluation assessing the readiness of Texas public school districts and open-enrollment charter schools, collectively called local education agencies (LEAs), to transition to 100 percent online administration of STAAR. The current study includes a benchmarking of other states' assessment programs, as well as an examination of the condition of Texas district- and campus-level infrastructure to support online testing.

Study results showed strong nationwide trends toward online testing, with 70 percent of states currently using 100 percent online testing for their primary state-level summative assessments. Additionally, on a statewide survey of Texas LEAs in spring 2020, over 60 percent of responding

LEAs noted having sufficient bandwidth per student to test electronically. Further consultation with non-profit organizations, including EducationSuperHighway and Connected Nation, determined that high-speed fiber internet connections are present in over 99 percent of Texas LEAs due primarily to past investments made by the Texas Legislature. Concurrent with the assessment of readiness, remote learning during the COVID-19 pandemic has resulted in the need for drastic increases in digital learning devices and internet connectivity for Texas students. State-level initiatives, such as Operation Connectivity, have infused millions of dollars into building device and connectivity readiness for Texas students. Despite a high level of infrastructure readiness for a majority of Texas LEAs, a small amount of further investment in internet connectivity is needed for a subset of LEAs to reach full readiness, with those LEAs being predominantly in small and rural areas.

To facilitate the successful transition of all Texas campuses to 100 percent electronic testing by 2022–23, HB 3906 requires an affirmative action by the 87th Texas Legislature to amend TEC, §39.02341 to confirm the 2022–23 timeline and clarify the scope for moving to 100 percent electronic assessments. In addition to the required statutory change, TEA offers two options for consideration as possible tools to ease the final transition process: (a) consider expanding the authorized use of the Technology and Instructional Materials Allotment (TIMA) funds to explicitly allow internet connectivity and training for online testing, and (b) consider the establishment of a matching grant fund for the purpose of one-time network infrastructure investment in LEAs without sufficient internet connectivity for electronic assessment.

A small subset of LEAs will need to make additional investment in internet connectivity and personnel to meet readiness targets for electronic testing. Statewide, strengthening internet connectivity to reach one megabit per second (Mbps) per student will require a **one-time investment** in network infrastructure (i.e., provision of fiber internet connection and sufficient internal connections to support bandwidth) of $12.9–$15.1 million, $9.4–$11.1 million of which is reimbursable through the federal E-rate program. Additional **statewide annual costs** include $25.4 million for bandwidth—$19.3 million of which is reimbursable through E-rate—as well as personnel-related costs of $7.3 million (i.e., additional technology personnel stipends and training). **After E-rate funding reimbursements, statewide, LEAs will need to make a one-time investment of $3.5–$4.0 million for network infrastructure and increase annual spending by approximately $13.4 million for additional bandwidth and personnel-related costs to achieve 100 percent STAAR online testing**.

As Texas continues its progress toward meeting the goal of providing personalized, flexible, and empowered learning outlined in the Long-Range Plan for Technology, 2018–2023, which was developed in conjunction with the State Board of Education, it is essential that 21st century environments are reflected in all aspects of student learning. With the majority of LEAs currently meeting readiness targets, a two-year transition period over school years 2021–22 and 2022–23 should enable remaining LEAs to move toward and achieve readiness, as well as allow educators and students sufficient time to increase familiarity and comfort with online testing. These factors, in combination with the recent shift to online learning and investment in digital learning, will assist in a successful transition to 100 percent STAAR online testing.

Section 2. Project Introduction

The Long-Range Plan for Technology, 2018–2023, developed in conjunction with the State Board of Education, identified six strategic goals targeted at providing all Texas students with 21st century learning experiences. The goals focused on (a) personalized, flexible, and empowered learning; (b) equitable access to technology; (c) digital citizenship; (d) safety and security; (e) collaborative leadership; and (f) reliable infrastructure. The overarching goal of the Long-Range Plan for Technology (TEA, 2018) is to prepare all students for success in the 21st century and ensure that all students have the technology skills to fully participate in an increasingly technological world. Since the establishment of these digital literacy goals, the COVID-19 pandemic has resulted in drastic increases in remote learning and the provision of online curricula for Texas students. This includes the addition of 2.5 million learning devices, as well as the establishment of online resources such as Texas Home Learning and a series of open-education-resource instructional materials.

To match the realities of today's online learning environment, testing and recalling information in an online format is the natural next step for Texas. Benefits of online assessments include the potential for faster results, the potential for customizable assessment, more engaging assessment questions, reduced operational complexity and paper waste, better test security, improved administration, and more equitable access to accommodation supports for students. A fully accommodated STAAR online test was first made available in the 2016–17 school year, and since then, the majority of Texas students requiring accommodation supports have participated in online testing. Examples of online accommodations include content and language supports, text-to-speech, speech-to-text, spelling assistance, American sign language videos, and refreshable braille.

Correspondingly, the 86th Texas Legislature passed HB 3906 in 2019, which requires TEA, in consultation with the State Board of Education, to develop a transition plan to administer all assessment instruments required under TEC, §39.023 electronically, beginning no later than the 2022–23 school year. HB 3906 requires action by the Legislature in order for the plan to move forward.

To inform the transition plan, TEA contracted with the Texas A&M University Education Research Center (ERC) to conduct an evaluation assessing the readiness of LEAs to transition to 100 percent online administration of STAAR. The ERC has a proven track record of completing research and evaluation projects for local, state, regional, national, and international partners. Prior research studies conducted by the ERC have focused on an extensive range of topics (e.g., technology use in PreK–12 settings; college and career readiness initiatives and programs; out-of-school-time programs in urban areas; international curricula; and science, technology, engineering, and mathematics initiatives in Texas schools and universities). In addition, the ERC partnered with Pearson and the Texas Association of School Administrators to assist TEA in a prior evaluation of LEAs' readiness for online testing (TEA, 2008).

Researchers used quantitative and qualitative methods to accomplish the primary purposes of the current mixed methods study, including (a) measuring current levels of electronic testing participation and readiness, (b) analyzing prior experiences with testing, and (c) examining key actions necessary to assist LEAs in achieving readiness for 100 percent STAAR online testing by the 2022–23 school year.

Study Parameters and Definition of 100 Percent Online Testing

The Texas assessment program measures academic outcomes for a diverse population of over 5.4 million students, across a broad spectrum of student groups and in a variety of formats. To account for the most appropriate testing environment for all students, readiness evaluation activities and the resulting transition plan operated under a set of parameters specifying an operational definition of 100 percent participation.

The current assessments required under TEC, §39.023 include the STAAR grades 3–8 and EOC assessments, STAAR Spanish assessments for grades 3–5, and STAAR Alternate 2 grades 3–8 and EOC assessments. Students enrolled in Texas LEAs participated in one or more administrations of STAAR in a paper-based or online mode during the 2018–19 school year. However, only 13 percent of STAAR assessments were administered online with the majority of those tests administered to students who require assessment accommodations.

STAAR assessments are administered with features and supports that increase accessibility for all students to ensure that each student can interact appropriately with the content, presentation, and response modes of the statewide assessment. Accessibility features are available to any student who regularly benefits from their use during instruction. STAAR online assessments provide the following accessibility features: color settings, zoom, place marker, highlighter, notepad, and pencil. Accommodations are changes to assessment materials or procedures that are intended to allow test takers to demonstrate their knowledge of the content being tested without the format of the assessment, the non-tested language or the type of response needed to answer the questions, being barriers. The following accommodations are available for STAAR online assessments: content and language supports (e.g., pictures or definitions), spelling assistance, text-to-speech, speech-to-text, refreshable braille, and sign language videos.

Even with all these accessibility features and accommodations that are available for STAAR online assessments, there are some students who will continue to need a paper-based test due to their particular disabilities. For example, a student who gets seizures from looking at a computer screen will likely need a paper-based test. In addition to students who need a paper-based test as a result of their disability, other special cases exist. For example, paper-based tests may be necessary for students whose educational placement at the time of the assessment (e.g., juvenile justice center) does not allow for online testing. **As a result of the small number of students who require paper-based tests compared to the total number of students tested, it is reasonable to expect that more than 99 percent of grades 3–12 Texas**

students participating in the general STAAR assessment will be able to be assessed through online testing.

The assessment referenced in TEC, §39.023(b), known as STAAR Alternate 2, is an alternate assessment based on alternate academic achievement standards. This assessment has been developed for students who have the most significant cognitive disabilities and are receiving special education services. These students exhibit significant intellectual and adaptive behavior deficits that affect their ability to plan, comprehend, reason, and apply social and practical skills in everyday life. Students who participate in STAAR Alternate 2 demonstrate mastery of skills in a variety of ways, using substantially modified materials. A student with a significant cognitive disability requires individualized, extensive, repeated, and specialized supports and materials beyond the typical support provided to peers. The student's Admission, Review, and Dismissal (ARD) committee determines whether the student meets the criteria to participate in STAAR Alternate 2. Although STAAR Alternate 2 was redesigned to be a more standardized assessment as a result of state legislation passed in 2013, it is administered individually to each eligible student, based on the most appropriate presentation and response modes for the student. For example, some students may require tactile test materials (e.g., textured graphics) while other students may respond to test questions by blinking. In addition, accommodations for these students do not always fit a particular testing mode. As a result, **TEA recommends that STAAR Alternate 2 not be included in the requirement to administer all assessments electronically**.

Data Collection and Analysis

The mixed-methods study employed a variety of data collection and analysis methods. Sources of data included research literature (see References for a detailed bibliography of literature reviewed), in-depth interviews with assessment officials and education professionals from across the United States and Texas, and electronically administered district- and campus-level surveys—thus providing triangulation of data to enrich understanding across the evaluation questions. Data from the interviews and open-ended survey questions were analyzed qualitatively, while statistical techniques, including descriptive statistics and inferential methods such as multiple linear regression, were used to analyze data from survey questions. Results allowed researchers to measure LEA readiness for 100 percent STAAR online testing and estimate readiness levels for non-responding LEAs. Finally, brief follow-up interviews were conducted with a sample of LEA administrators to verify survey findings and obtain additional context.

Readiness Evaluation Components

The research team conducted research in five main areas: (a) benchmarking other state assessment programs, (b) statewide surveys of readiness for 100 percent STAAR online testing, (c) case studies of representative LEAs, (d) evaluation and cost analysis of achieving readiness for online testing, and (e) interpretation and discussion of readiness. Each component of the evaluation is described below. After analysis and triangulation of all five components, the

Transition Plan (Section 8) was created to address Texas's move toward 100 percent online assessments by 2022–23.

Component 1: Benchmarking of Other States' Online Assessment Systems

The purpose of state benchmarking was to inform the transition to 100 percent STAAR online testing for Texas students based on experiences of other states that have already transitioned their statewide assessment programs from primarily paper-based assessment (PBA) to online testing. The benchmarking explicated the conditions under which state transitions occurred, as well as factors that had contributed to, and had hindered, successful transitions to online testing. The research team conducted a search of the Education Commission of the States and the National Conference of State Legislatures to compile relevant legislation on online testing, as well as a detailed list of states' assessment programs. Following the examination of state online testing programs and review of state-level reports and legislation regarding those programs, the research team selected a purposeful sample of states for further investigation via interviews with state education agency assessment experts. These interviews were purposed to collect background information regarding the extent to which each identified state uses online testing, reasons for an individual state's transition to online testing, and challenges and benefits experienced by each state as a result of the transition. Six states were identified—based on their history with online testing, the structure of their individual assessment programs, and state demographics—and state education agency representatives from five states agreed to participate in the interviews: California, Florida, Georgia, Pennsylvania, and West Virginia. Representative from Kentucky could not be reached. Detailed results can be found in Section 3 and Appendix A.

Component 2: Texas Statewide Readiness Surveys

The administration of an online survey of all Texas districts and campuses to gauge current readiness regarding hardware, network infrastructure, and personnel was the second evaluation component. The surveys also assessed districts' and campuses' prior experiences with, and perceptions of, STAAR online testing. Informed by a prior study of readiness for online testing (TEA, 2008), the electronic surveys administered in spring 2020 were developed based on feedback from TEA staff, ERC researchers, and statewide district and campus focus groups. Survey questions were designed to capture district and campus perceptions in four main areas: (a) hardware; (b) network infrastructure; (c) personnel, staffing, and training; and (d) experiences with, and perceptions of, online testing. Researchers worked with district and campus personnel to identify appropriate persons to complete the surveys and to confirm that survey links were received by the correct parties in each district and on each campus (i.e., superintendents, testing coordinators, technology coordinators at the district level and principals at the campus level). All 1,201 Texas LEAs were asked to participate in the survey. While there were 8,838 campuses across Texas, only 7,604 had identifying information as well as campus-level contacts to be reached for the survey. At the conclusion of the survey window, 901 LEAs had responded to the district-level survey, for an overall response rate of 75 percent, and 2,355 campuses had responded, for a response rate of 31 percent. Only district-level survey results were used to determine readiness, since readiness criteria are measured mainly at the district level. The campus survey results did, however, provide helpful information regarding campus-level experiences and perceptions, as well as any differences that may exist between district- and campus-level perceptions of STAAR online testing.

Component 3: Case Studies of Representative LEAs

Comprehensive case studies across eight LEAs were conducted to provide an in-depth look at LEA readiness, as well as perceptions of the advantages and challenges associated with the transition to 100 percent STAAR online testing. Results from qualitative interviews with administrators and teachers from participating LEAs were used to expand upon the quantitative survey results. Potential case study LEAs were identified based on geographic region, National Center for Education Statistics/TEA LEA type (size and urbanicity), student population and diversity, and rate of participation in 2018–19 STAAR online testing. The final group of eight LEAs was chosen based on their availability to participate in the study. The research team conducted 159 interviews with district and campus personnel in summer 2020 via the Zoom online meeting platform, using district- and campus-level interview protocols developed specifically for the study. The case study results are found in Section 5.

Component 4: Evaluation and Cost Analysis of Achieving Online Testing Readiness

Following the descriptive analysis of survey data, researchers targeted three broad areas for a more in-depth examination of LEA readiness for 100 percent STAAR online testing. Readiness areas were identified based on a review of existing literature and interviews with testing personnel across the United States and included the following: (a) hardware readiness, (b) personnel readiness, and (c) internet connectivity readiness. Recommendations for readiness in each area were drawn from a review of literature on technology and online assessments. Responses to the LEA survey were analyzed in conjunction with further research to determine current state of readiness in each major area and to calculate the baseline cost of moving all LEAs to achieve readiness for STAAR online testing. Analysis of LEA readiness, including a cost analysis of achieving readiness for 100 percent STAAR online testing, can be found in Section 6.

Component 5: Interpretation and Discussion of Readiness

Based on analyses across all study components and the consideration of existing federal and state resources to aid in the shift to 100 percent STAAR online testing, the research team identified key steps necessary for Texas to accomplish the goal of moving to 100 percent compliance. The two key actions identified were (a) an investment in internet connectivity and personnel-related costs among the small subset of districts currently not meeting readiness targets for online testing and (b) encouraging and strengthening partnerships across all stakeholder groups to ensure that educators, students, and parents are familiar and comfortable with online testing. Detailed aspects of each of the key actions are provided in Section 8.

Section 3. Benchmarking of Other States' Transition to Online Testing

The purpose of the state benchmarking component of this report is to evaluate the feasibility of transitioning to 100 percent online testing of students in the state of Texas. The benchmarking uses the following means to examine the possibility that such a transition can occur:

(a) Compiles a detailed list of states' assessment programs
(b) Identifies a group of states to investigate through interviews with assessment experts regarding their programs and experiences

State-Level Benchmarking of Online Testing Programs

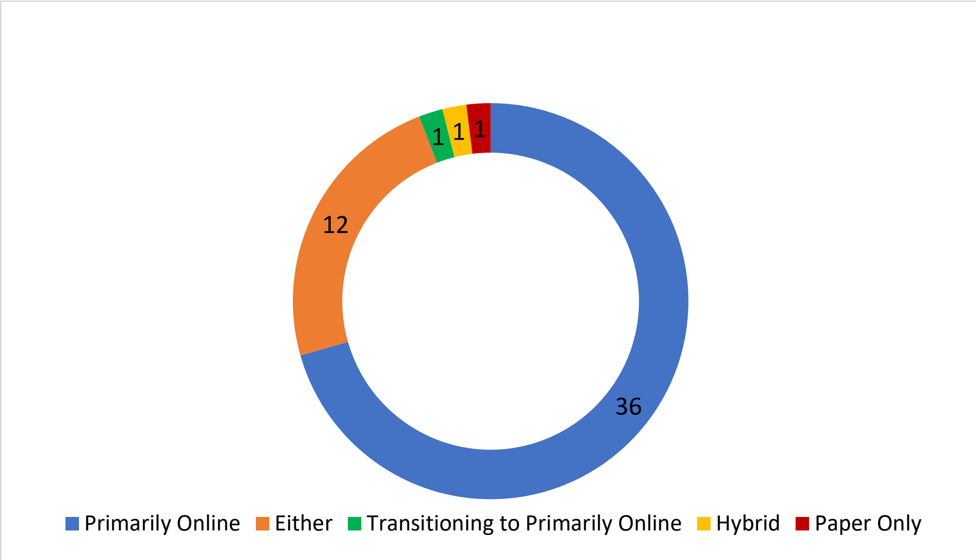
Methodology

To examine the current state of online assessment programs across the United States, the team conducted research to determine whether large-scale summative assessments were delivered using paper-based or online formats. State-produced reports and legislation were gathered and used to guide the benchmarking process. During their inquiry, researchers noted a number of descriptive statistics, such as which grade levels and subject areas were assessed online, what testing window lengths were established in different states, and which states were using online interim or formative assessments. This information is summarized below and presented in full in Appendix A.

State Analysis

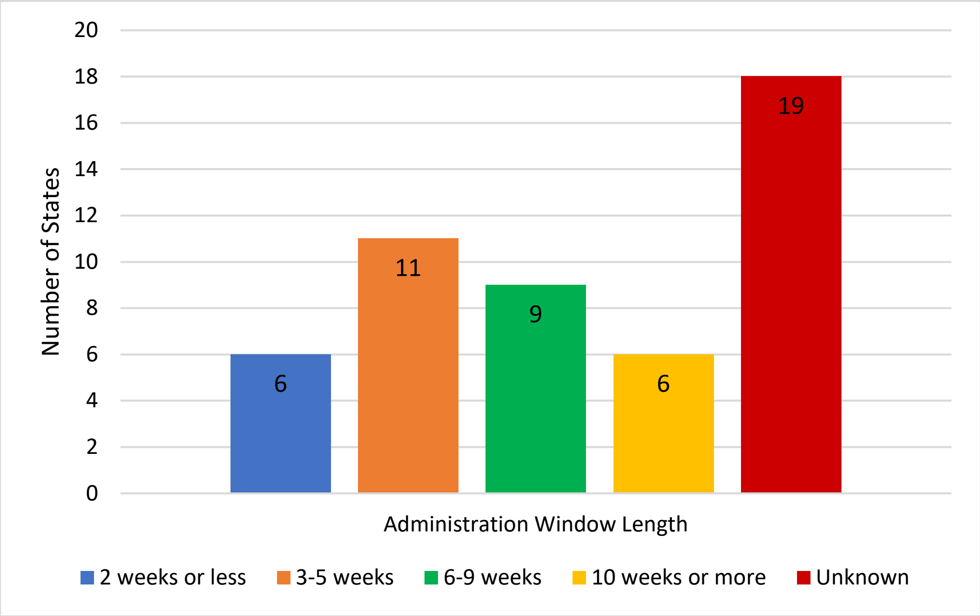
The research team uncovered many important similarities among assessment programs across the nation. As of spring 2020, **all but one of the 51 state education agencies (SEAs) examined for this report** (50 state agencies, as well as Washington, D.C.) **had instituted some form of online testing** with their students. Figure 1 illustrates this in further detail. States that are identified as being "primarily online" are those that seek to assess 100 percent of their students via online instruments (Olson, 2019). These states typically use online tests for grades 3–8 in English language arts (ELA), mathematics, and science assessments, to meet the guidelines in the Every Student Succeeds Act (ESSA, 2015). States identified as primarily online allow small populations of students to take PBAs to meet assessment accommodations, and many states have procedures in place to use PBAs during extenuating circumstances that prohibit technology-dependent tests from being feasible. **A majority (36/51 or 70 percent) of the SEAs assess their students using an online format, with very small numbers of students taking PBAs based on need**. Of the 15 SEAs that are not primarily online, 12 allow individual districts to select their mode of administration, 1 (Florida) uses a hybrid model by only administering online tests at the secondary level, 1 (Kentucky) is in the process of transitioning from paper to online testing, and 1 (Tennessee) used PBAs to assess all students in 2019–20. In addition, 14 states use online tests for their EOC examinations at the high school level for select ELA, mathematics, science, and social studies courses, and 11 states use online tests in non-ELA and mathematics courses at the primary level. (See Appendix A for the full table of state assessment programs.) Many states that have successfully transitioned to 100 percent online testing have higher percentages of students residing in rural settings than does Texas (e.g., Georgia at 27 percent, North Carolina at 37 percent, Mississippi at 47 percent, and Wyoming at 29 percent).

FIGURE 1. Administration mode across states 2019–20.



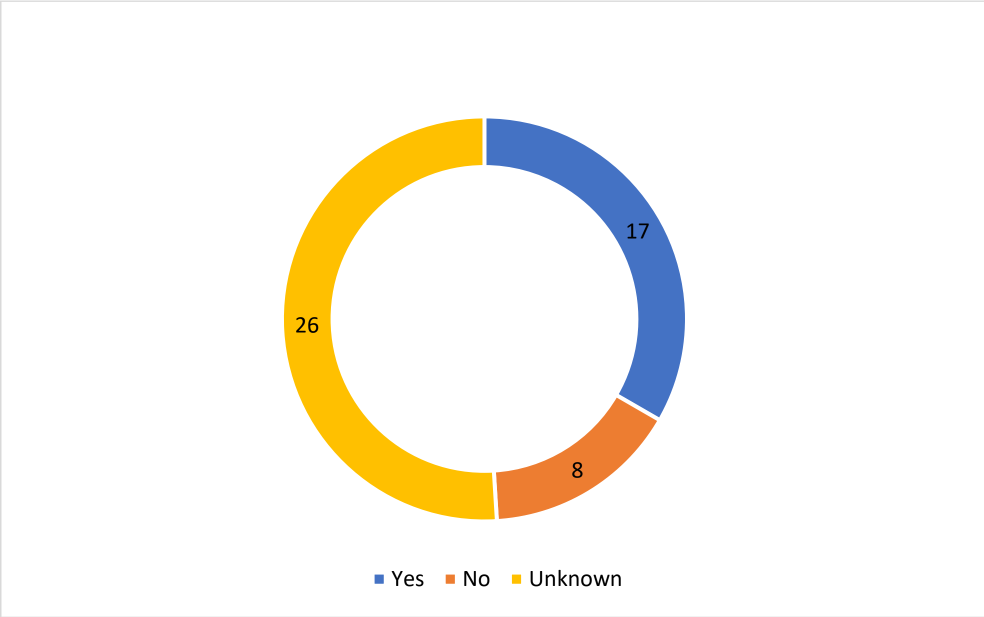
Currently, testing window length for administering online tests varies greatly across states (see Figure 2). Individual states administer different numbers of online tests across a variety of grade levels and subject areas. This variation, as well as the ratio of testing devices to students, affects how much time schools need to complete online testing. It should be noted that due to COVID-19 school closures in the 2020 spring semester, most states did not administer their summative tests. Some of these states consequently removed their testing calendars from their websites, which reduced the availability of data regarding testing-window length at the time of this study.

FIGURE 2. Online testing windows across states 2019–20.



As illustrated in Figure 3, 17 states were identified as having some form of interim or formative online tests. These interim and formative online tests can help teachers, students, and families acclimate to using technology-driven tests, as well as provide additional data to support decision-makers.

FIGURE 3. Online interim or formative assessments across states 2019–20.



Selection of States for Interviews

Following the examination of state online testing programs and review of state-level reports and legislation regarding those programs, the research team selected a small, purposeful sample of states for further investigation via interviews with SEA assessment experts. Six states (California, Florida, Georgia, Kentucky, Pennsylvania, and West Virginia) were identified based on their history with online testing, the structure of their individual assessment programs, and certain demographic factors (e.g., population size, urbanicity, poverty). These states are provided in Table 1, along with a brief rationale for each state's inclusion. The size, population, and student demographics of each of these states are provided in Table 2.

TABLE 1. States Selected for Interviews

State	Inclusion rationale
California	Large state with a diverse student population; long history of online testing
Florida	Large southern state with a diverse student population; only tests secondary grades electronically; provided state funds to districts to help them improve their readiness for electronic testing
Georgia	Long-time electronic testing state; gradual approach to implementation, sizeable rural population
Kentucky	Currently transitioning to online testing; uses online format for many examinations across grade levels and subject areas
Pennsylvania	LEAs are given the option of testing using paper or online tests; pockets of rural populations
West Virginia	Rural state; recent adopter of online testing; uses both computer adaptive and interim assessments

TABLE 2**.** State Statistics

State	Summative mode	Student pop. size (millions)	Land area (sq mi)	Students FRL*	Students in rural settings
Texas	Optional	5.4	261K	58.8%	16.4%
California	100% Online	6.0	156K	58.7%	5.8%
Florida	Hybrid	2.7	54K	58.4%	11.5%
Georgia	100% Online	1.8	58K	62.4%	27.3%
Kentucky	Transitioning	0.7	39K	56.9%	36.5%
Pennsylvania	Optional	1.7	45K	45.6%	18.8%
West Virginia	100% Online	0.3	24K	46.1%	42.4%

**Note*: Free and Reduced-Price Lunch; *Source*: Census.gov 2019 estimates; NCES 2015–16 statistics

Interviews with State Assessment Personnel

Researchers contacted assessment experts from the SEAs in these six states via email and requested an opportunity to interview them regarding their individual state's experiences with online testing, in hopes of better understanding how to successfully transition to 100 percent compliance. Personnel from five of the six states agreed to the interview requests; however, assessment officials from Kentucky were unresponsive.

Interviews were conducted, recorded, and transcribed via Zoom. These interviews followed a scripted protocol consisting of questions regarding (a) the structure of the state's online testing program, (b) the rationale behind that assessment program's structure, (c) how LEA readiness was ascertained and addressed, (d) the state's experiences in instituting its program, and (e) any advice respondents might choose to share with Texas regarding the move to statewide online testing.

Cross-State Summary

The interviews helped researchers paint a more in-depth picture of (a) what a statewide online testing program might look like, (b) what factors were influential in motivating states to enact their programs, and (c) the experiences of individual states during their transition to online tests. Interview respondents also provided recommendations for Texas to consider as the state moved to implement online tests on a larger scale. These four topics were used to organize the following cross-state summary of the information gained through the interviews with state assessment experts.

Assessment Program Structure

The five state assessment programs explored in the interviews employ a variety of assessment structures. California, Georgia, and West Virginia, for example, are primarily online and use online tests with students in ELA, mathematics, and science. Conversely, Florida operates under a hybrid assessment model and uses online tests with students in secondary grades only, while Pennsylvania LEAs can select which form (paper-based or online) they would like to use for their students' summative assessments. All five states employed supplementary online materials in addition to their summative online test (e.g., online practice questions, online interim or formative assessments). Four states (California, Georgia, Pennsylvania, and West Virginia) used interim or formative online tests, while Florida provided students with online practice tests for their EOC assessments. Historically, only West Virginia had previous experience with large-scale online testing prior to transitioning to this assessment mode for their statewide summative assessments. A large percentage of students in West Virginia had been given online writing assessments in grades 3–11, but the preexisting online testing programs in California, Georgia, Florida, and Pennsylvania had optional online components.

The assessment programs in these five states differed in other important ways as well. In Pennsylvania, the only state in which LEAs were permitted to choose the mode of administration, participation in online testing was much lower than in the other four states. Specifically, statistics provided by Pennsylvania assessment experts revealed that only about five percent of students in grades 3–8 were administered online tests in 2018–19, and participation in the state's high school online tests ranged from 9–12 percent in 2019. Another important difference among states was related to the grade levels and formats of the online tests. Florida, Georgia, and Pennsylvania use online EOC assessments with their students in select high school courses, while California, Georgia, and West Virginia were the only states that used online interim or formative assessments.

The five states featured in interviews either already had 100 percent of their students complete state assessments using online tests or have expressed a desire to do so. Florida and Pennsylvania fall into the latter category, representing the two states in the sample that are no longer pursuing 100 percent compliance with online testing due to the lack of public or legislative backing at the time of the interview. **The advantages of lower cost to the state, increased test security, and faster results from using online tests were mentioned multiple times by respondents from all five states.**

Motivation for Using Online Testing

When discussing why their states initially transitioned to online testing, the experts provided the following key motivating factors: (a) incorporating technological skills into their students' education; (b) lowering assessment costs for the state; (c) improving test security; and (d) speeding up the scoring process to get results back to schools, teachers, and students more expeditiously. A few experts also mentioned that there had been some pressure from their legislative bodies and state education leadership to "catch up" to other states that were already using online testing.

Interview respondents from all five states shared that their state education standards had previously been rewritten to incorporate 21st century technology or college and career readiness objectives prior to the state's transition to online testing. As such, these standards were expected to be a regular part of classroom instruction and student learning across elementary and secondary grades. Some state assessment experts, notably in Georgia, had referenced this when they received opposition from LEA officials and teachers regarding transitioning to online testing. **By already having technology-focused learning standards established, the addition of online testing represented a move toward streamlining the education experience for students and teachers**, instead of a drastic shift to a new education approach.

Interview respondents also asserted that using online tests offered states practical advantages, such as a comparatively lower cost of administration and increased test security. Printing, shipping, and security costs for PBAs, for example, represent a large expense that states could minimize by transitioning to online testing. Moreover, with online testing, there are no physical copies of the assessment to secure, access can be easily monitored by the computer program, and student responses are not recorded on forms that could be damaged or lost. Assessment experts consistently remarked that using online tests had simplified the administration and scoring process and eliminated many common problems that had plagued their offices prior to the transition. Respondents also stated that the test administration software had eradicated much of the cheating by students (and teachers) that they had encountered while using PBA. **The lowered costs and improved security of online testing were seen as two important advantages by all of the interviewed state experts.**

The last motivating factor to emerge from the interviews was one enjoyed not only by SEA officials but also by LEA officials, students, and their families. **The increased speed with which results from online testing were returned helped schools and teachers identify gaps in student understanding, often before those students left for summer vacation.** Some test items still require hand-scoring, but with online testing, the turn-around time from administration to scored results is significantly reduced, due to the elimination of collection and transportation of test materials. All the experts who were interviewed for this study mentioned that they had heard from stakeholders (such as students, families, teachers, and LEA officials), who appreciated that they could receive online testing results much faster than results from PBAs.

State Transition Experiences

The ease of transitioning from PBAs to online testing varied across the five states featured in the interviews. Experts from these states shared that they had encountered technical problems in the early years of using online testing. For example, West Virginia was forced to quickly transition from PBAs to online testing and had issues with unreliable internet access on many of its campuses. Stories of server crashes and vendor-related technical issues were recounted by the experts from Florida and West Virginia.

California and Georgia were both early adopters of online testing, but the two states had used a gradual transition plan with significant support to help LEAs successfully achieve 100 percent compliance. As a result, LEAs were able to overcome technological problems they encountered with increased support from the state or the testing vendor. According to one respondent in California, “Maybe 95 percent of districts went online that [first] year. Those remaining ones did take their time, but at least they felt like they had that option [of using paper-based tests].” **The districts that were immediately ready for online testing became early adopters, and attention was devoted to those districts with readiness gaps.**

To increase support for the impending transition to online testing, several states invested in building expertise among district and campus staff through large-scale training programs and the creation of helpful partnerships with stakeholders, especially between technology and testing staff. For example, California spent $10 million to train district and campus technology personnel prior to transition. West Virginia and Georgia also invested considerable resources to provide necessary training programs and test the adequacy of existing district and campus network infrastructure. **These investments helped increase buy-in and decrease reluctance among district and campus stakeholders to support the move toward 100 percent online testing.** Assessment experts from Florida and Pennsylvania, the two states that were unsuccessful in transitioning to 100 percent online testing, shared that they had faced intense push-back.

Gathering data about LEA readiness for moving to online testing was an important strategy employed by multiple states. In the year preceding its move to online testing, for example, Florida distributed the *Digital Classroom Transition Plan* to LEAs. This plan included a survey designed to gather important information about LEA readiness for online testing, as well as information for campuses regarding strategies for using computers and other technology in daily instruction. The information gathered from the survey helped the state identify LEAs that were lacking sufficient resources to facilitate online testing. Georgia also conducted a survey of LEA readiness prior to moving to an online testing model. The results of that survey were shared with the testing vendor, who was asked to work closely with the state assessment office to communicate with LEAs regarding what steps they were advised to take to close readiness gaps. Recommendations for increasing available bandwidth to campuses and advice on types of devices that would work best for testing were also provided to LEAs as they prepared for the transition.

Providing funding to help LEAs reach the goal of 100 percent online administration was a strategy employed in California, Georgia, Florida, and West Virginia with some success. In most states, priority was placed on improving internet connectivity prior to purchasing additional testing devices for students. In Florida, LEAs applied for and received funds to help them purchase devices, improve internet connectivity and speed on their campuses, and/or train personnel in using technology. According to the Florida assessment expert, LEAs were required to report how those funds were used, but the only accountability measure came in the form of an attestation of readiness for online testing from the LEA. In a report regarding the 2014 California Assessment of Student Performance and Progress field tests (Gao, 2015), researchers reported that much of the variation in LEA readiness to conduct online testing was connected to LEA size and expenditures. Larger LEAs and those that spent less per student were significantly less ready to transition than were their smaller counterparts or those willing to spend more funds. The study also found that despite concerns of technological unreadiness, many LEAs did not spend a large proportion of their state-apportioned implementation funds on upgrading technology; instead, they spent it on teacher training and instructional materials. An important conclusion of this study was that many LEAs would need ongoing financial support to reach complete readiness, and large, low-spending LEAs would be the least likely to meet benchmarks.

Infrastructural investment prior to the adoption of online testing was helpful in the transition from PBAs. Of the five states interviewed for this study, **three—California, Georgia, and West Virginia—sought to create a reliable, high-speed internet network for their LEAs prior to transitioning to online testing.** In Georgia, apparent inequalities of access to education technology at the campus level and within certain student populations were uncovered. Larger, urban LEAs seemed to struggle with these equity problems to a greater extent than did their smaller or more rural counterparts, due to the greater number of students needing to be assessed and the number of devices needed to do so in a timely manner. Additionally, it was discovered that students in lower grades were receiving less practice using technology when compared to students in higher grades within LEAs. The Georgia assessment expert communicated these concerns back to the district and campus leaders to facilitate better readiness across all campuses and grade levels in the state. The assessment expert from Pennsylvania shared that unreliable internet access was a major objection from LEAs resistant to online testing. So, although technical issues are not entirely unavoidable, **taking a measured approach to implementation and investing in infrastructure updates prior to the transition to online testing can help reduce the disruption to assessment caused by technological problems.**

The use of the existing FCC E-rate program, which provides federal grants to needy districts for improvement of internet access and campus infrastructure, was a priority for the states interviewed. **State-funded programs helped LEAs apply for federal E-rate support and often reimbursed qualifying LEAs for their expenditures.** In California, two distributions of state funds amounting to over $76 million enabled LEAs to complete network infrastructure projects. Additional funds supported training for technology personnel to implement online testing. State funding efforts such as Tools for Schools (West Virginia), Connections for Classrooms (Georgia), and the Digital Classroom Allocation (Florida) provided financial assistance to LEAs as they prepared for adoption of 100 percent online testing.

Resistance to moving to 100 percent online testing implementation centered around perceptions of disrupted instructional time and the high cost of transition. Objections in Pennsylvania and Florida were significant enough to cause both states to change course away from adoption of 100 percent online testing. In Florida, testing windows were initially lengthened at the request of LEAs to accommodate online testing administrations in which a limited number of devices were available. Although students' instructional time was not overly interrupted due to this longer window, a negative perception among families was impactful due to the misconception that individual students were testing for longer periods of time. Having a student-to-device ratio as close to 1:1 as possible was strongly encouraged to prevent the need for longer windows, but ratios of 2:1 and 3:1 were seen as indicators of readiness as well. In Pennsylvania, LEAs were concerned with the high costs of improving their technology and infrastructure to accommodate online testing. Ultimately, the state was forced to allow LEAs the choice of whether to use the newly created online tests or to continue with PBAs. Currently, less than 20 percent of students in the state are assessed with online tests.

Recommendations for Texas

When asked to provide guidance to Texas regarding the transition to online testing, the five assessment experts offered two helpful suggestions. First, officials from California, Florida, Georgia, and Pennsylvania **recommended setting 100 percent compliance as the goal and then remaining firm in that determination, while acknowledging that minor obstacles may occur**. Florida and Pennsylvania had both begun their move toward 100 percent adoption of online testing, but the transitions for both states were later deprioritized due to lack of broad support. California and Georgia made measured progress toward 100 percent compliance and supported districts that were struggling. Although California made the transition for their current test in two years beginning in 2013, its previous standardized assessment program had optional online components in place that helped LEAs prepare. In California, LEAs were expected to have 50 percent of their students assessed online in the first transition year and 100 percent in the second. The assessment expert from California related that 95 percent of LEAs were able to test online after the first transition year. Georgia established milestones of online testing percentages for LEAs to meet at designated checkpoints during the five-year scale-up to 100 percent adoption. The first year (2014–15), LEAs were expected to assess at least 30 percent of their students in grades 3–12 via online tests. The LEAs were also encouraged to begin this implementation with their populations of students with special education needs. By year 3 (2016–17), LEAs were expected to have at least 80 percent of their students in grades 3–12 complete online tests, and by year 5 (2018–19), they were expected to reach 100 percent. In West Virginia, early experience with an online writing assessment helped to ease the one-year expansion to 100 percent compliance with online testing in 2018–19. While each state established a different set of timelines and goals, the greatest determining factors include prior experience with online testing and the presence of resources and support needed to move towards 100 percent adoption.

Second, **providing state funds to help LEAs purchase the equipment they need to achieve readiness** was recommended. California and Florida LEAs were provided financial resources from the state, specifically meant to support their transition to online testing. Most of those funds were used to purchase devices such as tablets or laptops, but part of the funds were used to improve the campus infrastructure with more access points and other equipment. Georgia's Connections for Classrooms program allocated funding towards digital learning that positively affected online testing readiness, in which $13.5 million in state funds were awarded through an LEA application process, halfway through the state's transition period. The expert from Pennsylvania emphasized that since the state would be saving money with online testing, LEAs should also share in some of the financial windfalls. Campuses could use these funds to defray some of the costs of updating technology to prepare for the move.

Conclusions

Researchers analyzed state-level assessment programs and reviewed selected reports and legislation addressing online testing to identify a small group of states that merited further investigation regarding their transitions to 100 percent online testing. In interviewing assessment experts in California, Florida, Georgia, Pennsylvania, and West Virginia, researchers learned that the transition from PBAs to online testing with 100 percent compliance can be a challenging process. For example, California, Georgia, and West Virginia successfully transitioned to 100 percent online testing within their specified timeframe, but Georgia required a much longer timeline, and West Virginia was forced to lengthen test administration windows considerably to facilitate the adoption of online testing. Florida and Pennsylvania were unable to successfully transition to 100 percent online testing due to a lack of necessary infrastructure and to inadequate public support. The following key criteria were identified as essential for successful transition, based on responses from assessment officials in these five states:

- Goal of 21st century learning as impetus for move
- Breadth of support
- Prior experience with online testing

- Use of online interim or formative assessments
- Transition length
- Funding to ensure connectivity prior to transition
- Funding for devices and technology personnel

Successfully transitioning to 100 percent online testing requires broad support across the course of the transition; buy-in from district and campus leaders; and patience from teachers, students, and families. Funding opportunities that facilitate investments in two stages—first, internet connectivity and second, devices for students and training for personnel—can facilitate a smooth transition. Previous experience with online testing and the use of supportive online tools can also help to ease and shorten transition. Although moving from PBAs to online testing can be challenging, state assessment experts interviewed for this study agreed that the potential benefits of decreased yearly cost, increased test security, more responsive instruments, and faster turn-around of assessment results made the transition worthwhile.

Section 4. Statewide Survey Findings

A second component of this evaluation was the administration of an online survey to all Texas LEAs and campuses that administer STAAR to gauge current readiness regarding hardware, network infrastructure, and personnel. In addition, the survey assessed districts' and campuses' prior experiences with, and perceptions of, STAAR online testing. This section highlights the major findings from the survey. However, it is important to note that the survey was completed in May 2020 toward the beginning of the COVID-19 pandemic. Since then, funding sources (e.g., Operation Connectivity) have been established and district needs have changed. **Overall survey responses were combined with other data and analyses to create the cost estimations discussed in Section 6.**

Survey Development

Survey development was an iterative process. Feedback was solicited from TEA staff, ERC researchers, and district and campus focus groups from across the state. Focus group participants were recruited from state professional organizations involved in testing and technology (i.e., Texas Computer Education Association, Texas Statewide Network of Assessment Professionals, Texas Association of School Administrators, Texas K–12 Chief Technology Officers, and Texas Assistive Technology Network). The five focus groups were held virtually in March 2020 with representation from 11 LEAs across eight ESC regions. Focus group feedback sessions were not only used to refine and improve survey questions but also to improve survey functionality.

Survey Content and Administration

The online survey of districts and campuses was administered over a five-week period beginning in May 2020. Individual survey links were sent to each district and campus participating in the STAAR program, with weekly reminders to non-responding districts and campuses. Survey questions were designed to capture district and campus perceptions in three main areas: (a) network infrastructure; (b) personnel, staffing, and training; and (c) experiences with, and perceptions of, online testing. The district-level survey contained 41 questions in the following categories.

Categories	**Number of Questions**
Getting Started	2
Network/Infrastructure	14
Personnel/Staffing/Training	11
Financial	8
Experiences and Perceptions of Online Testing	6
Total	**41**

Due to the differing roles that districts and campuses assume in technology and assessment, the sections and numbers of questions were slightly different between the two instruments. The campus-level survey contained 32 questions in the following categories.

Categories	**Number of Questions**
Getting Started	2
Network/Infrastructure	12
Facilities/Hardware/Software	2
Personnel/Staffing/Training	10
Experiences and Perceptions of Online Testing	6
Total	**32**

A complete list of the district- and campus-level survey questions with summaries of responses is provided in Appendix C.

Survey Technical and Logistical Support

Researchers worked with district and campus personnel to identify appropriate personnel to complete the surveys and to confirm that survey links were received by the correct parties in each district and on each campus. Additionally, researchers supported districts and campuses via email and phone over the duration of the survey window, providing support with survey navigation and clarification on survey questions as needed.

Survey Participation

All 1,201 Texas LEAs that participate in STAAR were asked to participate in the survey. The initial window was four weeks for the LEA survey with a one-week extension for LEAs that required additional time. In addition to weekly reminders, TEA sent targeted emails and contacted LEAs to encourage participation. At the conclusion of the survey window, 901 LEAs had responded to the district-level survey, representing an overall response rate of 75 percent. An analysis of the demographics of responding and non-responding LEAs showed no categories in which the survey's sample differed significantly from the state, providing confidence that the survey's sample is representative of LEAs across the state. Appendix B provides comparison statistics for the final LEA sample compared to the state as a whole.

Campus-level surveys were also sent via email to 7,604 campuses. The initial window was four weeks for the campus survey, with a one-week extension for campuses requiring additional time to complete the instrument. Survey responses were received from 2,355 campuses for a response rate of 31 percent. Due to a lower than expected response rate, the campus survey results are reported descriptively but are not used to infer values for non-responding LEAs. Appendix B provides comparison statistics for the final campus sample compared to the state as a whole.

Survey Highlights

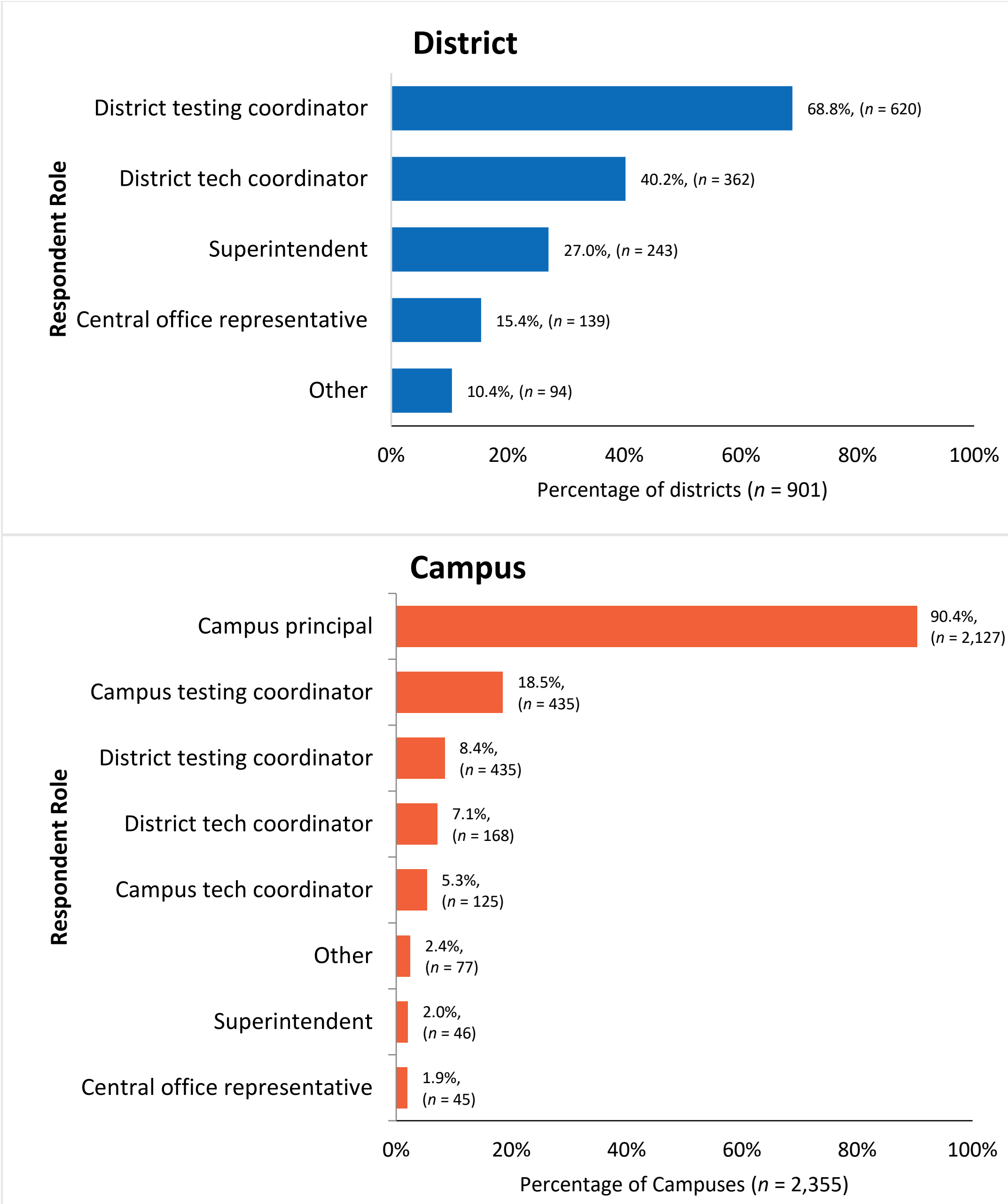
Highlights of the district- and campus-level responses are provided for each survey section below. Survey sections common to both surveys are discussed first (getting started, network/infrastructure, personnel/staffing, and experiences/perceptions of online testing), followed by the training (campus survey) and financial sections (district survey). The districts were provided additional questions to describe changes in readiness that were directly related to the ongoing COVID-19 pandemic. Appendix C contains full response data for both district- and campus-level surveys, with disaggregated data by ESC region and NCES Locale Category for survey question that research has shown to be strong indicators of online readiness.

Getting Started

The first two questions on both surveys asked respondents to indicate the role or roles of the persons completing the survey. Respondents could indicate multiple roles. In addition, respondents were asked to indicate the extent to which their individual district or campus participated in online testing during the 2018–19 school year. Additional questions regarding previous experiences with online testing were only displayed to districts and campuses that indicated that one or more groups of students had participated in online testing in 2018–19. A summary of the responses to the questions in this section of the surveys is provided below.

- For survey completion, district teams, including the superintendent, district testing coordinator, and district technology coordinator, were asked to collaborate with one another on survey completion to use the expertise of the various roles. One person in each district was responsible for submitting the completed survey.
- The majority of the district surveys were completed by teams consisting of testing coordinators (68.8 percent), technology coordinators (40.2 percent), and superintendents (27.0 percent).
- Campus surveys were completed by teams consisting mainly of campus principals (90.4 percent), with participation from campus testing coordinators and technology coordinators (23.8 percent). Figure 4 provides a breakdown of district and campus survey respondents by role, with respondents given the choice to select multiple roles.

FIGURE 4. District and campus survey participation by respondent role.



- Just over 50 percent of districts had STAAR online participation from students with and without testing accommodations. **A large majority of districts and campuses (over 80 percent) indicated that students requiring accommodations participated in online testing in 2018–19**.
- For students not requiring accommodations, STAAR online participation in 2018–19 was much lower, with just over half of districts (50.9 percent) and about one-fourth of campuses (26.4 percent) indicating that students not requiring accommodations participated in STAAR online testing.

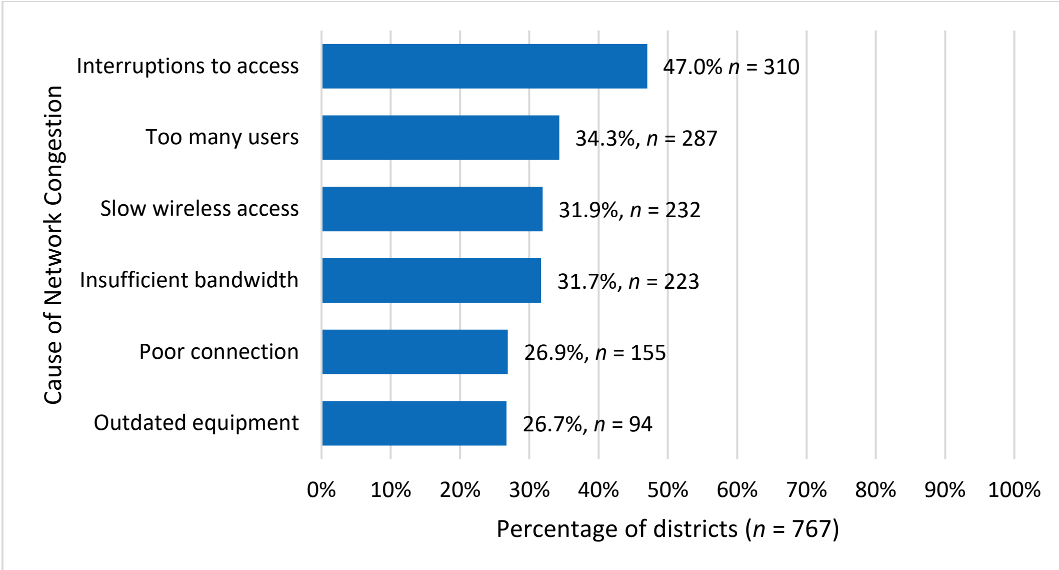
Network and Technical Infrastructure

Both district and campus surveys asked respondents to describe various aspects of their network infrastructure, including type of internet connection, as well as frequency of outages and sources of network congestion.

- With regard to type of internet connection, **a majority of responding districts and campuses indicated having a fiber connection** (85.8 percent of districts and 64.0 percent of campuses)**, with no responding districts indicating that there was no internet access on its campuses.** Correspondingly, a fiber internet connection is critical to a scalable broadband infrastructure (EducationSuperHighway, 2019). Of note, triangulation of external research conducted by EducationSuperHighway revealed that significantly more districts have fiber or have fiber underway (more detail available in Section 6).
- Over 60 percent of districts reported that their bandwidth presently meets the one Mbps bandwidth standard needed to successfully administer all STAAR assessments online. Around 30 percent of districts indicated that they would need two- to three-times more bandwidth to meet the recommended standard, while approximately 5 percent of districts indicated that their current physical connection cannot meet the recommended standard.
- Internet service disruptions, as well network congestion, can create obstacles to electronic testing. Over 60 percent of responding districts, however, indicated having a reliable internet connection with no internet outages lasting more than one hour in the prior year. An additional 30 percent of districts reported a slightly less reliable internet connection with monthly interruptions lasting more than one hour. **Only 2 percent of districts reported experiencing such outages on a weekly or daily basis.** A majority of districts (68.9 percent) do not have redundant Internet Service Provider (ISP) paths[1].
- Most districts (58.8 percent) do not have quality of service (QoS) technology to manage network congestion. Figure 5 shows the sources of reported network congestion for responding districts. Respondents could select multiple causes.

[1] A redundant ISP path is a situation in which an LEA has two internet connections from different service providers that, ideally, enter the facility from different directions.

FIGURE 5. Causes of network congestion for districts (as of May 2020).

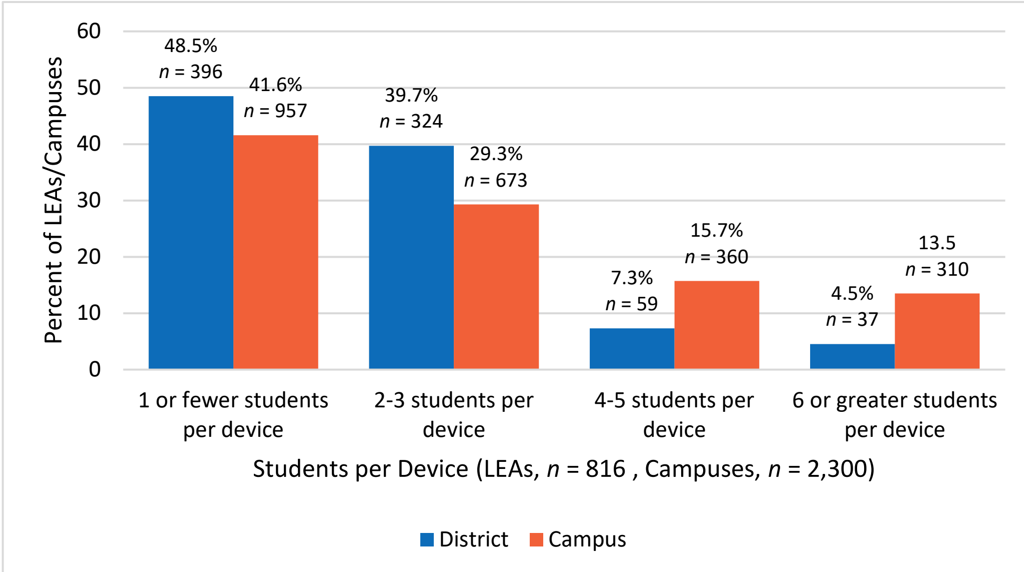


Facilities, Hardware, and Software

The survey questions focused on facilities, hardware, and software centered mainly around districts' and campuses' current numbers of devices that could be used for STAAR online testing, as well as numbers of devices needed for 100 percent STAAR online testing.

- Most districts and campuses reported relatively low student-to-device ratios. As of May 2020, nearly half of districts (48.5 percent) and campuses (41.6 percent) reported a student-to-device ratio of at least one student or less per device, with an additional 39.7 percent of districts and 29.3 percent of campuses reporting a student-to-device ratio of two-to-three students per device. These ratios reflect the findings of a recent national survey that reported 70 percent of schools nationwide have device ratios of one-to-two or fewer students per device (Consortium for School Networking, 2018).
- Variability was noted across student-to-device ratios between districts and their individual campuses, possibly indicating a difference among campuses within that district. One reason for this incongruity may be that campus-level technology grants or initiatives could bolster some campuses' ratios, while others within the same district might not have such funding sources. Figure 6 shows student-to-device ratio breakdowns in each category by district and campus.

FIGURE 6. Student-to-device ratios (as of May 2020).



- Although many districts have relatively low student-to-device ratios, districts across all ratio levels report needing additional devices for 100 percent STAAR online testing. This could be due to districts accounting for cycles of replacement and needed maintenance that will occur during the scale-up timeframe. Table 3 represents the number of devices needed by student-to-device ratio, as well as estimated numbers of devices needed for non-responding districts. **Note that since the onset of COVID-19, a total of $913 million has been invested by the state and LEAs towards remote learning, including learning devices and hotspots.** Triangulation of other data sources and ongoing initiatives resulted in final cost estimates that are discussed in the remaining sections of the report.

TABLE 3. Devices Needed by Student-to-Device Ratio (as of May 2020)

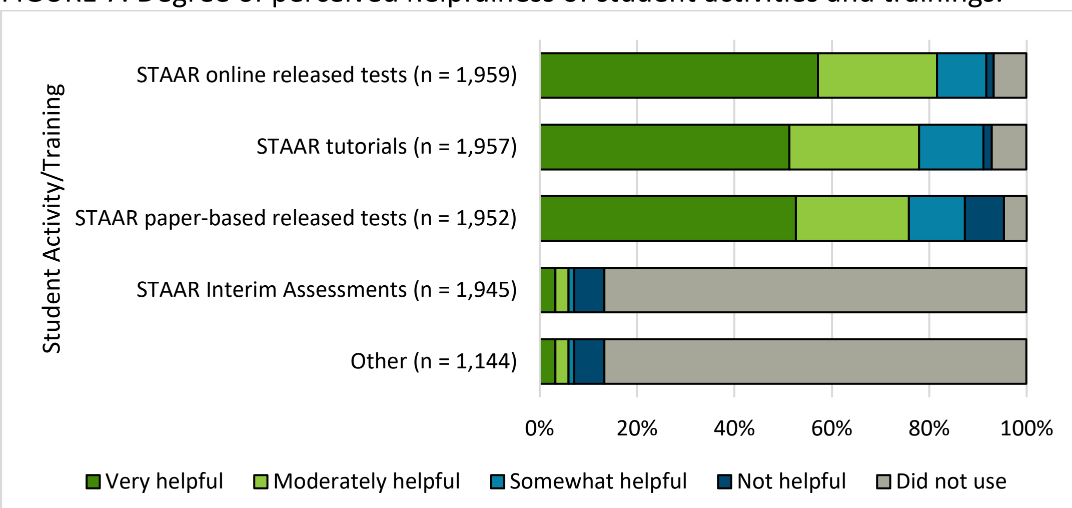
Student-to-device ratio	Devices needed: responding districts (*n* = 785)	Median devices needed
1 to 1 or fewer (*n* = 396)	435,998	100
2–3 to 1 (*n* = 324)	377,967	200
4–5 to 1 (*n* = 37)	64,140	213
6 to 1 or greater (*n* = 37)	66,283	229

Personnel and Training

The majority of the personnel and training questions were addressed only to districts and campuses that had participated in STAAR online testing in the 2018–19 school year. These questions focused primarily on the mode of information related to STAAR online testing accessed by districts and campuses (e.g., web-based materials, paper-based materials, etc.), as well as the sources from which the materials were provided (e.g., TEA, ESCs, LEAs). In addition, although districts were asked to estimate staffing numbers for 100 percent STAAR online testing, campuses were asked to provide information about the presence of on-site technology support staff.

- Both **districts and campuses found in-person trainings and STAAR online testing manuals to be the most effective modes of delivery for information and tools for STAAR online testing**, while both found webinars and online training modules to be less helpful. In contrast to their perceptions of web-based sources of information being less effective overall, both districts and campuses indicated wanting more STAAR online testing information from web-based sources, compared to in-person and paper-based sources.
- Regarding the effectiveness of sources of information for STAAR online testing, districts and campuses found district testing coordinator information to be the most effective, followed by information from TEA and ESCs.
- A final important source of information for STAAR online testing was focused on identifying activities or trainings that campuses found to be most effective in preparing students for STAAR online testing in 2018–19. Figure 7 provides a detailed breakdown of the perceived effectiveness of each student-related resource.

FIGURE 7. Degree of perceived helpfulness of student activities and trainings.



- Responding districts indicated needing one to four additional technology personnel, on average, for 100 percent STAAR online testing, while the greatest area of need for non-technology personnel was for test administrators. Despite the increased non-technology personnel needs reported by districts, over half of the responding campuses (53.3 percent) reported that they did not hire and/or reallocate personnel resources for STAAR online testing in 2018–19.

Financial Considerations

The district survey included questions that asked respondents to report annual and one-time costs in three main areas for the previous fiscal year (2018–19) and for the fiscal year at the time of the survey administration (2019–20). Additionally, the survey asked districts to report their anticipated spending for the next four fiscal years to support transition to, and maintenance of, 100 percent STAAR online testing. These questions focused on hardware, network infrastructure, and personnel costs. A full breakdown of relevant costs for responding districts is discussed in Section 6 of this report. In addition to financial estimates, districts that participated in STAAR online testing in 2018–19 were asked to provide sources of funding that could be used for technology to support electronic testing. Figure 8 provides an overview of how districts were asked to complete the financial questions.

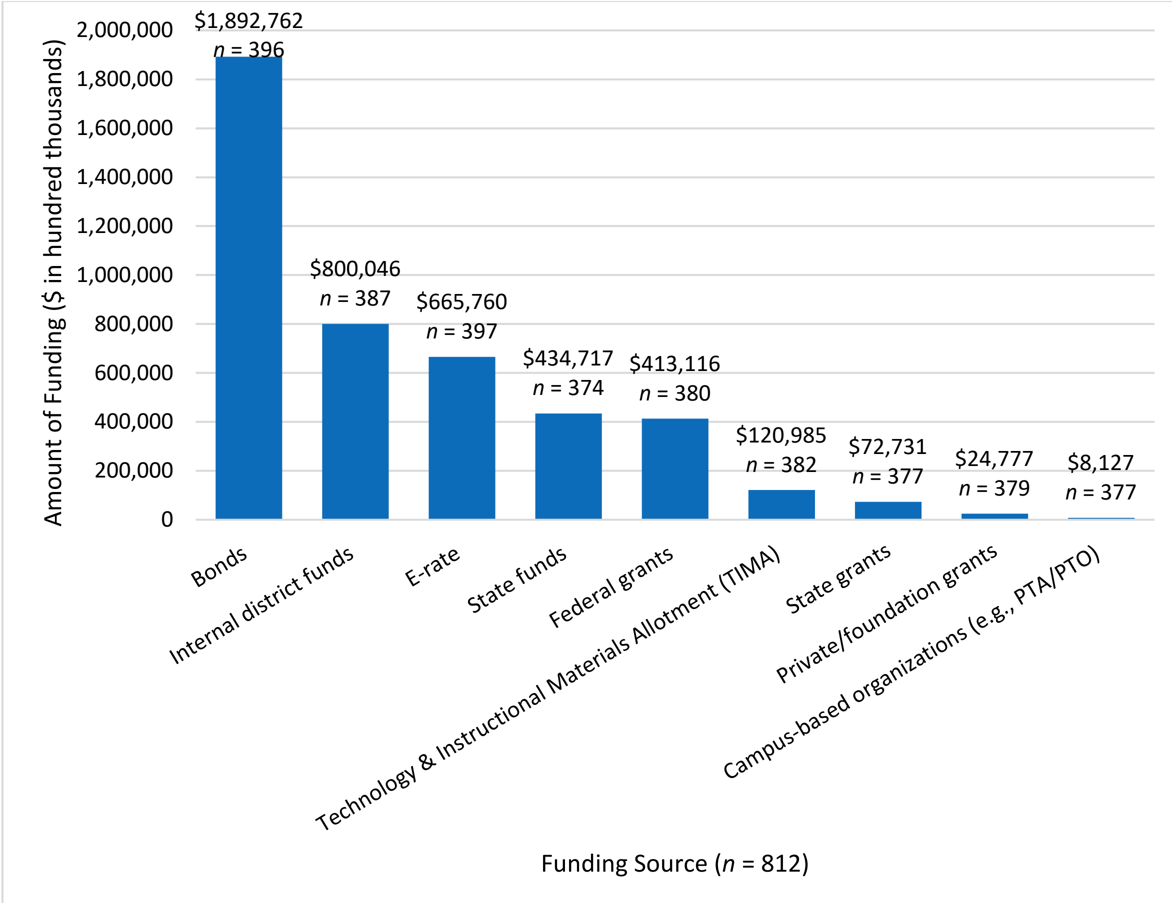
FIGURE 8. Guidance on financial question completion.

Major cost categories	Hardware, network infrastructure, personnel
Fiscal years for reporting	Baseline fiscal year: 2018–19 Scale-up fiscal years: 2020–23 Maintenance year: 2023–24

- District self-reported hardware costs included funds needed for resources such as new end-user device purchases, replacement and maintenance of devices, and assistive technology devices. Due to differentiation in districts' numbers of students and device needs, quite a bit of variability surfaced in these data overall.
- Network infrastructure costs included pre-E-rate costs for things such as broadband and DSL service and network equipment and maintenance, as well as internal connections such as cabling, switches, routers, firewall, and wireless access points.
- Finally, personnel and training included the addition of technology or testing personnel to administer and coordinate online testing, training for test coordinators and administrators, and costs related to temporary personnel hired to prepare for, or support, STAAR online testing.
- The largest funding sources for technology that could be used for online testing originated from school bond and internal district funds, followed by E-rate and state funds. Figure 9 provides a breakdown of median funding amounts by funding category. Respondents could select multiple funding sources.

It is important to note that the survey was completed in May 2020 toward the beginning of the COVID-19 pandemic. Since then, funding sources (e.g., Operation Connectivity) have been established and district needs have changed. **Overall survey responses were combined with other data and analyses to create the cost estimations discussed in Section 6.**

FIGURE 9. Median funding amounts by funding category.



Experiences with, and Perceptions of, Online Testing

A final set of questions asked district and campus respondents to reflect on the extent to which they agreed with items that were suggested as potential advantages and disadvantages of 100 percent STAAR online testing. In addition, districts and campuses that participated in STAAR online testing in 2018–19 were asked to provide specific feedback on online administrations. All district and campus survey respondents were asked to provide any additional feedback they could offer regarding the transition to 100 percent STAAR online testing. **A majority of responding districts (68.2 percent) and campuses (57.0 percent) were in agreement that the advantages of STAAR online testing outweigh the disadvantages.**

- District and campus respondents were in alignment on the perceived advantages and challenges of 100 percent STAAR online testing. Both groups perceived that for 100 percent STAAR online testing, the **greatest advantages would be the potential for faster results and accommodation supports for students**, while the **greatest perceived challenges were provisions for backups or alternatives in the event of system failure and an increased technology burden** on LEAs and campuses. Figures 10 and 11 provide a breakdown of LEA perceptions of the advantages and challenges of STAAR 100 percent electronic testing.

FIGURE 10. Degree of perceived advantages of STAAR online testing (as of May 2020).

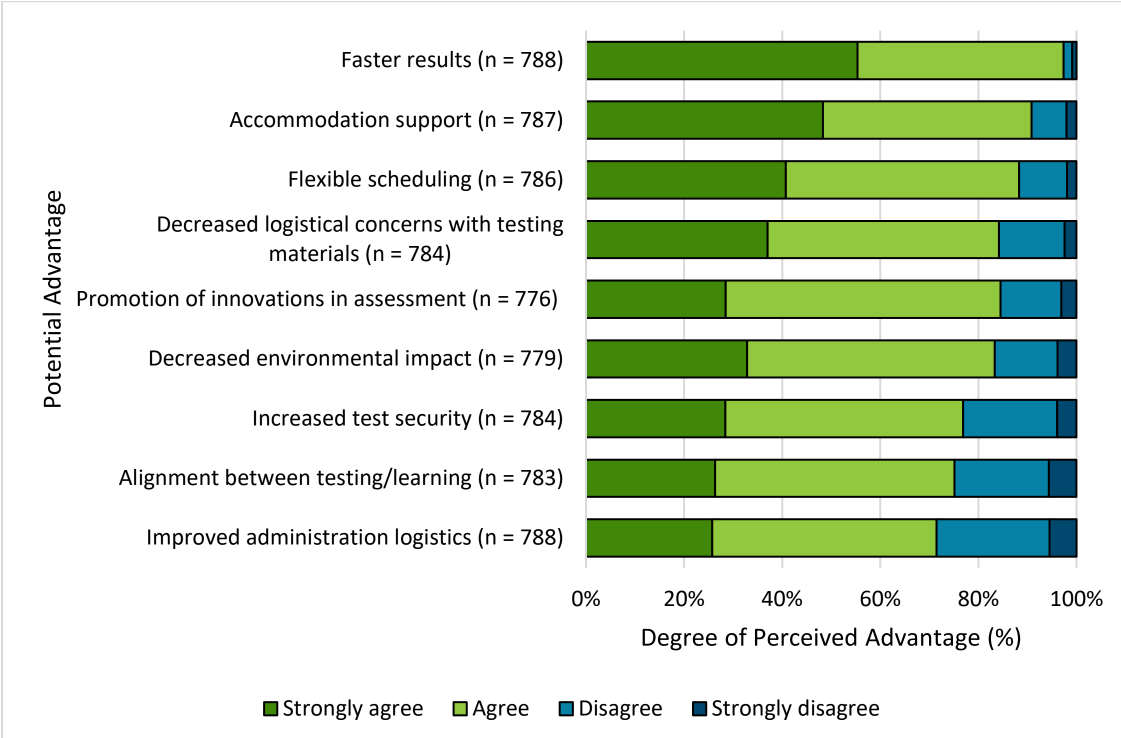
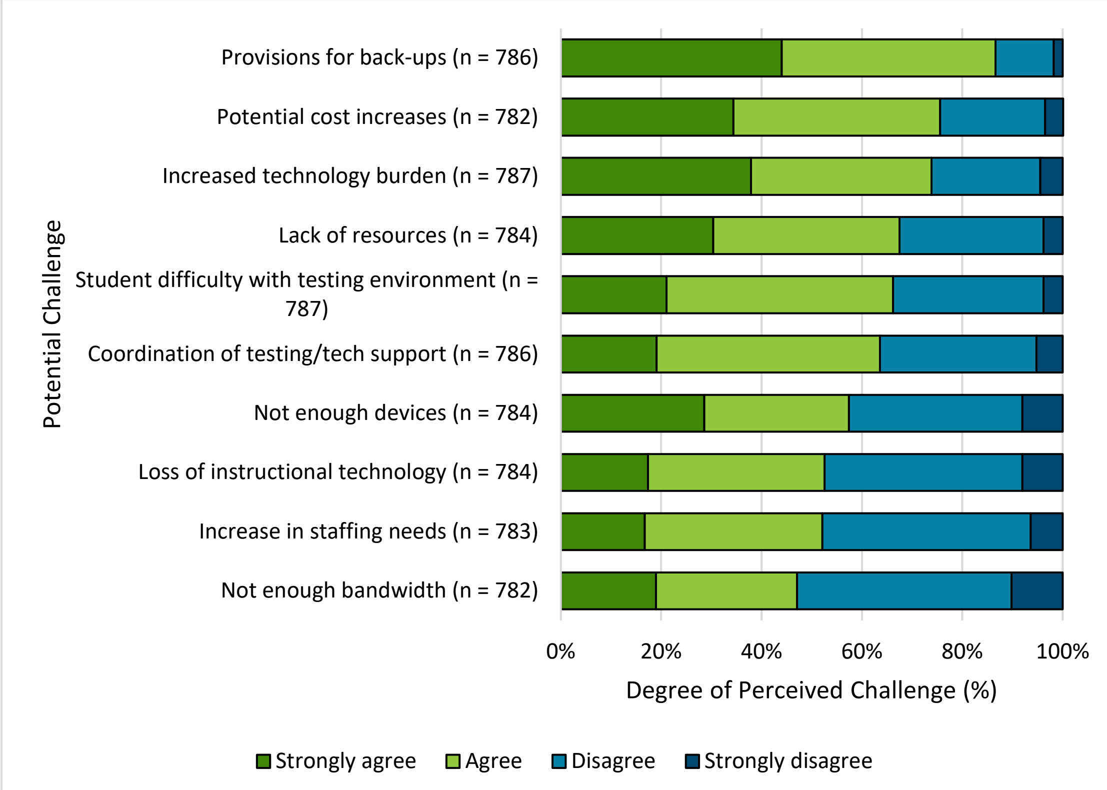


FIGURE 11. Degree of perceived challenges of STAAR online testing (as of May 2020).



Note: Given that the survey was disseminated at the beginning of the COVID-19 pandemic, significant investments have been made since then by LEAs and the state to acquire 2.5 million learning devices.

The LEAs and campuses that participated in STAAR online testing in 2018–19 were asked to provide feedback on STAAR online administrations. Specifically, those participating in 2018–19 STAAR online testing were asked to give feedback in regard to training, information, or resources for STAAR online testing.

- A **majority of responding LEAs and campuses suggested that more training for teachers and students is necessary for successful STAAR online testing**. Well over 50 percent of respondents (LEAs: 72 percent; campuses: 66 percent) discussed various aspects of the need for increased and improved training for teachers and students.
- Despite the fact that STAAR online testing training is already required for all test administrators, many responses focused on required teacher training for test administration, while other responses highlighted the need for teachers to participate in the STAAR online environment in the same manner in which a student would, for improved troubleshooting.
- Responses focused on student training underlined a need for increased online testing practice resources for students to have adequate time and opportunities to experience an online testing environment prior to STAAR online testing.

The final question on both surveys gave LEAs and campuses the opportunity to provide additional feedback regarding a move to 100 percent STAAR online testing. A majority of responses from both LEAs and campuses focused on concerns around student performance in the STAAR online testing environment compared to a paper-based testing environment.

- About 40 percent (181 out of 433) of the LEAs responding to the final question expressed **concerns around providing teachers and students with greater awareness and practice with STAAR online testing accommodation supports**.
- **Campuses expressed more general concerns about the appropriateness of a 100 percent STAAR online testing environment for all students,** with 40 percent of the respondents (499 out of 1,238) suggesting that many students may not perform similarly in an online testing environment. Many of these responses specifically mentioned younger students, so it may be that elementary campuses share a greater concern in this area than do middle or high school campuses.

Detailed summaries of all district- and campus-level responses are provided in Appendix C.

Section 5. District Case Study Findings

Qualitative case studies across eight LEAs were conducted to balance the statistical, quantitative data gathered via the online LEA and campus surveys and provide an illustration of the state's readiness for 100 percent STAAR online testing. Through in-depth interviews with administrators and teachers and open-ended responses to LEA and campus surveys, researchers captured participants' perceptions of the benefits and issues related to the transition to 100 percent STAAR online testing in Texas. This section highlights themes pertinent to all eight LEAs and frames them in the words of the interview respondents.

Participants

A multi-step process was followed in identifying and recruiting LEAs and campuses to participate as sites for a cross-case examination of LEAs' readiness for, and attitudes regarding, 100 percent STAAR online testing. In the first step, the 20 ESCs across the state were sorted into groups of two–three contiguous regions, and demographics, geographic area, enrollment counts, and economic information for each LEA within the region were examined. A group of potential participant LEAs was developed and shared with TEA. Invitations were extended to potential sites, and a final group of eight LEAs was chosen based on those that accepted. Consideration for an individual LEA's participation as a case study site included the following characteristics or features:

- geographic region
- NCES/TEA LEA type (size and urbanicity)
- student population and diversity
- rate of participation in STAAR online testing in 2018–19

The concluding cadre of participating LEAs comprised a diverse cultural, linguistic, racial, occupational, and regional mix that reflected the State of Texas as a whole.

Each of the eight LEAs provided names and contact information for district-level interview participants, as well as a list of campuses for inclusion in the study. Campuses, in turn, provided contact information for recommended interviewees. Using district- and campus-level interview protocols developed specifically for the study, a four-person team of **researchers conducted 159 interviews** with district and campus personnel in summer 2020. Interviews were originally planned as face-to-face encounters, but due to the COVID 19 pandemic and resulting quarantine, researchers embraced technology and conducted the interviews via Zoom.

Characteristics of each LEA are discussed below.

Aldine ISD is a large suburban LEA located in the southeast area of the state. The LEA serves portions of the City of Houston and unincorporated Harris County. With an attendance zone of 111 square miles, Aldine ISD educates **almost 67,000 students** on its 82 campuses, including 51 elementary schools, 14 middle or junior high schools, 5 ninth-grade schools, and 10 high schools. Researchers interviewed LEA technology personnel, as well as campus-level administrators and teachers, from one elementary, one middle, and one high school campus.

Bastrop ISD is a small, rural LEA located on the eastern edge of the Texas Hill Country in the City of Bastrop, which is part of the Greater Austin Metropolitan area. The LEA educates approximately **11,000 students** in six elementary, four middle/junior high, and four high school campuses (including one collegiate academy). Researchers interviewed district-level technology and assessment personnel, as well as campus teachers and principals, from one elementary campus, one middle/junior high school campus, and one high school campus.

Dallas ISD is a large urban LEA located in the northern part of the state. With an attendance zone of almost 400 square miles, Dallas ISD is the second largest LEA in the state and the 14th largest LEA in the United States, educating approximately **154,000 students** in 151 elementary, 41 middle, and 45 high school campuses (including academies and magnet schools). Researchers interviewed district-level technology and assessment personnel, as well as campus-level administrators and teachers, at two elementary campuses, two middle school campuses, and two high school campuses.

El Paso ISD is a large urban LEA located in west Texas on the Texas/Mexico border. With an attendance zone of approximately 253 square miles, El Paso ISD is the 12th largest LEA in Texas, educating over **57,000 students** on 89 campuses, comprising 55 elementary, 15 middle, and 10 traditional high school campuses (plus 4 specialty schools, 4 alternative schools, and 1 Pre-K–8 school). Researchers interviewed district-level technology and assessment personnel, as well as campus-level administrators and teachers, at one elementary/intermediate and one middle school campus.

Harlingen CISD is a mid-sized LEA located in southeast Texas in close proximity to the Texas/Mexico border. The LEA serves the cities of Harlingen and Palm Valley, as well as portions of unincorporated Cameron County. With a student population of over **18,500 students,** Harlingen CISD is composed of 17 elementary school, 5 middle and junior high school, and 7 high school campuses (including a freshman academy and an early college high school). Researchers interviewed district-level administrators and technology professionals, as well as campus-level administrators and teachers, from one elementary, one middle, and one high school campus.

IDEA Public Schools is a public charter LEA established according to Texas charter school law. Tuition-free and open to all students, charter LEAs make up 15.1 percent of K–12 public LEAs in Texas. Beginning as one small school with only grades 4–8 in 2007, IDEA has grown to comprise 19 elementary/secondary campuses, 37 elementary campuses, and 19 middle/junior high campuses educating close to **43,000 students,** primarily in the Rio Grande Valley and the Fort Worth, Houston, Austin, San Antonio, and EL Paso metropolitan areas. Researchers interviewed district-level assessment and technology personnel, as well as campus-based administrators and teachers, from one elementary and three elementary/secondary campuses.

Pampa ISD is a rural LEA located in the Texas Panhandle, about 60 miles northeast of the City of Amarillo. The LEA serves the City of Pampa (second largest city in the Texas Panhandle), as well as portions of Roberts County. Pampa ISD educates over **3,700 students** in four elementary, one junior high, one high school, and one Learning Center campuses. Researchers interviewed district-level assessment and technology personnel, as well as campus-based administrators and teachers, from one elementary, one junior high, and one high school campus.

Ysleta ISD is a major urban LEA located in El Paso, on the Texas/Mexico border. The LEA educates over **41,000 students** in 38 elementary, 9 middle/junior high, and 11 high school campuses (including an early college high school and Plato Academy). Researchers interviewed district-level administrators and assessment personnel, as well as campus teachers and principals, from one elementary, one middle, and one high school campus.
Table 4 provides an overview of the demographic characteristics of the eight LEAs selected as case study sites.

TABLE 4. Participating LEA Overview

LEA	Characteristics	2018–19 LEA enrollment	Student ethnicity (by percent)		Percent LEP	Percent economically disadvantaged
Aldine ISD	• Large • Major suburban • Geographic location: Southeast Texas	66,763	African American American Indian Asian Hispanic White Other	22.7 0.3 1.1 72.7 2.4 0.8	35	87
Bastrop ISD	• Mid-sized • Independent town • Geographic location: South Central Texas	11,043	African American American Indian Asian Hispanic White Other	3.7 0.2 0.4 67.4 25.3 3.0	28	71
Dallas ISD	• Large • Major urban • Geographic location: North Texas	155,030	African American American Indian Asian Hispanic White Other	22.0 0.5 1.3 69.6 5.6 1.0	45	86
El Paso ISD	• Large • Major urban • Geographic location: West Texas border	57,178	African American American Indian Asian Hispanic White Other	3.4 0.2 1.2 83.7 9.4 2.1	30	75
Harlingen CISD	• Mid-size • Central city suburban	18,574	African American American Indian Asian Hispanic White	0.5 0.1 0.1 93.4 5.3	14	8

	• Geographic location: Southeast Texas border		Other 0.6		
IDEA Public Schools	• Charter • Multiple locations	42,748	African American 4.1 American Indian 0.1 Asian 0.7 Hispanic 90.5 White 4.0 Other 0.6	36	87
Pampa ISD	• Small • Independent Town • Geographic location: Texas Panhandle	3,536	African American 3.2 American Indian 0.3 Asian 0.5 Hispanic 48.7 White 44.1 Other 3.2	17	60
Ysleta ISD	• Large • Major urban • Geographic location: West Texas border	41,036	African American 1.4 American Indian 0.2 Asian 0.3 Hispanic 94.7 White 3.1 Other 0.3	27	80

Themes

Data were collected from two sources for the case studies: participant interviews and responses to open-ended questions on an online survey of LEAs. The research team conducted an inductive analysis of the data, in which themes emerged from participants' words and were subsequently sorted into two categories: "Benefits of Online Testing" and "Challenges of Online Testing." The next two sections comprise a discussion of findings from the case studies, with benefits and challenges described in order of their impact on students, from highest to lowest.

Benefits of Online Testing

Most of the campus-based and LEA personnel interviewed for this study expressed positive perceptions in regard to 100 percent STAAR online testing. Very few of the people who were interviewed expressed negative perceptions in regard to online testing. What was evident across all interviews was that for most participants, the **long-term benefits after the transition to 100 percent STAAR online testing would be worth the investment of time and effort** required prior to and during the transition. This section highlights the seven themes of benefits respondents believed would accrue from the transition to STAAR online testing.

Offers rapid results. Respondents from all LEAs concurred that a more rapid turnaround of scores would be an advantage conferred by STAAR online testing. Interview participants were very positive about the idea of receiving the results in an expeditious manner, which would give them "a bigger window" in which to address the needs of the students who were unsuccessful, in a "quicker, more targeted, and effective manner." Educators believed that this would limit the number of students who were unsuccessful a second time, and the possibility of reducing wait time for their students also provided motivation for respondents to support STAAR online testing.

Supports different learning needs. Educators from some LEAs expressed that the STAAR online assessments support special needs students in ways that PBAs often do not, through embedded supports such text-to-speech. Some participants reported that the success their special needs students have already experienced with online testing gave respondents confidence that other students will be successful as well. Observing the advantages that the online environment has provided for special needs students has also given educators a glimpse into how all students might benefit from 100 percent STAAR online testing, and respondents wZoho had had prior experiences in different states that already use online testing asserted that “It can be done—and it can be done well.” Other educators spoke positively about the possibilities of online assessments because of the amount of support they provide to special needs students.

Prepares students for future academic and professional experiences. With very few exceptions, respondents across the districts agreed that STAAR online testing is, in a way, a rehearsal for their students’ futures and the nature of the world and workplaces that lie ahead of them. The majority of the teachers, administrators, and district personnel believed they would be doing students a great disservice if the transition to online testing was not accomplished. For participants from one LEA, online testing was considered a pathway toward school improvement that would trigger both expected and unexpected benefits for the students. Many respondents discussed how students today use technology on a daily basis. Technology has become a source of information and entertainment and a way to connect with others, and moving to an online system aligns with students’ lived experiences. Participants believed that technology is the future, and they need to prepare their students for that future in the best way they can.

Decreases opportunity for testing irregularities. According to respondents from many districts, STAAR online testing has the potential to relieve school-based educators of logistical and security concerns associated with PBA. Although students will still need to be properly supervised while completing online tests at school, the additional logistics required for secure handling of test booklets and coding of boxes required for PBAs will be eliminated. In addition, test administrators will be relieved of traditional worries surrounding the secure delivery of the completed state examination booklets to their designated places.

Decreases personnel concerns related to test administration. Respondents from most districts agreed that the transition to STAAR online testing would improve test administration for their district. Large-scale administration of official paper-based state assessments requires the re-scheduling of nearly every faculty member in any school building and extensive advance coordination of efforts. The heavy responsibility on teachers, support staff, and administrators (including librarians and technology, physical education, and art teachers) means an increased likelihood of human error. The stressful atmosphere around PBAs and the fear of making mistakes raises anxiety levels of all those who participate, including students.

Challenges of Online Testing

Need for student technology skill development. While the prevailing wisdom is that today's students are all more technologically skilled than students were in the past, many district respondents noted that their students were more competent in using their phones than they were in using an actual computer; and although students may be adept at texting, they tend to "type with their thumbs, not with their fingers," which makes it challenging for them to write essays on the computer. In addition, some respondents believed that their students from low-income families may have less access to technology at home than do students from more affluent environments and expressed concern regarding ways to overcome those inequities. One suggestion provided was that schools may need to start requiring additional classes in keyboarding and other basic technology skills.

Need for student experience and training in the online testing environment. Respondents from some LEAs shared that they would feel much more confident about students' potential for success with a STAAR online test if students were provided with regular, consistent opportunities to prepare by practicing on a platform similar to the "unique" platform used for the actual STAAR online test, as well as by using devices similar to the ones they will use for the actual testing. One participant, for example, asserted: "[You] can't have Kindles in the classroom and then computers for testing." Although some LEAs reported participation in the STAAR Interims, interview participants believed that that experience is not enough. They wanted their students to have access to a platform that would give them the opportunity for regular daily practice with "all the bells and whistles of STAAR" and sample questions that look like the questions will look on the actual STAAR online test. In addition, educators expressed that there was a need for additional text-analysis approaches to enhance students' success in the online testing environment. Respondents from some districts shared that they had developed successful methods for students to practice on PBAs and believed that more approaches should be developed that their students could use for successful STAAR online testing. Although some teachers, for example, reported that they had implemented different resources for online highlighting and notetaking, they worried that some students won't be successful using the annotation features built into the STAAR online assessments.

Increased technology demands. Across the interviews, participants agreed that equitable access to functioning technology for all students is an essential goal that must be addressed before the transition to 100 percent STAAR online testing can be successful. Respondents in most LEAs discussed critical components of technology upkeep and planning, noting that the purchase of new equipment and replacement or maintenance of existing equipment is a huge financial burden for LEAs, particularly for high-poverty LEAs. In addition to the need for functional computers, many participants expressed that successful online testing will be contingent, to some extent, on additional resources and auxiliary equipment, such as headphones, dividers for privacy shields, screen shields, etc., and asserted that costs for upkeep on computer chairs, computer labs, charging carts, and headphones must also be included in the budget. Finally, still other educators expressed that connectivity is a critical and often expensive step toward utilizing technology for assessment, with a few worrying that connectivity issues could create "almost insurmountable obstacles" to successful implementation of STAAR online testing in their individual LEAs.

Need for parent training and support. Teachers, administrators, and counselors from more than half of the case study LEAs thought parent education, particularly parent education "initiated by TEA," would be a "positive" way to prepare for STAAR online testing. Categorizing issues related to achieving a successful transition to online testing into three buckets—computers, the internet, and parents—some educators asserted that parents were the essential component. Parents, however, need training to understand how they can support their students in transitioning to the STAAR online testing environment. One respondent saw this as an opportunity for TEA to encourage a stronger partnership with schools and parents.

Increased demands for testing and technology personnel. The need for more testing personnel emerged as a general concern for several interview participants in discussing the transition to 100 percent STAAR online testing, with participants from some LEAs pointing out that their districts do not have extra personnel available for testing. Several respondents also indicated that their LEAs don't have the technology personnel needed to support 100 percent STAAR online testing. Although most LEAs have personnel dedicated to technology, some teachers and administrators expressed that the number is inadequate for district and campus needs. It's not unusual for a technology support person to be dedicated to more than one campus, and several participants described a time-consuming process for getting support that involves submitting "a ticket" and waiting "one day or one week" for the issue to be resolved. Respondents from a few LEAs, however, asserted that technology personnel in their districts were prompt and helpful in responding to their needs: "You can call for help with a problem. . .and have someone visit you before the end of the day." This support, in turn, enabled teachers and administrators to better meet the needs of their students.

Test security and oversight. Respondents from most of the LEAs shared concerns about potential security of STAAR online tests. Participants related that online testing security is one of the major components of the training they receive regarding the testing process, but they still felt anxiety and uncertainty about the issue. They did not understand how test security will work in an online environment and expressed that they had not received a satisfactory explanation of how a "secure test" will be achieved. Some teachers and administrators did not realize that the assessment platform already includes a feature enabling test administrators to "lock students' screens" or "block students from opening additional tabs." Still other respondents were unaware that testing security and support could be enhanced by the addition of a system to monitor the status of students in real time, as they were completing the STAAR in an online environment. They believed that these features would allow educators and technology support personnel to observe students' progress through their individual assessments, watch for potential issues, and determine the speed with which students are completing the test.

Unexpected Consequences of the COVID-19 Pandemic

Several of the case study interview questions explored educators' perceptions regarding the impact of COVID-19 on district technology and network infrastructure, as well as on online testing and learning. Some interview respondents believed that the outbreak of the virus had forced LEAs to "deploy technology" in ways they would not have considered prior to the pandemic, compelling people to access technology and the internet. Correspondingly, many LEA and school personnel described the COVID-19 situation as a "wake-up call," noting that they and their LEAs would never be able to return to "the old normal." At the same time, however, some educators believed that the pandemic had exposed inequities among campuses and LEAs in regard to technology and infrastructure. Respondents from LEAs across the study described discrepancies in distribution of devices between grade bands and uneven device access within families.

Overall, educators' perceptions regarding the impact of the COVID-19 pandemic on online testing and learning were positive. Some participants asserted that teachers' opposition to 100 percent STAAR online testing will be reduced once the pandemic ends, and moving forward, educators will be "more accepting" of 100 percent STAAR online testing because they used technology to such a great extent during the pandemic. Teachers who had previously resisted technology and online teaching and learning now understood its importance, and one administrator related that many teachers who were previously "a little reluctant" to incorporate technology or even interactive technology, had now started to explore ways to use it. Finally, most of the educators who participated in the interviews believed that they, their LEAs, and their administrators were encouraged and supported to master new technology skills during the pandemic, that they would not have otherwise learned.

Summary of Participants' Perceptions

A review of the challenges expressed by LEA and campus personnel who participated in this study indicates that interview respondents, to some extent, hold misconceptions regarding the current state assessment program, as many of the concerns they discussed have already been addressed. For example, **the online testing management interface already allows for monitoring technology and students on the same platform, with the result that only one proctor is necessary per 30 student test-takers**. The most serious concern expressed by participants in relation to the transition to a 100 percent STAAR online testing system is in regard to test security. **Many interview participants confessed to having anxiety and uncertainty about security for the STAAR online tests, despite having received extensive training on that very subject. Respondents offered several suggestions for enhancing security, such as adding features to the assessment platform that would allow test administrators to "lock students' screens" or "block students" from opening additional tabs—features that are already available for the STAAR online tests. In fact, given these features, STAAR online tests are more secure than PBAs.** For a comprehensive list of what the TEA assessment division already provides in STAAR CBA training and best practices, as well as other topics such as security and embedded supports and accommodations, see Appendix D.

Researchers for this study conducted 159 in-depth interviews with district-level assessment and technology personnel and campus-level administrators and teachers in eight districts across the State of Texas. Many interview respondents shared concerns related to perceived external or systemic issues that may create challenges to a successful transition to 100 percent STAAR online testing, but they also produced some helpful suggestions and potential solutions. The suggestions and solutions are rooted in educators' desire to do what is best for students, as well as the hope that support and resources provided during this transition to 100 percent STAAR online testing will ensure success for students and their families. At the same time, educators across all levels expressed feelings of excitement and anticipation for the transition. They are ready for the "push" and believe that "technology is our future, and we need to prepare our students."

Section 6. Evaluation and Cost of Achieving Readiness for STAAR Online Assessment

The purpose of this section is to estimate and evaluate baseline costs of achieving 100 percent online testing, apart from the availability of current funding sources (which will be discussed in more detail in Section 7).

Following analyses of survey results, consideration of state benchmarking findings, and further review of existing literature, three broad areas of LEA readiness for STAAR online testing were identified: (a) hardware readiness, (b) personnel readiness, and (c) internet connectivity readiness. Although a myriad of factors could impact readiness for online testing, these three areas were consistently identified as critical to address for a successful transition from paper-based to online assessments. Below is a brief overview of how readiness is operationalized in each area.

- **Hardware readiness:** ensuring that sufficient devices meeting minimum system requirements are available for students in grades 3–12 who take STAAR online to test within two-week testing windows
- **Personnel readiness:** confirming appropriate staff-to-student ratios and training for personnel categories involved in the preparation and administration of STAAR online testing
- **Internet connectivity readiness:** meeting minimum infrastructure requirements for a scalable network connection, having sufficient and reliable bandwidth to test

Survey responses were analyzed in conjunction with further research to determine LEAs' current state of readiness in each major area, as well as to calculate the cost of moving all LEAs toward readiness for STAAR online testing. While initial estimates indicate that $37—$73 million is needed to bring all LEAs up to a 3:1 student-to-device ratio, **it is unlikely that additional devices are needed due to significant investments made during COVID-19.** On the other hand, it is estimated that 2,452 additional technology personnel (using $2,500 stipends) are needed across the state to prepare for and support during STAAR online administrations, as well as an average of 2 additional hours at $39 per hour of STAAR online administration training for all currently existing and additional technology staff (see Table 11). **In total, a subset of LEAs needs to invest an estimated $7.3 million towards personnel-related needs.** In order to bring the state up to internet connectivity readiness, it is estimated that 70 campuses need to build fiber connections (see Table 17), 461 LEAs need to invest two to four times more on bandwidth than their current annual spending (see Table 18), and 85 LEAs need to budget for one-time internal connection upgrades (see Table 19). **Before E-Rate reimbursements, a subset of LEAs across the state will need to invest an estimated $12.9—$15.1 million one-time and $25.4 million annually on internet connectivity.**

Methodology

Responding LEAs' Readiness for Online Testing

Seven survey questions were used to gauge current readiness for 100 percent STAAR online testing, as well as to determine costs associated with scaling up to 100 percent STAAR online. The questions asked LEAs to report on specific aspects of their hardware, personnel, and internet connectivity and focused on the following areas.

- **Hardware**: student-to-device ratio and number of devices needed for 100 percent STAAR online testing
- **Personnel and training**: total number of technology personnel compared to numbers of students in the LEA who are STAAR testers and the additional number of training hours needed for 100 percent STAAR online testing
- **Internet connectivity**: type of internet connection, bandwidth speed, adequacy of internal connections, and ISP redundancy

Non-responding LEAs' Readiness for Online Testing

To provide the most comprehensive picture of STAAR online readiness and scale-up costs, statistical models were used, where needed and possible, to predict values in each readiness area for non-responding LEAs (i.e., current number of devices, number of additional devices needed, current technology personnel, and additional technology personnel). In cases where predictive models could not accurately predict values for non-responders, proportion-based estimates were used for non-responding LEAs (i.e., additional training hours, type of internet connection, bandwidth availability, adequacy of internal connections, and ISP redundancy). An analysis of the demographics of responding LEAs compared to overall state demographics, combined with an overall high survey response rate (75 percent), instills confidence that estimates provide a reasonable range of values. **The models allowed researchers to predict readiness values for non-responding LEAs based on their similarity to responding LEAs on LEA type and number of STAAR testers in grades 3–12.** For LEA type (Table 5), researchers used the four locale categories provided by the National Center for Education Statistics (NCES), which represent the geographical context of a school by designating each as one of the following: city, suburb, town, or rural.

TABLE 5. NCES LEA Types

	Responders		Texas	
NCES LEA Type	*n*	%	*n*	%
City	151	16.76	200	16.53
Suburb	117	12.99	144	11.90
Town	166	18.42	214	17.69
Rural	467	51.83	652	53.88
Total	**901**	**100**	**1210**	**100**

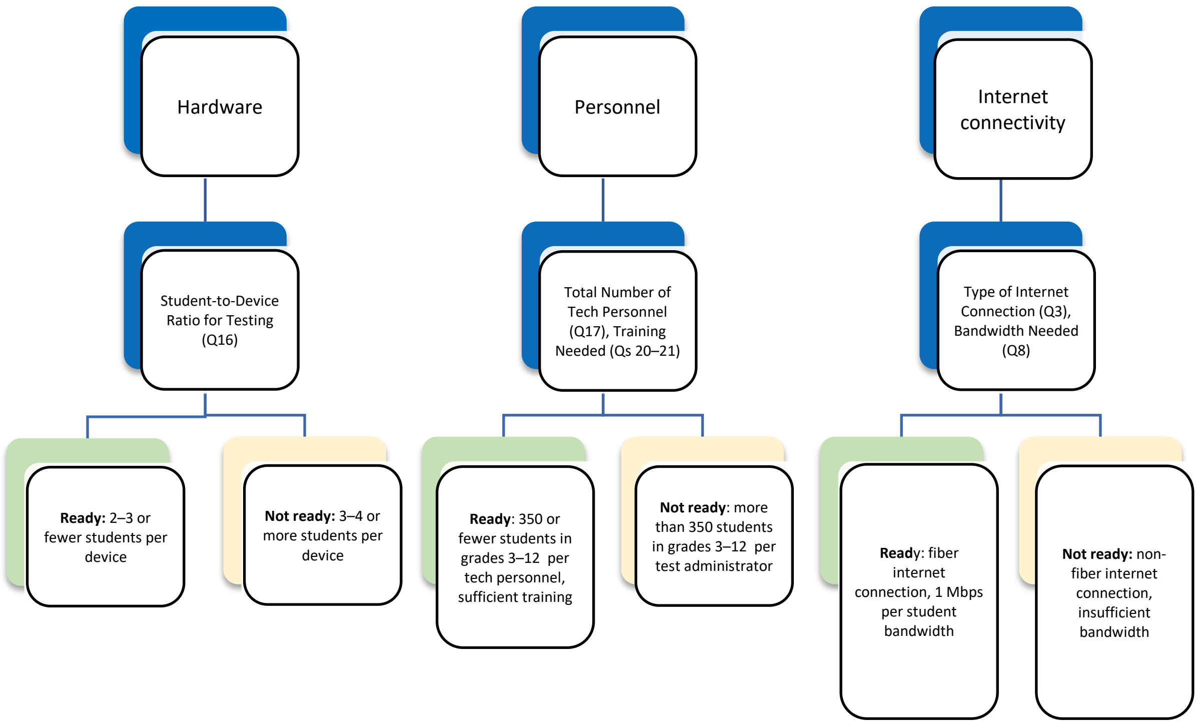
Appendix E provides detailed information on the statistical models used to predict each aspect of readiness for online testing. The student sample was limited to grade levels in which students participate in STAAR (grades 3–12). Numbers of STAAR grades 3–12 testers were taken from the testing vendor's data on unique testers per grade level by LEA in spring 2019 and provided to TEA.

Survey Response Limitations

The statewide survey had a robust response rate of 75 percent, with 901 responding LEAs that researchers determined were representative of the state as a whole. Despite the high response rate, a few limitations were noted in the data. One limitation is that **not all LEAs provided answers to every question; therefore, the number of LEAs with complete readiness information varied by question.** Additionally, costs associated with internet connectivity readiness (e.g., scaling up to fiber internet connection or increasing bandwidth) cover a vast array of costs that are highly context dependent (Broadband Now, 2020; Columbia Telecommunications Corporation, 2018). As such, the internet connectivity costs are rough estimates and may not cover all aspects of internet connectivity.

Figure 12 depicts how readiness levels were determined for responding LEAs and predicted for non-responding LEAs for 100 percent STAAR online testing.

FIGURE 12. Readiness levels.



Hardware Readiness

Hardware readiness was **operationalized as the student-to-device ratio of devices meeting minimum system requirements that could be used for STAAR online testing.** The recommended student-to-device ratio for hardware readiness is three or fewer students per device. This recommendation is based on conversations with state assessment officials from across the United States, as well as a Public Policy Institute of California report on that state's transition to online testing (Gao, 2015).

Survey question 16 asked respondents to indicate the individual LEA's student-to-device ratio that meets the minimum system requirements and could be used for STAAR online testing. Although 2–3 or fewer students-per-device is recommended, individual LEA needs and scheduling flexibility within testing windows allow for LEAs with higher student-to-device ratios to successfully participate in STAAR online testing.

Hardware Readiness Component: Devices Needed

To determine the number of devices that LEAs perceived were needed for 100 percent STAAR online, question 14 asked LEAs to provide information on current number of devices, as well as an estimation of the total number of devices needed to administer STAAR online within two-week testing windows. The number of devices needed was locally determined by the LEA; thus, the number of devices each LEA indicated needing may yield different student-to-device ratios. To strengthen estimates from the data, the number of devices needed was limited to a value that was not greater than the total LEA enrollment of grades 3–12 students, as there were some outlier cases in which LEAs indicated needing a number of devices that would bring their total number of devices to twice the size of their LEA enrollment of grades 3–12 students. Regression-based models were used to predict numbers of needed devices for non-responding LEAs, excluding LEAs with device needs that were extreme outliers (see Appendix E for detailed explanation). Table 6 represents the number of devices needed by student-to-device ratio, as well as a total estimated number of devices needed for non-responding LEAs.

TABLE 6. Estimated Number of Devices Needed to Achieve Hardware Readiness (as of May 2020)

Student-to-device ratio	Number of LEAs	Total devices needed	Median devices needed per LEA
1:1 or fewer	368	469,629	100
2–3:1	305	393,898	200
4–5:1	54	64,152	238
6:1 or greater	34	67,064	229
*Non-responding LEAs**	*446*	*254,392*	*249*
Totals	1,207	1,249,135	

*Student-to-device ratio could not be predicted for non-responding LEAs; therefore, those LEAs' estimated devices are not disaggregated by student-to-device ratio. Median values are reported rather than mean scores because mean scores are more likely to be influenced by the presence of the outliers.

In total, just over 1.2 million devices are needed by LEAs to scale-up to 100 percent STAAR online testing, with the majority of devices needed by LEAs with device ratios of 2–3:1 or fewer students per device.

Cost Estimates to Achieve Hardware Readiness

Hardware readiness costs were calculated in two ways: (a) a low-end estimate based on the least expensive minimally adequate device typically in use in LEAs (i.e., devices using Chrome OS) and (b) a cost estimate based on purchasing needed devices according to percentage of operating system used in the spring 2019 STAAR online administration. The data for operating system use were provided by the STAAR online vendor. Due to the hardware readiness focus on devices that are available for grades 3–12 STAAR online-eligible students to test within two-week testing windows, device needs of LEAs with 2–3 students or fewer per device were also included in cost estimates. Tables 7 and 8 show device costs by operating system and the range of total device cost estimates. Device cost estimates were obtained through follow-up conversations with LEA technology personnel.

TABLE 7. Device Costs by Operating System

Operating system	Approximate cost per device	Percent Used for testing
Windows	$610	49.93
Chrome OS	$229	45.27
MacOS	$950	3.94
iPad iOS	$375	0.8

Note: The Chrome OS device cost includes the cost of the device, plus the annual maintenance fee in its first year. The Windows cost is for an HP© laptop.

The one-time device cost estimates, for responding and non-responding LEAs combined, range from approximately $286 million to $560 million for the 1.2 million devices needed by LEAs to scale-up to 100 percent STAAR online testing. **The total device costs for LEAs not meeting the 2–3:1 student-to-device ratio ranges from an estimated $37 million to $73 million for approximately 160,980 devices.** The non-ready device costs include the $30–$59 million from responding LEAs as shown in Table 8 below, as well as an equal proportion of devices for approximately 12 percent of non-responding LEAs that are assumed to not meet the recommended ratio, which adds another $7–$14 million. **Since the onset of COVID-19 and the administration of the survey, 2.5 million devices across Texas have been acquired with the aid of Operation Connectivity, thereby remove the need for further device investments (more detail provided in Section 7).**

TABLE 8. One-Time Device Cost Estimates (as of May 2020)

Student-to-device ratio	Total devices needed	Low	High
1:1 or fewer (*n* = 379)	469,629	$107,545,041	$210,709,054
2–3:1 (*n* = 311)	393,898	$90,202,642	$176,730,728
4–5:1 (*n* = 58)	64,152	$14,690,808	$28,783,161
6:1 or greater (*n* = 34)	67,064	$15,357,656	$30,089,692
Non-responding LEAs (*n* = 446)	254,392	$58,255,768	$114,138,389
Total costs	**1,249,135**	**$286,051,915**	**$560,451,024**

Note: The per-device costs were calculated as follows:
(1) Low = Number of devices ∗ $199 + $30 Chrome OS subscription fee
(2) High = Number of devices ∗ percent of use for each operating system ∗ cost of device with each operating system

In addition to one-time device cost estimates, annual ongoing device costs were calculated according to a 5-year device refresh/replacement cycle in use by the majority of responding LEAs, as well as the annual device fee for additional Chrome OS devices needed. The total replacement costs were estimated as LEAs having to replace 20 percent of their current devices (at the time of survey) each year. The $30 Chrome OS subscription fee was included for the remaining 80 percent of current devices (at the time of survey), as well as 100 percent of the devices needed for scale-up that were estimated to be devices using Chrome OS. Table 9 represents the annual ongoing costs for existing and additionally needed devices.

TABLE 9. Annual Ongoing Costs for Current and Additional Needed Devices (as of May 2020)

Annual ongoing costs	Sub-category	Low-end	High-end
Existing devices (3,689,257 devices)	Replacement costs (20% of existing)	$168,967,971	$331,052,567
	Chrome OS subscription fee (80% of existing)	$88,542,180	$40,083,045
Additional needed devices (1,249,135 devices)	Chrome OS subscription fee	$37,474,050	$16,964,502

Although the replacement and maintenance of existing devices is a cost already incurred by LEAs, it is noted here to provide a sense of the potential total annual ongoing costs for current and newly-purchased devices. On the other hand, potential Chrome OS subscription fees for additionally needed devices could be incurred beginning in year 2 of device adoption. The annual ongoing costs for the approximately 160,980 devices needed for LEAs not meeting the 2–3:1 student-to-device ratio ranges from an estimated $2.2 million to $4.8 million.

Personnel Readiness

Personnel readiness for STAAR online is focused on determining whether LEAs have sufficient personnel and training to administer and coordinate assessments. STAAR online testing does not require modifications to the 30:1 student-to-test administrator ratios or required training hours; therefore, the main focus of personnel readiness was technology personnel and related training needs. Specifically, personnel readiness was operationalized in two areas: **(a) the student-to-technology staff ratio and (b) the additional training hours needed to prepare technology staff to successfully administer STAAR online.**

The recommended student-to-technology personnel ratio is 350 students per technology staff member. This recommendation is based on a Public Policy Institute of California report on California's transition to online testing (Gao, 2015) and on the Long-Range Plan for Technology (TEA, 2018). Although both reports referenced above used devices-to-technology staff ratios, the current report used the ratio of students-to-technology staff, due to a large degree of variation in LEAs' self-reports of device numbers and ratios needed for 100 percent STAAR online. Therefore, the number of students provided a more stable variable on which to base additional technology personnel estimates. Survey question 18 asked respondents to indicate the total number of district- and campus-level personnel who support STAAR online testing in several technical roles, including roles such as technology directors and repair technicians. Due to the fact that one staff member often serves many different technology-based roles in smaller LEAs, the number of personnel in each category was summed to get a total number of technology personnel. Regression-based models were used to predict numbers of needed technology staff for non-responding LEAs, excluding LEAs with personnel needs that were extreme outliers (see Appendix E for detailed explanation).

Personnel Readiness Component 1: Technology Personnel

The evaluation of technology personnel readiness examined LEAs' current student to technology personnel ratio, as well as the additional number of technology personnel needed to reach the recommended 350:1 ratio. To determine current ratio of students to technology personnel, the current number of technology personnel in each responding LEA was divided by the total number of STAAR-participating students (paper or online) in the LEA in the 2018–19 school year. The LEA technology staff are not dedicated strictly for students in grades 3–12; however, the number of unique STAAR-participating students in each LEA was the most complete data set from which to estimate ratios for non-responding LEAs.

To determine the number of additional technology staff members needed by LEAs to reach the recommended 350:1 ratio of students to technology staff member, the number of STAAR-participating students (paper or online) in the LEA in the 2018–19 school year was divided by the target ratio of personnel in each area (i.e., 350 for technology personnel). The number of personnel needed was then subtracted from LEAs' reported technology personnel numbers. In cases where LEAs were meeting or exceeding the recommended ratio, the number of personnel needed was set to zero. Table 10 represents the number of additional technology personnel needed in responding LEAs, as well as an estimated total of personnel needed for non-responding LEAs.

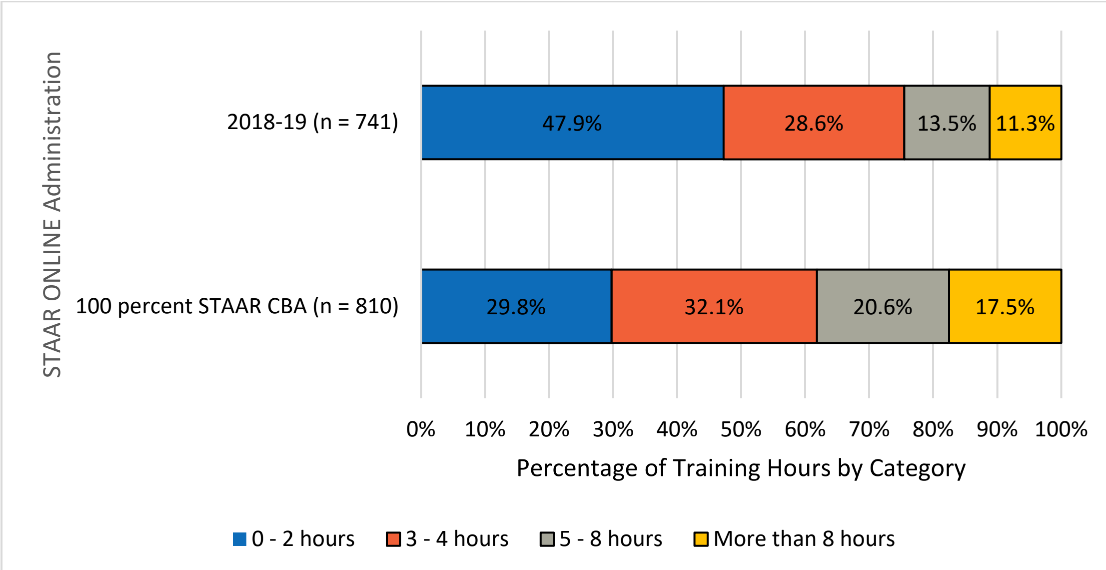
TABLE 10. Staff Needed to Achieve Personnel Readiness

Type of personnel	Number of LEAs	Total personnel needed
Responding LEAs		
No personnel needed	627	0
Personnel needed	171	2,146
Non-responding LEAs		
No personnel needed (estimates)	367	0
Personnel needed (estimates)	45	306
Total		**2,452**

Personnel Readiness Component 2: Training for Technology Personnel

Two survey questions asked LEAs to report the range of training hours required for 2018–19 STAAR online testing for various technology personnel roles (question 20), as well as how many hours would be required for successful 100 percent STAAR online implementation (question 21). Responding LEAs reported that LEA technology personnel would need significantly more training overall for 100 percent STAAR online testing. Figure 13 illustrates the percentage of LEAs indicating how many hours of training technology personnel needed in 2018–19 compared to hours anticipated for 100 percent STAAR online testing. A majority of LEAs reported needing between zero and two hours of training for technology personnel in 2018–19, while most LEAs perceived that the technology personnel group would need three to four hours of training for STAAR online testing.

FIGURE 13. Hours of training needed by technology personnel.



Cost Estimates to Achieve Personnel Readiness

Cost estimates assume the addition of additional technology staff to reach the 350:1 students-to-staff ratio. Achieving technology staffing numbers for the purpose of online testing is accomplished in a variety of ways by LEAs, primarily through stipend-based assignments for current campus personnel. The stipend-based option most applicable for LEAs, given that just-in-time support for online testing is needed at various points during the school year. Therefore, in Table 11, figures for personnel assumes a $2,500 stipend per additional personnel.

The hourly rate for additional training is based on a $39 average hourly teacher rate. The data for hourly estimates were drawn from the Bureau of Labor Statistics May 2019 State Employment and Wage Estimates for Texas' average teacher salary, due to the fact that TEA does not require LEAs to report salaries for technology personnel in the Texas Academic Performance Reports (TAPR). An additional two hours per LEA technology staff member was budgeted for additional training.

Table 11 shows the personnel cost estimates. The LEAs with student-to-technology personnel ratios that are higher than 350:1 are about four times as likely to be a large LEA than the LEAs as a whole, with almost four times as many students on average. Estimates for additional technology stipends are considered annual ongoing costs. In addition, STAAR online training for technology personnel will be necessary on an annual basis.

TABLE 11. Ongoing Personnel Scale-up Cost Estimates (Responding and Non-responding LEAs)

Personnel cost category	Total staff	Cost per staff member	Total costs
Additional technology stipends	2,452	$2,500	$6,130,000
Additional training hours for technology personnel	15,719*	$78**	$1,226,082
Total			$7,356,082

*This value includes personnel numbers provided by responding LEAs, as well as predicted values for current and needed personnel for non-responding LEAs.

**The value per staff member is an additional two hours of training time at an hourly rate of $39 per hour.

Internet Connectivity Readiness

Internet connectivity readiness for STAAR online is centered around LEAs meeting minimum infrastructure requirements in three areas: (a) a scalable network connection that allows for increased bandwidth, (b) sufficient bandwidth per student, and (c) a reliable internet connection. Internet connectivity readiness was initially **operationalized as having a fiber internet connection as at least one connection type, having bandwidth of at least one Mbps per student, and having a redundant ISP connection.** The recommendations for internet connectivity readiness are based on connectivity targets and connection types from EducationSuperHighway (2019), the State Educational Technology Directors Association (SETDA, 2019), the U.S. Department of Education Office of Educational Technology (2014), and E-Rate connectivity targets (Federal Communications Commission, 2014).

Survey questions 3, 8, and 11 asked respondents to indicate the individual LEA's internet connection type(s), bandwidth status regarding the one Mbps per student target, and use of redundant ISP paths. Due to the uniqueness of individual LEAs' internet connectivity needs, regression-based equations were unable to reliably predict any of the internet connectivity readiness criteria for non-responding LEAs; therefore, the number of non-responding LEAs for each readiness measure were extrapolated from the percentage of responding LEAs. A high response rate and the representativeness of responding LEAs, combined with triangulation from Broadband Now (2020) and conversations with Texas ESC personnel involved in E-Rate reimbursements, provide confidence in the estimated percentage of non-responding LEAs in each area of internet connectivity readiness.

Internet Connectivity Readiness Component 1: Fiber Internet Connection

To determine the LEA internet connection type, question 3 asked LEAs to indicate the type(s) of internet connections present in the individual LEA. Those LEAs with fiber as at least one connection type were considered to have a scalable network connection for increased bandwidth. A total of 868 LEAs responded to question 3, with just over 86 percent indicating having a fiber internet connection. In addition, it was estimated that 86 percent of the 339 non-responding LEAs also had a fiber connection. Among responding LEAs, charter campuses and rural LEAs were less likely to have a fiber connection than were non-charter campuses. The number and percent of LEAs with and without a fiber internet connection (based on the survey data collected) are provided in Table 12, with additional detail in Appendix F.

The number of LEAs that reported not having a fiber connection is quite a bit higher than the number of non-fiber LEAs reported in the EducationSuperHighway State of the States (2019) report for Texas. However, there are a few reasons that could explain this difference. One reason for the difference could be due to the fact that EducationSuperHighway excludes charter and special purpose LEAs (e.g., juvenile justice LEAs) from its sample, resulting in a total sample of 1,024 LEAs compared to the survey sample of 1,207 LEAs. In addition, EducationSuperHighway primarily relies on E-Rate 471 applications and does not verify completion of fiber projects. Therefore, it is possible that some LEA-initiated fiber projects for which LEAs were seeking E-rate reimbursement in 2019 were not complete at the time of the survey. Finally, EducationSuperHighway characterizes non-fiber connection types as scalable, in few cases, for LEAs with fewer than 1,000 students that are able to receive the one Mbps per student bandwidth.

TABLE 12. Number of LEAs with Fiber Internet (as of May 2020)

LEAs	Responding LEAs (*n* = 868)	Non-responding LEAs (*n* = 339)	Total LEAs (*n* = 1,207)
Fiber connection	750 (86.4%)	293 (86.4%)	1,043 (86.4%)
No fiber connection	118 (13.9%)	46 (13.9%)	164 (13.9%)

Internet Connectivity Readiness Component 2: Bandwidth Sufficiency

The LEAs’ bandwidth need for STAAR online testing was measured according to a standard of one Mbps per student. Question 8 asked LEAs to indicate how many times more bandwidth would be needed to meet the standard. A total of 829 LEAs responded, with just over 60 percent indicating that their LEAs’ bandwidth is presently meeting the standard. It was estimated that a similar percentage of the 378 non-responding LEAs had bandwidth needs proportionate to those of responding LEAs. No clear patterns emerged in the demographic characteristics of LEAs with differing levels of bandwidth sufficiency. The number and percent of LEAs with each level of bandwidth need are provided in Table 13.

TABLE 13. Amount of Bandwidth Needed (as of May 2020)

LEAs	Responding LEAs (*n* = 829)	Non-responding LEAs (*n* = 378)	Total LEAs (*n* = 1,207)
Bandwidth presently meets 1 Mbps standard	512 (61.8%)	234 (61.8%)	746 (61.8%)
Need two times more bandwidth to meet 1 Mbps standard	180 (21.7%)	82 (21.7%)	262 (21.7%)
Need three times more bandwidth to meet 1 Mbps standard	98 (11.8%)	45 (11.8%)	143 (11.8%)
Current bandwidth cannot physically meet 1 Mbps standard	39 (4.7%)	17 (4.7%)	56 (4.6%)

Internet Connectivity Readiness Component 3: ISP Redundancy

The purpose of redundant ISPs is to connect LEAs to the internet connection through more than one ISP, should one connection be lost due to things such as damage to a connecting line or a complete outage from the primary ISP. Ideally, redundant ISP lines originate from opposite directions. Question 11 asked LEAs to indicate whether the LEA had redundant ISP paths. A total of 825 LEAs responded, with almost 70 percent indicating that their LEA does not have redundant ISPs. Redundant internet service was recommended for online testing by SETDA (2019) and as a result, non-redundant internet was originally considered in this section of the report. However, upon further research, it was determined that the features of online assessment programs, such as test caching, make ISP redundancy less necessary. In addition, a majority of LEA survey respondents indicated having a reliable internet connection, with no internet outages last more than one hours in the prior year. It is also important to note that it is unlikely that a majority of LEAs would continue to pay for redundant internet beyond initial funding for several reasons. Redundancy is not available in all areas and is not reimbursable with E-Rate funds. Redundancy essentially doubles the cost of internet service (monthly bandwidth) for LEAs, making it an untenable cost in the long-term. **As a result, having internet redundancy was not determined to be a readiness target and was not used as a factor to estimate resource gaps within the state for 100 percent online testing.**

The number and percent of LEAs with redundant ISP are found in Table 14. It was estimated that a similar percentage of the 382 non-responding LEAs had redundancy proportionate to that of responding LEAs. There were slightly fewer LEAs in the NCES town category with redundancy compared to LEAs overall, but there were no strong patterns in LEAs with redundant ISP.

TABLE 14. Number of LEAs with Redundant ISP

LEAs	Responding LEAs (*n* = 825)	Non-responding LEAs (*n* = 382)	Total LEAs (*n* = 1,207)
Redundant ISP	258 (31.3%)	120 (31.3%)	378 (31.3%)
No redundancy	567 (68.7%)	262 (68.7%)	829 (68.7%)

Cost Estimates to Achieve Internet Connectivity Readiness

Due to the complex nature of internet connectivity and associated costs, readiness costs in this area were calculated using both survey data and existing, publicly available data, as well as a nationwide study of internet connectivity costs. Annual bandwidth costs were calculated from bandwidth need indicated on the survey, as well as LEAs' E-rate Form 471 Category 1 monthly costs for internet access. In addition to bandwidth costs associated with internet access, LEAs' annual costs for internal connections (e.g., routers, wireless access points, switches) were calculated from E-rate Form 471 Category 2 costs. Estimates for the provision of fiber to non-fiber LEAs were extrapolated from existing estimates of the cost of last-mile fiber to connect anchor institutions—including schools, healthcare institutions, and libraries—to broadband across six geographic regions of the United States, to the nearest existing fiber optic connection (Columbia Telecommunications Corporation, 2018). The last-mile fiber cost estimations study, conducted on behalf of the Schools, Health, & Libraries Broadband (SHLB) Coalition, operated under several assumptions, including the use of an average distribution of distances between anchor institutions and last-mile fiber connections, average cost of construction within different geographic areas, and maximum economies of scale with regard to combining last-mile projects to the greatest extent possible in large-volume contracts. It is important to note that if projects were to be undertaken individually, rather than at large-scale, the cost estimates could be many times greater than calculated estimates for non-fiber LEAs.

The use of proportion-based estimates allowed for the identification of an approximate number of non-responding LEAs in each readiness category (e.g., fiber and non-fiber, level of bandwidth need) with some certainty; however, it precluded the identification of the specific readiness level of non-responding LEAs. Therefore, cost estimates in this area were calculated based on average costs across responding LEAs, excluding LEAs with monthly costs that were extreme outliers. Where appropriate, geographic location and LEA size were also taken into account when calculating average costs (e.g., the cost of internal connections and last-mile fiber). A breakdown of cost calculations for each criterion is provided in Table 15. **It is important to note that all costs estimated below are total cost, before E-Rate is applied.**

TABLE 15. Cost by Readiness Criteria

Readiness criterion	Cost calculations (Responding LEAs lacking resource)	Cost calculations (Estimated non-responding LEAs lacking resource)
Costs for last-mile fiber for non-fiber LEAs	SHLB estimated cost for each LEA based on geographic region of Texas (metro area, plains, eastern rural, desert)	SHLB estimated cost by region ***times*** percentage of responding LEAs by geographic region ***times*** total number of non-responders
Costs for additional bandwidth	LEAs' E-Rate Form 471 Category 1 reimbursement application monthly recurring cost for internet access ***times*** two or three (less monthly cost), depending on need*, times 12 months	Average monthly recurring cost for bandwidth ***times*** percentage of non-responding LEAs estimated at each level of additional bandwidth need, times 12 months
Costs for internal connections	LEAs' E-Rate Form 471 Category 2 reimbursement application annual cost for components of internal connections	Average E-Rate Form 471 Category 2 reimbursement application annual cost within each NCES Locale category ***times*** percentage of non-responding LEAs estimated to be in each category

*Costs for LEAs that indicated their physical connection cannot meet the one Mbps standard (*n* = 39 responders; *n* = 17 estimated non-responders) were calculated at a rate of four times their current monthly cost.

Component 1 Costs: Fiber to Non-fiber LEAs

Of the responding LEAs in the survey, 118 indicated not having a fiber connection. It was extrapolated that the same percentage (14 percent) of non-responding LEAs would lack a fiber connection, resulting in an additional 46 LEAs predicted to be without fiber. As stated previously, fiber cost estimates were taken from existing low- and high-end estimates of the cost of last-mile fiber to four of the six geographic regions of the United States (Columbia Telecommunications Corporation, 2018).

TABLE 16. Last-Mile Fiber Estimates by Geographic Region

	Metro	Desert	Plains	Rural Eastern
Low-end	$34,000	$97,000	$66,000	$75,000
High-end	$47,000	$151,000	$97,000	$112,000

Low-end estimates assume non-fiber LEAs are in close proximity to a fiber location, while high-end estimates assume non-fiber LEAs are distant from a fiber connection point. Cost estimates for non-responding LEAs were calculated based on percentages of responding LEAs located within each geographic category. Among responding LEAs, charter campuses and rural LEAs were less likely to have a fiber connection than were non-charter campuses.

Further research, including utilization of EducationSuperHighway data and follow-up conversations with a sample of personnel from non-fiber LEAs, narrowed down the list of LEAs and campuses without fiber connection to 55 LEAs (70 campuses). In addition to last-mile fiber cost estimates, annual ongoing fiber maintenance costs were calculated according to an SHLB-recommended annual maintenance cost of one to two percent of the total last-mile fiber cost estimate. Maintenance costs are typically paid to the service provider to repair downed lines and perform any routine work. The fiber maintenance costs were estimated each year across the two scale-up years (2021–22 and 2022–23) following last-mile fiber installation. Table 17 represents the total one-time fiber costs and annual ongoing fiber maintenance costs for the 55 estimated non-fiber LEAs. Maintenance costs were not estimated for fiber LEAs because those LEAs already build maintenance into their annual internet connectivity costs.

TABLE 17. One-Time and Annual Ongoing Fiber Cost Estimates

	One-time Fiber	Ongoing Fiber Maintenance
Low-end estimate	$3,169,000	$47,665
High-end estimate	$5,367,000	$80,505

Note: Maintenance costs are calculated at a rate of 1.5 percent per year. This cost is considered negligible when split up across the 55 non-fiber LEAs (70 campuses).

In total, the one-time and annual ongoing costs for fiber ranged from a low-end estimate of $3.2 million to a high-end estimate of $5.4 million. It is important to note that the geographic estimates assume the use of existing infrastructure to the greatest extent possible. Additionally, conversations with technology directors and network experts from across the state point to the highly context-dependent nature of fiber provision, which means that LEAs' unique contexts (e.g., geography, nearness of ISP providing fiber) could result in over- or under-estimations in individual LEA costs.

Component 2a Costs: Bandwidth Sufficiency–Additional Bandwidth Costs

There were 278 responding LEAs that indicated needing to double or triple their current bandwidth to meet the 1 Mbps per student recommendation for 100 percent STAAR online testing. It was assumed that the same percentage of non-responding LEAs would fall within each category of bandwidth need. Bandwidth costs were drawn, where possible, from internet access line items of LEAs' 2019 E-Rate Form 471 reimbursement applications for Category 1: Data Transmission and Internet Access. The E-Rate federal reimbursement program provides 20–90 percent reimbursements for most internet connectivity costs, with the reimbursement rate dependent upon percentages of an LEA's students who are eligible for the National School Lunch Program (Universal Service Administrative Company [USAC], 2020). In cases where no E-Rate internet access information was available for responding LEAs, the mean value of internet access cost across responding LEAs was used as the monthly cost. The mean cost was also used for 127 non-responding LEAs that were projected to need additional bandwidth. An additional 39 LEAs indicated that their physical connection cannot meet the recommended standard.

Bandwidth costs for those LEAs were calculated at four times their current monthly cost for internet access. The annual ongoing additional bandwidth cost estimates for responding and non-responding LEAs is $25.4 million across one year of scale-up. Table 18 shows estimated scale-up costs for additional bandwidth for responding and non-responding LEAs.

TABLE 18. Annual Ongoing Additional Bandwidth Costs

LEAs	Responding LEAs (*n* = 317)	Non-responding LEAs (*n* = 144)	Total cost
Need **two times** more bandwidth to meet 1 Mbps standard	$6,263,111	$2,678,118	$8,941,229
Need **three times** more bandwidth to meet 1 Mbps standard	$7,367,084	$2,939,398	$10,306,482
Cannot physically meet 1 Mbps standard	$4,224,412	$1,929,673	$6,154,085
Total cost	**$17,854,607**	**$7,547,189**	**$25,401,796**

Note: Additional bandwidth cost was calculated as one monthly cost for LEAs needing twice the bandwidth or twice the monthly cost for LEAs needing triple the bandwidth times 12 months for one scale-up year.

Component 2b Costs: Bandwidth Sufficiency–Internal Connections

In addition to bandwidth costs associated with internet access, LEAs' costs for upgrading internal connections to meet the one Mbps standard (e.g., routers, wireless access points, switches) were calculated from E-rate Form 471 Category 2 reimbursement requests for the fiscal year. Category 2 costs for 2020 were used due to the fact that average costs across the preceding four years (2017**–**20 fiscal years) showed an annual increasing trend, with 2020 costs being higher than prior years. According to the time of upgrade and lifespan of components purchased, a six- to seven-year cycle for upgrades is estimated. For purposes of this calculation, non-ready LEAs were considered to be responding LEAs that indicated their current bandwidth does not meet the one Mbps standard and who did not file a 2020 Category 2 E-rate application for reimbursement. It was assumed that those LEAs would be least likely to have the necessary internal connections and associated funds budgeted to cover the scale-up of internal connections required for additional bandwidth need. A corresponding percentage of non-responding LEAs with no E-rate Category 2 application were also predicted to be non-ready.

Calculations used average 2020 pre-E-rate costs within NCES Locale categories (city, suburban, town, rural) for LEAs that indicated or were estimated to have an additional bandwidth need of two or more times their current bandwidth, including LEAs that indicated that their current bandwidth could not physically meet the one Mbps per student standard. Due to the fact that the survey did not contain a question directly addressing individual components of internal connections, the following criteria were used to calculate internal connection costs for responding LEAs: (a) applied for E-rate Category 2 funds for the year 2020, (b) had a value for percent Economically Disadvantaged students to calculate E-rate discount tier, and (c) had a value for NCES locale category for urban versus rural location. For the non-responding LEAs with no E-rate application, researchers estimated that non-responding LEAs would be similarly distributed across the NCES/E-rate categories in the same percentages as responding non-ready LEAs with no 2020 Category 2 E-rate application.

There were a total of 75 non-responding LEAs with no E-rate Category 2 application for 2020. Although their location was known, it could not be estimated/predicted which LEAs consider themselves to have sufficient bandwidth to meet the one Mbps requirement. Therefore, it was estimated that 38 percent of these LEAs (*n* = 29) would be non-ready due to the fact that 38 percent of responding LEAs were non-ready. **A total of 85 non-ready LEAs (56 responders and 29 estimated non-responders) were estimated to need a total of $9.7 million for internal connections to scale-up bandwidth to meet the one Mbps standard.** Table 19 shows estimated internal connection costs for responding and non-responding LEAs.

TABLE 19. Internal Connection Costs

	Responding LEAs (*n* = 56)	Non-responding LEAs (*n* = 29)	Total cost
Internal connection cost	$6,148,955	$3,617,603	$9,766,558

Section 7. Interpretation and Discussion of Readiness

The purpose of this section is to triangulate studies done as a part of the report with existing research, initiatives, and resources to determine the readiness of Texas LEAs and campuses to move toward 100 percent STAAR online testing by the 2022–23 school year.

Summary of Implementation in Other States

As discussed in previous report sections, benchmarking of online testing programs in other states revealed that 70 percent of states currently have 100 percent online testing for their primary summative assessments. Examination of these online testing programs provided key information on mode of delivery, assessment window length, supporting online resources, and vendor choices. Through this examination and subsequent interviews with assessment experts from five states, criteria for evaluating the success of transition to 100 percent STAAR online testing were identified:

- Goal of 21st century learning as impetus for move
- Breadth of support
- Prior experience with online testing
- Use of online interim or formative assessments
- Transition length
- Funding to ensure connectivity prior to transition
- Funding for devices and technology personnel

The states' implementation processes and experiences are detailed below and then evaluated using the criteria listed above. Key takeaways from this evaluation and information regarding the present condition of readiness for online testing in Texas were considered when planning how best to move toward complete implementation by 2022–23.

Results from interviews with assessment experts from five other states regarding their online testing programs revealed varying levels of success in transitioning to 100 percent compliance. California, Georgia, and West Virginia, for example, were able to reach this goal by their deadlines, according to the assessment experts who participated in the interviews.

- California and West Virginia had already had experience and support with online testing in previous assessment programs but were required to move quickly to reach 100 percent online testing within one–two years as they began new, computer-adaptive statewide testing programs.
- Georgia set participation benchmarks at 30 percent for year one, 80 percent for year three, and 100 percent for year five. The more protracted approach was taken to give schools time to increase their networks, hardware, and personnel readiness.
- All three states used field trials to stress test their campus network access and infrastructure, with problems emerging relating to connectivity and bandwidth.

- Through a collaborative effort involving federal and state government agencies and LEAs, all three of these states had already ensured that all school campuses had high-speed internet access.
- The two states that transitioned quickly, California and West Virginia, provided funding to LEAs in the transition years to facilitate needed improvements to network, hardware, and/or personnel readiness.

Florida and Pennsylvania, on the other hand, struggled with garnering public support for 100 percent online testing adoption and had to change course.

- Pennsylvania faced concerns regarding the potentially high costs associated with moving LEAs toward readiness, and therefore it was determined that each LEA can select between online testing and PBA each year.
- Florida was on track to reach its goal when the state decided to reduce the number of online tests to address concerns about increases in instructional interruptions. The state now uses online testing only for students in the higher grades.
- In the initial planning phase, Florida took a different approach to implementation, preferring to add additional online tests by subject and grade level each year of its five-year transition plan.
- Neither state had an existing statewide LEA internet network prior to the move to online testing.
- Florida implemented an application process to provide funding to LEAs to help them increase their readiness, but that was not the case for Pennsylvania.

Application of the criteria listed earlier to evaluate the success of the five states featured in interviews resulted in **three key takeaways: (a) partnerships and buy-in for digital literacy and online testing needs to be widespread, (b) familiarity with online testing can shorten length of time needed for 100 percent transition, and (c) two categories of funding should exist—internet connectivity first, then devices/personnel**. These lessons, along with the present levels of readiness across the state, were given consideration when creating strategies to move Texas toward implementing a statewide online testing program.

Evaluating Readiness to Transition in Texas

When assessing the feasibility of transition plans, it is helpful to first evaluate the State of Texas' readiness for 100 percent online testing. This section of the report begins with a summary of Texas' historical experiences with online testing before to moving to a discussion of present-day conditions.

Texas' Experiences with Administering Online Tests

The State of Texas has offered online versions of some of its assessments since fall 2005. The vision behind implementation of online testing was to greatly simplify the ease of administration for the state, for LEAs, and for students. Online testing eliminates the labor-intensive aspect of PBA administration, allowing LEAs to focus on monitoring of test administration on the actual test day rather than dealing with the logistical considerations necessary for administering PBAs. With online testing, LEAs avoid shortages of test booklets or answer documents and do not need to distribute tools (dictionaries, rulers, calculators, reference materials, etc.) required to respond to test questions, as all tools are embedded in the appropriate tests. In addition, integrated accessibility features and designated supports, which are best offered online, greatly level the playing field for students needing accommodations.

Due to the ease in administration, the state has developed its online testing offerings as an option for LEAs for all STAAR assessments. To date, more than 5.5 million STAAR online tests have been delivered successfully. In addition, since the 2008–09 school year, the Texas English Language Proficiency Assessment System (TELPAS) has been 100 percent online, with over eight million online tests submitted along with approximately eight million holistic ratings entered with no issues at the state level. The TEA has offered optional online STAAR interim assessments, which inform intervention and predict performance on the STAAR summative assessments, since the 2017–18 school, and as of the 2019–20 school year, 3.8 million online interim assessments had been taken in aggregate.

Although TEA has successfully delivered nearly 25 million online tests in total, two incidents of statewide outages have occurred. These were immediately identified and handled for those affected. In March 2016, server timeout resulted in over 14,000 students experiencing a disruption in their testing. In reaction to this incident, Education Commissioner Mike Morath announced that the state would assess a fine against the assessment vendor and require an investment to upgrade the testing infrastructure.

The assessment vendor also spent $20 million of its own money to provide support to Texas schools because of the problems that surfaced during that test administration. Some of the solutions the vendor implemented included (a) providing LEAs with tools to determine local capacity prior to test windows, (b) testing local devices to ensure minimum requirements were met, (c) confirming local networks were appropriately set up, and (d) monitoring online testing and diagnosing local issues in real time.

During the April 2018 STAAR online administration, some LEAs experienced login issues that lasted, in some cases, for up to three hours; Students completing the mathematics tests for grades 5 and 8, writing for grades 4 and 7, and English I experienced connectivity slowdowns of approximately 20 minutes. Overall, 41,702 students were affected by the disruption. In May 2018, approximately 29,307 students completing the STAAR grades 3–8 reading online test encountered a connectivity slowdown of roughly 90 minutes, and some Texas students were kicked out of the testing software while completing the STAAR. As well as imposing more penalties against the vendor, the service level agreement (SLA) between the TEA and its testing vendors was revised to include substantially higher penalties for any systems interruptions. The new SLA requires the testing vendor to conduct rigorous pre-administration quality assurance and system performance testing. Escalation procedures and contingency plans must also be drafted and tested for TEA approval prior to the launch of any administration. The testing vendor also moved its Assessment Management System from its own data center to Amazon Web Services (AWS) in fall 2019. The AWS platform is cloud-based, and the vendor's migration to AWS services eliminated issues with bandwidth and provided the ability to scale testing processes and automatically adjust capacity to maintain steady, predictable performance. This incident allowed the state the opportunity to upgrade the system for a larger scale deployment of online testing.

To avoid any local disruptions due to power outages and to prevent any other unforeseen local issues, the state instituted testing windows when the STAAR testing program began in 2012. This allowed LEAs the option to reschedule their test administrations should local technology issues arise. Beginning with spring 2018, the testing windows were extended to allow even more flexibility in scheduling online testing.

In the two years since the 2018 disruptions, Texas has had six consecutive administrations of the STAAR online testing, with no statewide issues. The TEA believes the changes in the service level agreements with test vendors, as well as the massive reinvestment and improvements to their infrastructure and substantial penalties assessed against vendors for interruptions, have been instrumental in ensuring a problem-free online testing experience for Texas students over the past six administrations. Although administrations may have had small, district-level issues, recent success has shown the feasibility of online testing in the state.

May 2020 Readiness Update and COVID-19 Impact

In addition to the progress made at the state level toward more dependable online test administrations, 68 percent of all LEA survey responses acknowledged that the potential advantages of 100 percent online testing outweighed any disadvantages. The prospect for faster results, more flexible scheduling, and increased security were specifically identified by respondents.

Although many responding LEAs recognized the potential benefits of 100 percent STAAR online testing, the existing readiness gaps are causes of concern. Currently, no statewide high-speed internet network exists, and statewide survey results revealed that 40 percent of LEAs lack the necessary bandwidth to be considered "ready" for STAAR online tests. Additionally, 51.5 percent of responding LEAs did not have a student-to-device ratio of at least 3:1, and 20 percent did not have the necessary personnel readiness. Finally, although 87 percent of campuses participated (in varying degrees) in STAAR online testing in spring 2019, average student participation across those campuses remains below 20 percent. As shown in Tables 20 and 21, overall test submissions for STAAR online tests across the state have been steadily increasing over the years, although there is a higher percentage uptake on December administrations compared to spring administrations. This is likely because only STAAR EOC subjects are administered in December, resulting in an overall lower volume of test takers that are also older students. One final thing to remember, however, is that online test submission counts do not necessarily reflect schools' ability to administer all of their summative assessments online.

TABLE 20. Spring STAAR Administrations

Administration	Submitted online	Submitted PBA	Percent Online
Spring 2016	689,847	10,345,336	6%
Spring 2017	1,221,516	14,502,416	8%
Spring 2018	1,016,752	10,598,557	9%
Spring 2019	1,089,626	8,573,786	11%

TABLE 21. December STAAR Administrations

Administration	Submitted online	Submitted PBA	Percent Online
December 2016	99,986	337,419	23%
December 2017	137,828	295,071	32%
December 2018	157,611	256,114	38%
December 2019	167,158	213,237	44%

The COVID-19 pandemic and resulting campus closures during spring 2020 had a significant impact on the state of technological readiness for LEAs across the nation and in Texas. As LEAs attempted to remotely instruct their students, large-scale investment in the technology needed to facilitate this new paradigm was undertaken not only by LEAs but also by state agencies and many supporting organizations. **In 2020, $913 million was spent to purchase over 2.5 million devices for students and to upgrade existing network access and infrastructure.** This investment made remote instruction of students possible and helped to further close many of the readiness gaps identified in this study in regard to electronic testing. Case study participants evinced a great sense of urgency regarding increasing technological capabilities in their LEAs. Capitalizing on this momentum is highly advised as the push toward 100 percent STAAR online testing continues.

Existing Supports and Resources

As LEAs transition to 100 percent STAAR online testing, they will need guidance, resources, and supports. Existing supports and resources that could assist this transition are listed and described in Table 22. Additionally, numerous resources are available to help LEAs and campuses prepare their students and train their staff for online testing. Those resources are provided in Appendix D.

TABLE 22. Existing Resources to Aid Transition

Existing Resource	Description
HB 3906 homepage	Landing page for this legislation with helpful links for LEA officials, students, and parents interested in learning more about the bill requirements and what resources are available to support the transition to 100 percent STAAR online testing.
Long Range Plan for Technology, 2018–2023	Details six strategic technology goals for LEAs to enhance and improve 21st century educational experiences for Texas students and teachers.
Transition to electronic testing checklist	Key guidance and resources for LEAs as they move from PBA to STAAR online testing. Detailed checklist with links to other tools that can be used to assess readiness and track progress.
STAAR interim assessments	Administrations in STAAR-tested subject areas and grade levels such as ELA and mathematics in grades 3–8, science in grades 5 and 8, and social studies in grade 8, as well as high school English I and English II, Algebra I, Biology, and U.S. History. Depending on the grade and course, there are one to two opportunities available during each school year. Select interim assessments are available in Spanish language forms, and all include appropriate content and language supports. These interim assessments can help to build students' familiarity with the electronic testing environment and provide feedback for stakeholders regarding expected scores on the summative STAAR.
E-rate tools	Information about the Federal Communications Commission (FCC) E-rate program and for what programs it can provide funding, as well as useful resources on how to complete the application and form partnerships with other LEAs.
STAAR online testing platform	Application designed to allow students to gain familiarity with the electronic testing platform used for the STAAR assessments through practice tests, practice activities, and tutorials for various grades and courses.

Education service centers	Twenty regional ESCs across the state provide valuable resources to LEAs in achieving 100 percent STAAR online testing, such as support for obtaining funds for technological tools and improvement projects and for purchasing these tools, as well as trainings in how to best use them with students. Although not all ESCs are equal in terms of capacity to help, they do offer a wide array of supports to LEAs to achieve 100 percent STAAR online testing in the state of Texas. This support includes providing the following (though not identical in capacity across regions): • Technology connectivity purchasing services to maximize economies of scale • Access to several consortia designed to leverage the purchasing power of LEAs (i.e., NETXV Consortium, Fiber 10 Network Consortium, SuperNet Consortium, Fiber 20, ORION) • Consultative services in regard to acquiring funds for technology connectivity purchases (e.g., devices, bandwidth, fiber), such as E-rate program applications • Technology training • Connectivity, WAN Support, technology audits, and network consultation • Assistance to help maintain and support technology on the local area network, including file servers, workstations, connection devices, and desktop/network operating systems • Access to forums for LEAs to share ideas and discuss best practices among technology directors

Key Steps for Texas

Through the benchmarking and evaluation of online testing programs in other states and a close look at current readiness present in Texas, two key steps for implementation have been identified: (a) **invest in internet connectivity, technological devices, and personnel**, especially among the subset of LEAs currently not meeting readiness targets for online testing; and (b) **encourage and strengthen partnerships across all stakeholder groups** to ensure that educators, students, and parents are familiar and comfortable with online testing.

Step 1: Investment in Increasing Readiness

This study has established readiness criteria across the three domains of internet connectivity, personnel, and devices. The readiness domain of internet connectivity includes having the following: a fiber connection, sufficient bandwidth, and adequate internal connections (within, between, and among LEA campuses and buildings). Fiber and bandwidth improvements fall into E-rate Category 1, while internal connections are classified as Category 2 projects. The readiness domain of personnel includes meeting the 350:1 student-to-technology personnel ratio, while the device readiness domain includes meeting the 1:1 student-to-device ratio.

Study data shows that a majority of Texas LEAs indicated that they currently meet, or were predicted to meet, readiness goals across one or more of the three domains. Over 80 percent of LEAs have a fiber connection, while over 60 percent of LEAs indicated that they currently meet the one Mbps per student bandwidth standard. With regard to personnel and device readiness, 60 percent of responding LEAs currently meet the 350:1 student-to-technology personnel ratio, while nearly half of LEAs reported a student-to-device ratio of at least one student or less per device prior to the infusion of millions of devices purchased as a result of the COVID-19 pandemic. Although most Texas LEAs exhibit readiness in one or more areas, additional investment is key for LEAs not currently meeting readiness targets.

Step 1a: Identify Funding Connections with Other Statewide Initiatives

Survey responses from LEA and campus personnel identified cost as a preeminent concern for transitioning to 100 percent STAAR online testing by 2022–23. However, as LEAs across the state seek to increase their capacity for remote instruction and further integrate technology into existing methods of communication and instruction, programs and partnerships between state and federal education agencies and LEAs have emerged to attempt to close existing readiness gaps. Several of these endeavors have provided resources and funding to LEAs to upgrade their existing networks and infrastructures; purchase laptops, tablets, or other devices for student use; purchase mobile hotspot devices that allow students to access the internet while not on campus; or procure other needed resources. Below is a list of initiatives or programs that are currently active.

- **Operation Connectivity**—*$913 million net impact in 2019–20 and 2020–21 school years*
    - A state matching program was allocated to help support campuses as they improved their capacity to support remote learning during the COVID-19 pandemic and resulting school closures. This included a bulk order program as well as a reimbursement program.
    - Since March 2020, over 2.5 million devices have been purchased for use by Texas students.
    - All student learning devices (with the exception of a relatively small number of iPads acquired without keyboards) adopted through the bulk order program meet the STAAR testing minimum requirements and are the property of the individual LEA. It should be assumed that all devices will return to the classroom for daily use when full in-person instruction resumes after the pandemic.
    - Beyond the bulk order and reimbursements, collaboration continues with vendors to identify statewide fixed broadband solutions for students and families across the state. Indirect benefits may accrue to LEA offices and campus sites as a result of extended internet connectivity in geographic areas targeted.
    - The initiative also plans to stand up systematic data tracking of the connectivity gap at the student level.

- **Classroom Connectivity**—*$6 million impact in 2020–21 school year to Category 1 improvement projects*

- This program, backed by the governor's office, focuses on providing funds through a 10 percent state match program (cumulative $25 million impact) for LEAs that need fiber connections for their campuses and are eligible for E-rate Category 1 reimbursement for special construction fiber projects.
- Since 2015, nearly 500 campuses have been able to upgrade to fiber connections and 232 LEAs have upgraded their networks.
- In addition to funding, expert guidance for LEAs regarding network infrastructure and technology was made available through EducationSuperHighway.
- The 2017–20 match grant period is now closed, but beneficiaries were able to draw from funds through August 2020. The 2018–21 match grant remains open and $6 million in funds can be draw down until May 2021.
- It is important to note that the federal E-rate matching program does not apply to Category 2 E-rate reimbursement for internal connections.

- E-rate—*approximately $227 million impact annually, with possible additional funding*
  - Established in 1996, this FCC program disburses funds to help LEAs improve their network access and performance. The annual nationwide E-rate budget is about $4 billion, though the cap has not been reached in recent years.
  - The FCC commits approximately $240 million on an annual basis for Texas schools and libraries combined. The program can cover costs for external fiber or network projects and internal network improvement equipment but not internet provider redundancy or consulting.
  - E-rate reimbursements of 20–90 percent are based on the percentage of students in poverty, school location (urban or rural), and what type of services are being requested (external or internal).
  - Local education agencies can form partnerships/consortia to ease the application process. Eligible entities can band together to aggregately demand and negotiate lower prices. Currently, 18 consortia are applying in the 2020–21 school year.
  - For the 2020 application year, approximately 80 percent of all LEAs have applied as an individual LEA. A special application window has been created for the time period of September 16–October 16, 2020, to further assist LEAs requiring additional bandwidth due to the COVID-19 pandemic.
  - While E-rate Category 1 funding for things such as fiber projects and internet access are funded on an annual basis, Category 2 funds are capped at $167 per student across a five-year funding cycle.
  - **The upcoming funding cycle beginning in 2021 will shift budgets to the LEA level, rather than the campus level, allowing LEAs to administer one budget across all campuses. This change will simplify the process and also allow LEAs to allocate internal connection resources as needed across the LEA, rather than having to budget for each campus.**
  - **Additionally, the minimum amount of funding for small LEAs (less than 150 students) has been increased from $9,200 to $25,000, better incentivizing smaller LEAs to apply for E-rate funds. It is crucial that all LEAs apply for E-rate funding to help reach readiness levels.**

- **Technology Instructional Materials Allotment**—*approximately $1 billion biannually*
  - In 2017, the legislature renamed the Instructional Materials Allotment (IMA) to better describe the growing need for technology-related purchases to deliver the Texas Essential Knowledge and Skills (TEKS). Renamed the Technology and Instructional Materials Allotment (TIMA), the fund provides resources for LEAs to purchase instructional materials to support instruction of the TEKS established by the State Board of Education.
  - Each LEA is allotted TIMA funds during each biennium. Total allotment is based on 50 percent of funds allotted to the Permanent School Fund. Individual LEA funds are allocated by the commissioner based on a per student rate, with additional consideration for students who are English-language learners and LEAs with high growth rates.
  - A majority of TIMA funds is spent on acquiring state-adopted curricular and instructional materials through the Emergency Management Association of Texas (EMAT) ordering system.
  - After LEAs certify the purchase of materials to cover 100 percent of the TEKS, any remaining funds may be used to purchase and support technology-related instructional materials, including devices, salaries, and professional development. Any funds not expended during a school year or biennium roll over into the following year or biennium.

These existing initiatives could reduce some of the identified funds needed to achieve readiness for 100 percent STAAR online testing, as calculated by researchers in this study. Although a number of these initiatives are recent and continue to develop, some connections have been drawn between the funds being disbursed and financial needs captured in the study. Further triangulation is laid out below, as well as in Section 8.

In addition, it is important to note another initiative that will be heavily impacted by the transition to 100 percent online testing.

- **Multiple Choice (MC) Cap**—*negative impact of approximately $30 million per school year 2022–23 and beyond if new item types are implemented without 100 percent STAAR online testing*
  - HB 3906 establishes a cap stipulating that no more than 75 percent of a STAAR test can be multiple choice. This takes effect for all STAAR tests in 2022–23, to align with the legislative requirement for TEA to develop a plan to move to a full online administration by 2022–23. The new cap on multiple-choice questions will require changes to the design of the state assessments and the development of more engaging assessment questions.
  - New innovative item types present more authentic contexts for students to demonstrate mastery of learning objectives, can further engage students to improve motivation, and reduce the effects of guessing (Bryant, 2017).

- Educators began providing input during summer 2019 to help inform the new design and will continue to provide input through 2020. Field testing of new item types would be required, starting in the 2021–22 school year.
- With these new items included on all STAAR tests in 2022–23, human scoring will be needed for paper submissions of the test in the instance that 100 percent online testing adoption is delayed. The approximate cost of human scoring is estimated to be around $30 million per year beginning in 2022–23 (assuming cost of $1–$2 per item graded).

Step 1b: Priority Implementation Cost Estimates

Concurrent examination of the total estimated costs to move all Texas LEAs to a state of complete readiness for online testing and an analysis of existing funding sources and recent initiatives related to connectivity and devices highlights several costs that need to be prioritized as a state to facilitate a successful transition to online testing for non-ready LEAs. Additionally, estimates of the total cost to the state of transitioning to 100 percent STAAR online testing should consider the impact of large-scale initiatives that could significantly decrease the total cost. Final figures associated with this cost are outlined in the final Transition Plan, but it is first important to note how cost categories previously discussed are applied in context. **Several revisions and assumptions are noted below, with full transition costs detailed in the Transition Plan in Section 8.**

Devices. Due to the impact of Operation Connectivity, estimated one-time costs associated with purchasing devices are no longer considered an outstanding cost. For example, additional devices cost estimates for all LEAs were initially projected to be $37–$72.9 million in May 2020, and since then there has been at least $913 million of device and hotspot spending by the state and the LEAs. Purchasing of devices through Classroom Connectivity has largely met the needs of LEAs and their students for devices meeting minimum requirements for online learning and testing.

Personnel. Outstanding annual personnel costs for non-ready LEAs are estimated at $7.3 million per year ($6.1 million for technology personnel stipends and $1.2 million for training). TIMA, while not an additional funding source, can be leveraged to cover technology personnel needs, given that LEAs have local control over how these funds can be best allocated. Although some LEAs may need additional full-time FTEs for year-round support, other LEAs may feel that just-in-time support might be more appropriate for online testing at various points during the school year. At a minimum, it will be important for LEAs to designate one technology point person per campus to assist the campus testing coordinator (if not the designee) in technological preparation for online testing.

Internet Connectivity. Internet connectivity readiness for online testing covers three primary categories:

- Sufficient bandwidth—Internet "speed" of one Mbps per student recommended for smooth digital learning and online testing
- Internal Connections—Connections within, between, and among district buildings, including routers, cabling, and wireless access points
- Fiber—Connection from the internet service provider's line from the street to inside the building

An average of 76 percent reimbursement through E-rate has been applied for all internet connectivity cost categories, leaving the remaining 24 percent that is the outstanding, non-reimbursable cost. Last-mile fiber estimates for these campuses range from $3.2 million to $5.4 million, resulting in an estimated $0.8–$1.3 million one-time outstanding cost. Similarly, an estimated $2.7 million one-time outstanding cost (less E-rate reimbursement) is needed to update the internal connections for the 85 LEAs (284 campuses) estimated to lack sufficient bandwidth to meet the one Mbps per student readiness standard. Finally, an estimated $6.1 million per year annual ongoing cost (less E-rate reimbursement) is attributed to maintaining the additional bandwidth needed for internet access for the 461 LEAs (3,570 campuses) that do not meet the one Mbps bandwidth standard.

Step 2: Encouraging and Strengthening Stakeholder Relationships through Change Management

A two-year transition will allow educators and students time to increase familiarity and comfort with online testing. As the state works to facilitate the transition to 100 percent STAAR online testing by 2022–23, fostering ownership at each level will also promote buy-in from different stakeholder groups.

First, a formalized communication plan will improve levels of support to LEAs as they transition to 100 percent STAAR online testing and will ensure that additional resources could be added to those already available. **A good first step might be an improved online repository of helpful information and resources; that is a one-stop shop for building toward 100 percent online testing.** Officials could subscribe to the page for updates and be kept abreast of new information or resources as they are added. The roll-out of this platform could be coordinated across multiple social media platforms, as many LEAs maintain a presence in these environments. Increased coordination between TEA and ESCs around the state to distribute needed information and resources would also be advisable, as many LEAs already work closely with their nearby ESC officials for trainings and support. These connections could also be used to help the test vendor communicate with LEAs that need its technical advice. The ESCs could continue to support LEAs as they seek out funding opportunities and could provide them with training resources. Additional technological supports could include assistance with testing the capabilities of LEAs' network infrastructure to ensure STAAR online tests are administered smoothly.

Some crucial pieces of information include the following:

- **Training resources made available in multiple formats, including interactive documents and videos**. Live virtual meetings would continue to be used to facilitate the distribution of helpful information to LEAs across the state. Those meetings should be recorded, and the recordings should be made available to those who could not attend the live sessions.
- **Information regarding state and federal funding opportunities**. Application procedures for this funding should be simple and straightforward to facilitate the process for those LEAs that may lack personnel with experience in applying for external funding.
- **Case studies of exemplar LEAs could be featured as helpful guides for other LEAs that find themselves at similar points in the process.** An LEA that is near complete readiness, an LEA that is on track with the chosen transition plan, and an LEA that is lagging behind— but making progress—would be ideal choices. This group could be expanded to include additional LEAs that meet certain specific aspects of readiness (network, device, or personnel) or that are found in various geographical contexts (rural, urban, suburban, large or small), to increase relatability for other LEAs. Information about steps these LEAs took or are currently taking to meet implementation goals could be featured in materials provided to LEAs throughout the transition.

In terms of general implementation considerations for LEAs, it is recommended that LEAs be given freedom in choosing how they want to employ different approaches to meet online testing goals. For example, students in upper grade levels typically have an easier transition to electronic testing than do their younger counterparts, so focusing on higher grades first might be worth considering. Furthermore, five STAAR EOC assessments are required for students in grades 9–12, while 17 tests are currently required for students in grades 3–8. Survey data gathered in this study revealed that high school campuses had a lower student-per-device ratio and a lower student-per-technology support staff ratio than did elementary campuses, so readiness for electronic testing may be greater on campuses serving higher grades.

The LEAs that cannot reach the implementation goal by 2022–23 will need to account for limitations affecting their progress to readiness for electronic testing. The TEA can facilitate the application of deferment waivers in which LEAs are required to detail the limitations they face, prior to approval. This will provide a helpful source of information for the state and allow for more strategic deployment of resources and supports to help close readiness gaps.

Conclusions

In reviewing the intelligence gathered through this study (benchmarking of state assessment programs, LEA and campus surveys, and case study interviews) and other relevant sources of information regarding currently available funding, it is estimated that the State of Texas is relatively close to having the infrastructure necessary, on top of its years of experience, to administer all assessments electronically by 2022–23. As mentioned previously, two key steps are necessary to close the remaining readiness gaps: (a) invest in internet connectivity, technological devices, and personnel, especially among the subset of LEAs currently not meeting readiness targets for online testing; and (b) encourage and strengthen partnerships across all stakeholder groups to ensure that educators, students, and parents are familiar and comfortable with online testing. While this section provides some detail on change management, necessary stakeholder action by level is provided in Section 8.

Section 8. Transition Plan

Introduction

As previously discussed in this report, growing utilization of digital learning environments across the nation has coincided with increases in student online testing, resulting in the number of online tests for grades 3–8 students surpassing the number of paper-based tests for the first time in the 2015–16 school year (EdTech Strategies, LLC, 2016). Online testing holds many advantages for students, including a closer match between digital learning systems and assessments, flexibility in scheduling, potential for faster results, and accommodation supports for students with disabilities. These embedded supports, including text to-speech and other content and language tools, have largely facilitated the digital assessment of students requiring accommodations.

As outlined in Section 7, next steps for Texas in preparing for 100 percent STAAR online testing are as follows:

(1) **Investing in internet connectivity, technological devices, and personnel among the subset of districts currently not meeting readiness targets for online testing.** Those LEAs not meeting readiness targets should continue to apply for funding support for infrastructure improvement projects through E-rate. The Texas legislature could consider expanding the authorized use of TIMA, as well as creating new matching grant programs to fund additional investments in infrastructure improvements, similar to the Classroom Connectivity initiative.

(2) **Encouraging and strengthening partnerships across all stakeholder groups to ensure that educators, students, and parents are familiar and comfortable with online testing.** Remote learning during COVID-19 has already increased student and educator familiarity with online platforms. Establishing strong stakeholder partnerships over the next two years to provide consultative support in implementing online testing (e.g., scheduling, technology support, and trainings) and ensuring close connection between technology and test personnel will generate greater ownership across all levels of implementers, leading to further buy-in for online testing and overall digital literacy goals.

Readiness Targets for 100 Percent Online Testing

The following readiness targets have been researched and established for transitioning to 100 percent online testing:

- 3:1 student-to-device ratio
- 1 Mbps per student of fiber connection or scalable internet
- 350:1 student-to-technology personnel ratio

These readiness targets are already being addressed by LEAs as they work to meet the baseline requirements for increasing digital literacy outlined in the Long-Range Plan for Technology (TEA, 2018):

- 1:1 student-to-device ratio
- 1 Mbps per student of fiber or wireless connection
- 350:1 device-to-technology personnel ratio

The readiness targets as specified by this project have thresholds that are equal to or lower than those established by the Long-Range Plan for Technology (TEA, 2018). Although Texas is very close to finalizing the infrastructure necessary to administer all assessments online, further investment in time, effort, and funding is required.

Funding Necessary for Transition to 100 Percent Online Testing

Despite the majority of LEAs in Texas being ready for online testing, a subset of LEAs (primarily those that are small and rural) will require additional investment in internet connectivity and personnel. Tables 23 and 24 illustrate the readiness needs and associated one-time and on-going costs of these LEAs. Outstanding one-time costs for LEAs to meet the readiness targets amount to \$3.5–\$4.0 million, consisting of \$0.8–\$1.3 million for fiber and \$2.7 million for internal connection improvements not covered by the federal E-rate program. The unmet annual ongoing costs that districts need to cover amount to \$13.4 million, consisting of \$6.1 million for additional bandwidth not covered by E-rate, \$6.1 million for technology personnel stipends, and \$1.2 million for online testing training. Meeting the outstanding costs will require LEAs to be strategic in their allocation of available funding (i.e., TIMA). Of note, since March 2020, 2.5 million devices have been purchased for LEAs and students through Operation Connectivity, providing the needed devices for 100 percent online testing.

TABLE 23. One-Time Implementation Costs

	Volume needed	Additional cost to meet readiness targets	Estimated E-Rate coverage	**Outstanding costs**
Fiber	70 Campuses	\$3.2M–\$5.4M	\$2.4M–\$4.1M	**\$0.8M–\$1.3M**
Internal connections (LAN/WAN)	85 LEAs	**\$9.7M**	**\$7.0M**	**\$2.7M**

TABLE 24. Annual Ongoing Implementation Costs

	Volume needed	Additional cost to meet readiness targets	Estimated E-Rate coverage	**Outstanding costs**
Fiber maintenance	70 Campuses	<0.1M	*Negligible*	*Negligible*
Internet bandwidth	461 LEAs	$25.4M	$19.3M	**$6.1M**
Technology personnel*	2,452 tech personnel	**$6.1M**	---	**$6.1M**
Technology personnel raining	2 hours per tech personnel	**$1.2M**	---	**$1.2M**

*TIMA provides $500M annually that can be used on instructional materials and technology (including salaries and other expenses of an employee who provides technical support for the use of equipment).

Recommendations for State Stakeholders

A two-year transition will allow educators and students time to increase familiarity and comfort with online testing. As a part of a larger change management effort, stakeholders at all levels can consider the following examples as ways to enable a smooth transition to 100 percent online testing.

TEA

- Continue to provide opportunities for training of LEA personnel and educators
- Continue to provide practice tests, tutorials, and other tools (e.g., STAAR Interim Assessments) for students to practice interacting with the online platform
- Create a one-stop shop for resources helpful in building toward 100 percent online testing. Either improve the existing HB 3906 webpage on the TEA website or create a completely new site, to simplify LEAs' access to useful materials during the transition process
- Provide consultative support in implementing online testing, such as technology support and trainings
- Establish deferment waivers for districts that cannot meet deadlines during transition years to track progress across the state
- Coordinate with the recently convened Texas Governor’s Broadband Development Council to share their findings and recommendations with LEAs for increasing internet access for schools and students in under-served areas of the state. Formed in 2019 by HB 1960, the first report from this council is due to the governor in November 2020.

ESCs or testing vendors

- Provide professional development opportunities for educators to learn more about online testing and gain familiarity with the online platform
- Assist TEA as it provides consultative support in implementing online testing, such as scheduling technology support and trainings
- Provide consultative support with E-rate applications, ensuring all LEAs apply individually or are part of a consortium

LEAs

- Continue to move toward digital literacy goals and connect the transition to online assessments with other technology initiatives (refer to STAAR online implementation checklist)
- Provide professional development and opportunities to increase digital literacy and fluency among educators and students and enable them to gain familiarity with the testing platform
- Ensure connections between technology and testing personnel and help conduct network stress tests prior to summative assessment administration
- Use "Supporting Online Testing Resources" to prepare for online testing (see Appendix D)

Final Considerations

To recap, the present project used surveys, interviews, and case studies to gather and analyze data regarding current LEA readiness for 100 percent online STAAR testing across multiple domains and explored previous experiences with online testing in Texas and in other states. These data helped researchers to determine readiness and to develop an estimation of the remaining costs to reach 100 percent readiness. Existing funding initiatives that may help defray implementation costs were identified and included in financial calculations. Finally, some general recommendations were made for state stakeholders and the Texas legislature as they move forward in implementing electronic testing with students, to meet the goals as outlined in HB 3906.

The transition to 100 percent online testing requires the state legislature to amend TEC §39.02341 to clarify the scope of these online testing requirements and to confirm the 2022–23 deadline. In clarifying the scope, the STAAR Alternate 2 should be exempted from the 100 percent online transition. Given the unique needs of students who take STAAR Alternate 2, LEAs should be permitted to administer the assessment in the format that is most appropriate for participating students. A very small number of students with circumstances that prevent them from testing online (e.g., visual impairments) will continue to test on paper. Confirmation of the implementation deadline would communicate to stakeholders that the transition to 100 percent online testing is a priority goal for the state and appropriate measures to achieve it must be taken. This deadline also coincides with the rollout of the 75 percent multiple-choice cap (part of HB 3906), in which TEA is currently developing new item types for the STAAR. A simultaneous rollout limits the amount of change management required, in contrast to these mandates being implemented separately. If the implementation of new items occurs without online testing, an additional annual cost of $30 million would be incurred to manually score these items.

In addition to this priority recommendation, two additional steps could be considered by the legislature. First, the legislature could consider expansion of the authorized uses of TIMA (TEC §31.0211) to cover internet connectivity and training for online testing. By creating new allowable expenses categories for bandwidth costs, training for online testing, fiber, and internal connections (LAN/WAN), schools would be more able to strategically use their allotment of funds to become ready for online testing. Additionally, these expenses are increasingly necessary as schools continue to instruct students in multiple environments, including in-person, virtual, and hybrid. Second, the formation of a new matching grant fund that could be used to help LEAs finance one-time network infrastructure investment could be considered. This new grant fund could operate similarly to Classroom Connectivity for Category 1 costs, which provided financial assistance to LEAs as they applied to upgrade to fiber connections and bandwidth. These two adjustments to existing legal code would assist LEAs and TEA as they work to shift to technology-dependent online assessment of students.

In conclusion, as LEAs and state and federal agencies continue to work together toward closing current readiness gaps, ongoing and consistent monitoring of progress is recommended. The COVID-19 pandemic and resulting closures, and the reliance on remote instruction, are providing strong catalysts for increasing technological capabilities of LEAs. This present momentum could be helpful as schools prepare to transition to 100 percent online STAAR in the coming years. The earlier adoption of the Long-Range Plan for Technology (TEA, 2018) and the included baseline requirements for increasing digital literacy have helped LEAs prepare for the last stages of movement toward readiness. The final lift needed for the few LEAs not currently ready for 100 percent online testing will require the utilization of existing funding sources and the strategic allocation of LEA funds to attain the goals laid out in HB 3906. Achieving something of this magnitude will require close coordination among stakeholders, including LEAs, TEA, ESCs, the testing vendor, and the Texas legislature. Some aspects of the transition will be carried out by a single entity, but many features will depend on partnerships and collaborative efforts to reach effective implementation by 2022–23.

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Appendices

APPENDIX A. State-by-State Benchmarking Chart

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Primarily Electronic Administration of Summative Test							
Alabama	Yes	Primarily online	ELA/math: 3; science: 5, 7	2 weeks	Yes (ELA/math/ science)	Yes	Scantron, Data Recognition Corporation (DRC)
Arkansas	Yes	Primarily online	ELA/math/writing/science: 3-10 (ACT Aspire)	5 weeks	No	Yes	ACT
California*	Yes	Primarily online	ELA/math: 3-8, 11; science: 5, 8, HS	5 weeks	Yes (ELA/math)	Yes	Smarter Balanced, Educational Testing Services (ETS) with CA DoEd
Connecticut	Yes	Primarily online	ELA/math: 3-8; science: 5, 8, 11	NA	Yes (ELA/math)	Yes	Smarter Balanced, College Board, Next Generation Science Standards (NGSS)
Delaware	Yes	Primarily online	ELA/math: 3-8; science: 5, 8, 11; SS: 4, 7, 11	10 weeks	Yes (ELA/math)	Yes	Smarter Balanced, AIR, WestEd, Pearson

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Georgia*	Yes	Primarily online	ELA/math: 3-8; science: 5, 8; SS: 5, 8; EOC exams	NA	No	Yes	DRC, GA DoEd
Hawaii	Yes	Primarily online	ELA/math: 3-8, 11; science: 4, 8, HS; EOC Exams	NA	Yes (ELA/math/science/ EOCs)	Yes	Smarter Balanced, AIR
Idaho	Yes	Primarily online	ELA/math: 3-8, 10; science: 5, 8, 11	NA	Yes (ELA/math/science)	Yes	Smarter Balanced, AIR
Illinois	Yes	Primarily online	ELA/math: 3-8; science: 5, 8, 11	9 weeks	Unknown	Unknown	Pearson
Indiana	Yes	Primarily online	ELA/math: 3-8; science: 4, 6, HS; SS: 5, HS	NA	Yes (ELA/math/science)	Yes	Smarter Balanced, AIR
Kansas	Yes	Primarily online	ELA/math: 3-8, 10; science: 5, 8, 11	2 weeks	Yes (ELA/math/science)	Unknown	University of Kansas Achievement and Assessment Institute, DLM
Maine	Yes	Primarily online	ELA/math: 3-8	8 weeks	Unknown	Unknown	Cognia, DRC,
Maryland	Yes	Primarily online	ELA/math: 3-8, HS; science: 5, 8, HS	ELA: 8 weeks, science: 4 weeks	No (move to CAT in 2021)	No	ETS, Pearson
Massachusetts	Yes	Primarily online	ELA/math: 3-8, 10; science: 5, 8, HS	8 weeks	Unknown	Unknown	Cognia

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Minnesota	Yes	Primarily online	ELA/math: 3-8, HS; science: 5, 8, HS	10 weeks	Yes (ELA/math)	Unknown	Pearson
Mississippi	Yes	Primarily online	ELA/math: 3-8, HS: science: 5, 8, HS	5 weeks	Unknown	Unknown	Questar, DRC
Missouri	Yes	Primarily online	ELA/math: 3-8; science: 5, 8; EOC exams	EOC: 15 weeks, ELA/math: 8 weeks	No	Unknown	DRC, Nextera, Questar
Montana	Yes	Primarily online	ELA/math: 3-8; science: 5, 8	10 weeks	Yes (ELA/math)	Yes	Smarter Balanced, AIR,
Nebraska	Yes	Primarily online	ELA/math: 3-8; science: 5, 8	NA	Yes (ELA/math)	Yes	Northwest Evaluation Association,
Nevada	Yes	Primarily online	ELA/math: 3-8; science: 5, 8, HS; EOC exams	12 weeks	Yes (ELA/math)	Yes	Smarter Balanced, DRC
New Hampshire	Yes	Primarily online	ELA/math: 3-8; science: 5, 8, 11	NA	Unknown	Unknown	AIR
New Jersey	Yes	Primarily online	ELA/math: 3-10; science: 5, 8, 11	9 weeks	Unknown	Unknown	New Meridian, Pearson,
New Mexico	Yes	Primarily online	ELA/math: 3-8, HS; science: 5, 8, 11	5 weeks	No	Yes	Cognia
North Carolina	Yes	Primarily online	Math: 5, 8; science: 5, 8; EOC exams	2 weeks	No	Unknown	Questar with NC DoEd
North Dakota	Yes	Primarily online	ELA/math: 3-8, 10; science: 4, 8, 10	8 weeks	Unknown	Unknown	AIR, Dynamic Learning Maps with ND DoEd
Ohio	Yes	Primarily online	ELA/math: 3-8, HS; science: 5, 8, HS	NA	No	Unknown	AIR

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Oregon	Yes	Primarily online	ELA/math: 3-8, 11; science: 5, 8, 11	NA	Yes (ELA/math)	No	Smarter Balanced
South Carolina	Yes	Primarily online	ELA/math: 3-8; science: 4, 6; EOC exams	4 weeks	No	Unknown	DRC
Utah	Yes	Primarily online	ELA/math: 3-8; writing: 5, 8; science: 4-8; EOC exams	8 weeks	Yes (ELA/math/science/EOCs)	No	AIR, Questar, Pearson
Vermont	Yes	Primarily online	ELA/math: 3-9	NA	Yes (ELA/math)	Unknown	Smarter Balanced, AIR, VT DoEd,
Virginia	Yes	Primarily online	ELA/math: 3-8; writing: 8; science: 5, 8; SS: 4/5, 6/7/8; EOC exams	11 weeks	Yes (ELA/math)	Unknown	Pearson
Washington	Yes	Primarily online	ELA/math: 3-8, 10; science: 5, 8, 11;	NA	Yes (ELA/math)	Yes	Smarter Balanced, AIR,
Washington D.C.	Yes	Primarily online	ELA/math: 3-8, HS; science: 5, 8; EOC exams	6 weeks	Unknown	Yes	PARCC, New Meridian, Pearson
West Virginia*	Yes	Primarily online	ELA/math: 3-8; science: 5, 8	NA	Yes (ELA/math)	Yes	AIR
Wisconsin	Yes	Primarily online	ELA/math: 3-8; science: 4, 8; SS: 4, 8, 10; (+ACT Aspire)	NA	Unknown	No	DRC, ACT

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Wyoming	Yes	Primarily online	ELA/math: 3-8, 9, 10; science: 4, 8, 10	NA	Yes (ELA/math)	Unknown	AIR
Kentucky*	Yes	Transitioning to primarily online	ELA/math: 3-8, 10; writing: 5, 8, 11; science: 4, 8, 11; SS: 5, 8	1 week	No	Unknown	Pearson, ACT
Hybrid Administration of Summative Test							
Florida*	Yes	Hybrid	Math: 7-8, HS; ELA/writing: 7-10; EOC exams	4 weeks	No	Unknown	AIR, Pearson
Either Paper or Electronic Administration of Summative Test							
Alaska	Yes	Either	ELA/math: 3-9; science: 4, 8, 10;	NA	No	Unknown	DRC, AK DoEd
Arizona	Yes	Either	ELA/math: 3-8,10; science: 4, 8, HS	NA	No	Unknown	American Institutes for Research (AIR), Pearson
Colorado	Yes	Either	ELA/math: 3-8; science: 5, 8, 11; SS: 4, 7, 11 (limited roll-out)	5 weeks	No	No	Pearson
Iowa	Yes	Either	ELA/math: 3-11; writing: 3-11; science: 5, 8, 10	NA	Unknown	Unknown	Iowa Testing Program, Pearson

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Louisiana	Yes	Either	ELA/math: 3-8; science: 3-8: SS: 3-8; EOC exams	9 weeks	No	No	DRC, WestEd
Michigan	Yes	Either	ELA/math: 3-7 (w/PSAT in 8); science: 5, 8, 11; SS: 5, 8, 11	5 weeks	Yes (ELA/math)	Yes	Smarter Balanced, DRC, ACT, College Board
New York	Yes	Either	ELA/math: 3-8	4 weeks	Unknown	No	Questar with NY DoEd
Oklahoma	Yes	Either	ELA/math: 3-8; science: 5, 8, 11; SS: 11	2 weeks	Unknown	Unknown	Cognia
Pennsylvania*	Yes	Either	ELA/math: 3-8; science: 4, 8; EOC exams	4 weeks	Yes (optional interim assessments in ELA/math/science)	Yes	DRC with PA DoEd
Rhode Island	Yes	Either	ELA/math: 3-8, 11; science: 5, 8, 11	2 weeks	Unknown	Unknown	AIR, Cognia with MA DoEd
South Dakota	Yes	Either	ELA/math: 3-8; Science: 5, 8, 11	NA	Yes (ELA/math)	Unknown	Smarter Balanced, AIR,
Texas	Yes	Either	ELA/Math: 3-8; writing: 4-7; Science: 5, 8; SS: 8; EOC exams	5 weeks	No	No	ETS
Paper Only Administration of Summative Test							

State	Summative online assessments available	Summative assessments: Administration mode	Summative online assessments: Subjects/ grade levels	Summative online assessment window	Computer-adaptive testing utilized	Interim or formative online assessments	Current assessment partners
Tennessee	Available but only paper tests given in 2019–20, due to legislative action	Paper	ELA/math: 3-8; science: 3-8; SS: 6-8; EOC exams	Not Applicable	NA	Unknown	Pearson

**State identified for interview*

APPENDIX B. Respondent Demographics by ESC Region and NCES Locale Category

TABLE B.1. Responding **LEAs** by ESC Region and NCES School Locale Category

	City				**Suburban**				**Town**				**Rural**				**Region Total**			
	LEAs		State		LEAs		State		LEAs		State		LEAs		State		LEAs		State	
	n	%	*N*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Region 1	12	7.95	12	6.19	14	11.97	16	11.19	6	3.61	6	2.83	6	1.28	9	1.38	38	4.22	43	3.58
Region 2	6	3.97	8	4.12	1	0.85	1	0.70	12	7.23	16	7.55	16	3.43	21	3.22	35	3.88	46	3.83
Region 3	1	0.66	1	0.52	0	0.00	0	0.00	8	4.82	10	4.72	24	5.14	28	4.29	33	3.66	39	3.25
Region 4	21	13.91	32	16.49	26	22.22	31	21.68	5	3.01	8	3.77	11	2.36	13	1.99	63	6.99	84	6.99
Region 5	4	2.65	5	2.58	4	3.42	6	4.20	3	1.81	5	2.36	16	3.43	20	3.07	27	3.00	36	3.00
Region 6	6	3.97	6	3.09	2	1.71	2	1.40	6	3.61	9	4.25	27	5.78	44	6.75	41	4.55	61	5.08
Region 7	6	3.97	7	3.61	2	1.71	3	2.10	20	12.05	23	10.85	52	11.13	69	10.58	80	8.88	102	8.49
Region 8	3	1.99	3	1.55	1	0.85	1	0.70	11	6.63	11	5.19	21	4.50	31	4.75	36	4.00	46	3.83
Region 9	2	1.32	2	1.03	0	0.00	0	0.00	7	4.22	9	4.25	19	4.07	26	3.99	28	3.11	37	3.08
Region 10	20	13.25	30	15.46	26	22.22	33	23.08	9	5.42	12	5.66	35	7.49	43	6.60	90	9.99	118	9.83
Region 11	11	7.28	12	6.19	14	11.97	19	13.29	9	5.42	11	5.19	39	8.35	51	7.82	73	8.10	93	7.74
Region 12	4	2.65	5	2.58	7	5.98	8	5.59	9	5.42	11	5.19	40	8.57	57	8.74	60	6.66	81	6.74
Region 13	13	8.61	19	9.79	9	7.69	12	8.39	9	5.42	13	6.13	19	4.07	30	4.60	50	5.55	74	6.16
Region 14	1	0.66	2	1.03	1	0.85	1	0.70	4	2.41	7	3.30	22	4.71	33	5.06	28	3.11	43	3.58
Region 15	1	0.66	2	1.03	0	0.00	0	0.00	7	4.22	9	4.25	18	3.85	32	4.91	26	2.89	43	3.58
Region 16	2	1.32	2	1.03	1	0.85	1	0.70	7	4.22	12	5.66	32	6.85	47	7.21	42	4.66	62	5.16
Region 17	3	1.99	3	1.55	1	0.85	1	0.70	9	5.42	13	6.13	32	6.85	42	6.44	45	4.99	59	4.91
Region 18	3	1.99	5	2.58	0	0.00	0	0.00	10	6.02	10	4.72	13	2.78	21	3.22	26	2.89	36	3.00
Region 19	9	5.96	11	5.67	3	2.56	3	2.10	1	0.60	1	0.47	3	0.64	4	0.61	16	1.78	19	1.58
Region 20	23	15.23	27	13.92	5	4.27	5	3.50	14	8.43	16	7.55	22	4.71	31	4.75	64	7.10	79	6.58
Locale Total	**151**		**194**		**117**		**143**		**166**		**212**		**467**		**652**		**901**		**1,201**	

TABLE B.2. Responding **Campuses** by ESC Region and NCES School Locale Category

	City				**Suburban**				**Town**				**Rural**				**Region Total**			
	Campuses		State		Campuses		State		Campuses		State		Campuses		State		Campuses		State	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Region 1	60	6.31	298	8.85	53	8.18	217	9.89	9	4.29	34	3.16	33	6.04	116	5.28	155	6.68	665	7.52
Region 2	52	5.47	86	2.55	0	0.00	5	0.23	13	6.19	70	6.50	18	3.30	54	2.46	83	3.52	215	2.43
Region 3	5	0.53	17	0.50	0	0.00	1	0.05	13	6.19	47	4.36	26	4.76	83	3.78	44	1.87	148	1.67
Region 4	175	18.40	576	17.10	219	33.80	680	30.98	5	2.38	34	3.16	40	7.33	149	6.78	439	18.64	1439	16.28
Region 5	29	3.05	46	1.37	2	0.31	43	1.96	4	1.90	19	1.76	12	2.20	61	2.78	47	2.00	169	1.91
Region 6	41	4.31	79	2.35	10	1.54	43	1.96	19	9.05	54	5.01	41	7.51	148	6.73	111	4.71	324	3.67
Region 7	13	1.37	54	1.60	5	0.77	18	0.82	14	6.67	114	10.58	32	5.86	204	9.28	64	2.72	390	4.41
Region 8	2	0.21	15	0.45	1	0.15	6	0.27	13	6.19	47	4.36	15	2.75	79	3.59	31	1.32	147	1.66
Region 9	19	2.00	32	0.95	0	0.00	0	0.00	11	5.24	32	2.97	11	2.01	48	2.18	41	1.74	112	1.27
Region 10	113	11.88	530	15.74	131	20.22	514	23.42	11	5.24	75	6.96	25	4.58	182	8.28	280	11.89	1301	14.72
Region 11	41	4.31	367	10.90	87	13.43	312	14.21	4	1.90	77	7.15	49	8.97	170	7.73	181	7.69	926	10.48
Region 12	10	1.05	97	2.88	8	1.23	63	2.87	11	5.24	53	4.92	45	8.24	151	6.87	74	3.14	364	4.12
Region 13	60	6.31	286	8.49	59	9.10	126	5.74	22	10.48	63	5.85	67	12.27	184	8.37	208	8.83	659	7.46
Region 14	18	1.89	41	1.22	2	0.31	19	0.87	3	1.43	35	3.25	23	4.21	75	3.41	46	1.95	170	1.92
Region 15	11	1.16	30	0.89	0	0.00	0	0.00	1	0.48	40	3.71	13	2.38	89	4.05	25	1.06	159	1.80
Region 16	0	0.00	63	1.87	0	0.00	3	0.14	17	8.10	68	6.31	16	2.93	89	4.05	33	1.40	223	2.52
Region 17	49	5.15	60	1.78	3	0.46	4	0.18	6	2.86	64	5.94	14	2.56	86	3.91	72	3.06	214	2.42
Region 18	12	1.26	74	2.20	1	0.15	3	0.14	8	3.81	44	4.09	4	0.73	45	2.05	25	1.06	166	1.88
Region 19	59	6.20	193	5.73	14	2.16	40	1.82	2	0.95	4	0.37	10	1.83	24	1.09	85	3.61	261	2.95
Region 20	182	19.14	424	12.59	53	8.18	98	4.46	24	11.48	103	9.56	52	9.52	161	7.32	311	13.21	786	8.89
Locale Total	**951**		**3,368**		**648**		**2,195**		**210**		**1,077**		**546**		**2,198**		**2,355**		**8,838**	

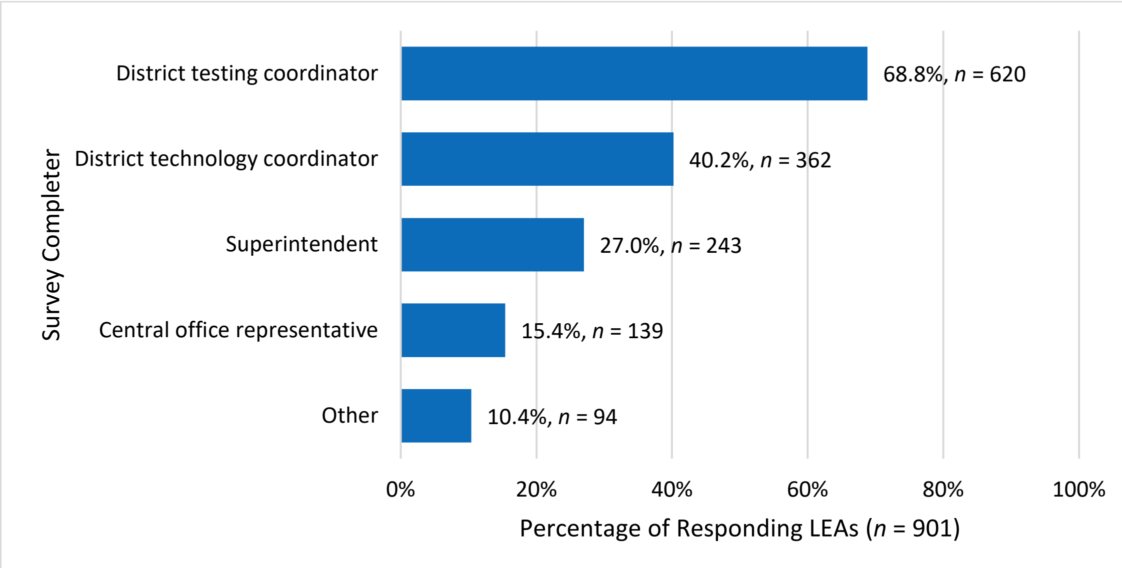
Note: The table represents responding campuses for which NCES and ESC Region data were available compared to the total number of campuses in the state for which these data were available. Therefore, the totals in this table are slightly different from the total number of responding campuses.

APPENDIX C. Survey Questions and Responses

STAAR Online Testing Needs Assessment LEA Survey

Getting Started:

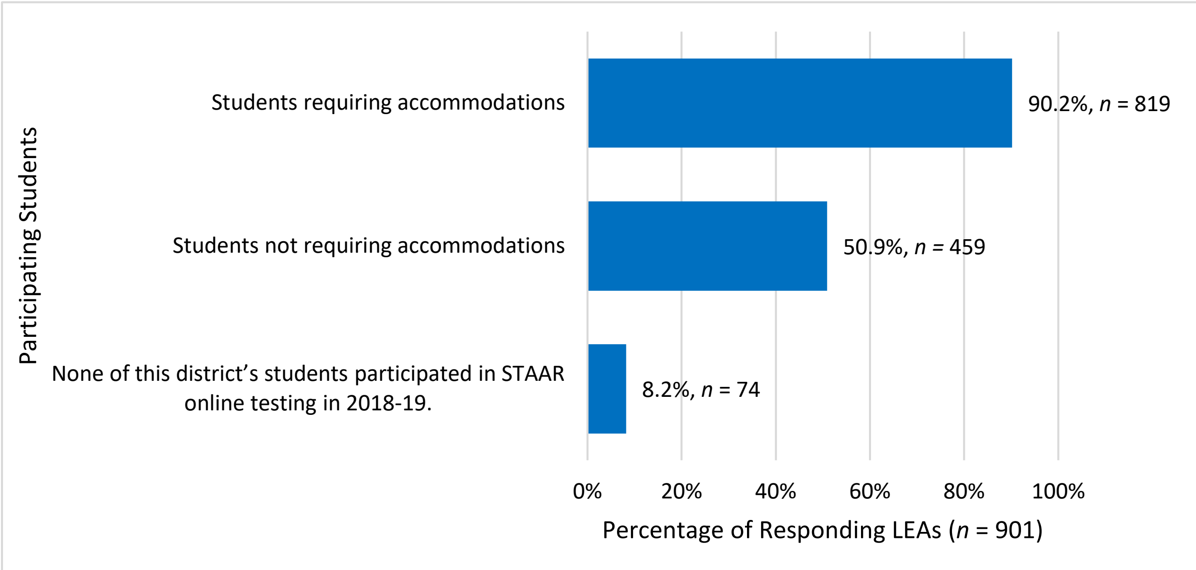
1. Who is providing information to complete the survey for this LEA? Select all that apply[2].



Note: Other types of responding personnel included other LEA- and campus-level personnel

[2] On any question for which participants were allowed to select more than one answer, the total number of responses may exceed the total number of responding campuses. In all cases, the percentage depicted reflects the percent of the total respondents who selected each category.

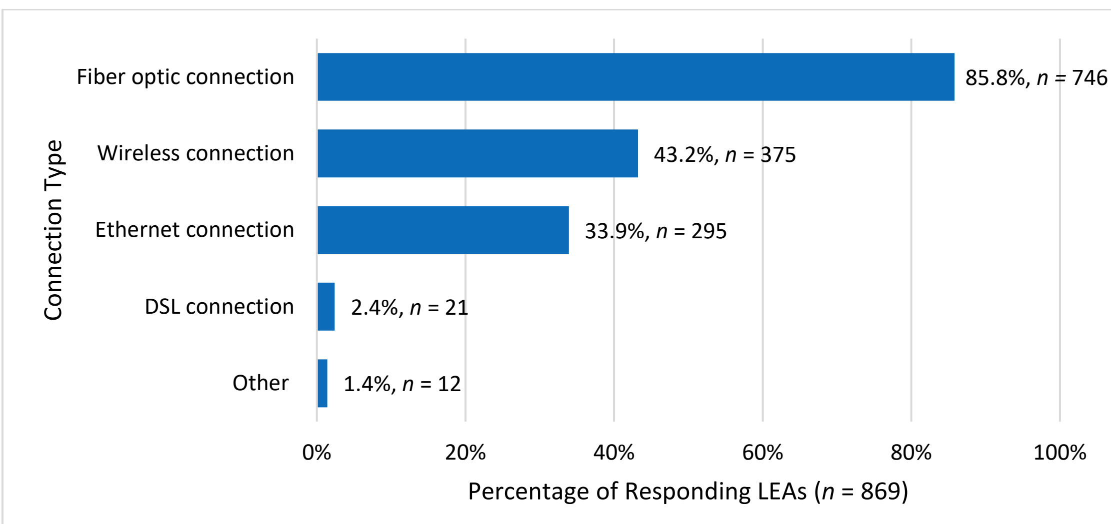
2. Which of the following student groups in this LEA participated in online administration of State of Texas Assessments of Academic Readiness (STAAR) during the 2018–19 school year? Select all that apply. *Do not include retests or STAAR Interim participation*.



Note: LEAs were able to select both options for student groups, if applicable. Just over 50 percent of LEAs (*n* = 451) indicated that students **both** with and without accommodations participated in STAAR CBA in 2018–19.

Network/Infrastructure:

3. What type of internet connection is used by this LEA? Select all that apply.



Note: A majority of respondents in the "Other" category indicated use of hot spots, line of sight, or microwave connections.

4. What is the available bandwidth of this LEA's <u>main</u> telecommunications/internet connection to classrooms, in Megabits per second (Mb/s)? Utilize the System Check Test to determine the system's bandwidth.

	Number	Percent
0 to 150 Mb/s	88	10.3
151 Mb/s to under 500 Mb/s	160	18.8
500 Mb/s to under 1 Gb/s	258	30.3
Greater than 1 Gb/s	60	7.1
Bandwidth capacity at this district is not known.	285	33.5
Total	851	100.0

5. Does this LEA monitor bandwidth at the campus level?

	Number	Percent
Yes	450	52.6
No	406	47.4
Total	856	100.0

*****Questions 6 and 7 were asked only of LEAs that indicated in Question 5 that the LEA monitors bandwidth at the campus level.**

6. How many of this LEA's campuses fall within each range of typical bandwidth <u>usage</u> on a regular school day?

Typical bandwidth usage	Median number of campuses	Range of campuses
0 to 24% (*n* = 394)	19.1	0–268
25% to 49% (*n* = 394)	8.6	0–100
50% to 74% (*n* = 392)	8.2	0–144
75% to 100% (*n* = 392)	5.94	0–82

7. Keeping in mind that a certain percentage of available bandwidth is (or must be) held in reserve for administrative and classroom purposes, how many of this LEA's campuses fall within each range of bandwidth <u>availability</u> for online testing?

Bandwidth availability for testing	Median number of campuses	Range of campuses
0 to 24% (*n* = 664)	4.14	0–85
25% to 49% (*n* = 661)	3.19	0–42
50% to 74% (*n* = 664)	4.95	0–72
75% to 100% (*n* = 666)	5.24	0–80
100%, we do not cap our bandwidth	42.1	0–1000

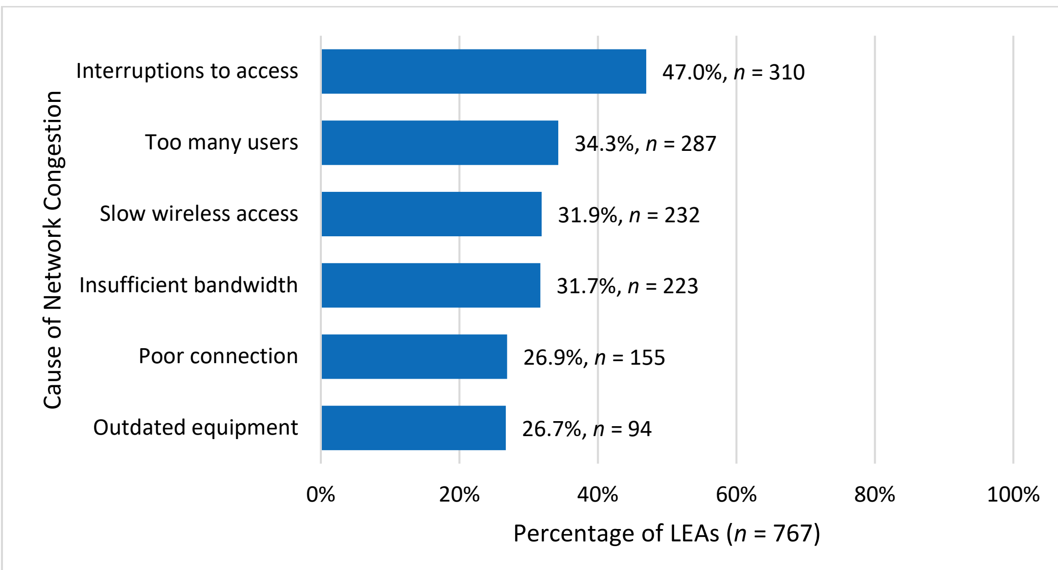
8. Based on a recommended standard of at least 1Mb/s per student, how much *additional* bandwidth does this LEA need in order to be able to deliver all STAAR assessments electronically?

	Number	Percent
This LEA's current bandwidth presently meets the recommended standard.	506	61.6
This LEA would need two times its current bandwidth to meet the recommended standard.	178	21.7
This LEA would need three times its current bandwidth to meet the recommended standard.	98	11.9
This LEA's current physical connection cannot meet the recommended bandwidth standard.	39	4.8
Total	821	100.0

9. Approximately how often in the last school year did this LEA experience internet outages lasting more than one hour?

	Number	Percent
Daily	3	0.4
Weekly	14	1.7
Monthly	293	35.1
This campus did not experience internet outages lasting more than one hour in the last school year.	524	62.8
Total	834	100.0

10. Overall, what are the causes of network congestion in this LEA? Select all that apply.



11. Does this LEA have redundant internet service provider paths?

	Number	Percent
Yes	254	58.8
No	563	68.9
Total	817	100.0

12. Does this LEA use Quality of Service (QoS) technology to manage network congestion?

	Number	Percent
Yes	480	58.8
No	337	41.2
Total	817	100.0

13. To what extent are this LEA's campuses equipped with onsite file servers that could be used for proctor caching?

	Number	Percent
All campuses have their own file servers that could be used for proctor caching.	234	28.3
All campuses have file servers centrally located at the LEA location that could be used for proctor caching.	368	44.4
Some campuses have their own file servers that could be used for proctor caching.	58	7.0
Some campuses have file servers centrally located at the LEA location that could be used for proctor caching.	136	16.4
Total	828	100.0

Hardware:

14. Column A: What is the current total number of devices meeting minimum system requirements available for STAAR CBA?

    Column B: Assuming the current online testing windows for spring STAAR testing, what is the total number of eligible devices needed to administer the STAAR 100% electronically in this LEA? Utilize the School Capacity Calculator to determine the number of devices needed.

	A: Current total (*n* = 789)	B: Total number needed for 100 percent CBA (*n* = 759)
Mean	3,744.6	2,687.4
Median	9,207.2	8,178.0
Range	0.0–80,000.0	0.0–115,806.0

15. How many *additional* devices meeting minimum system requirements does this LEA anticipate purchasing during the remainder of FY 2019–20 due to the COVID-19 situation?

	Additional devices due to COVID-19 (*n* = 787)
Mean	716.7
Median	3,332.2
Range	0.0–46,500.0

16. What is the student-to-device ratio of devices that meet the minimum system requirements for STAAR CBA on this campus?

	Number	Percent
More than one testing device per student	78	9.6
1 student per testing device	318	39.0
2–3 students per testing device	324	39.7
4–5 students per testing device	59	7.2
6–7 students per testing device	16	2.0
8–9 students per testing device	45	0.7
10 or more students per testing device	6	1.8
Total	816	100.0

Personnel/Staffing:

17. Column A: What is the total number of LEA- and campus-level technology personnel in each of the categories below currently working in this LEA?

    Column B: Assuming the current online testing windows for spring STAAR testing, what is the total number of technology personnel needed in each category to administer the STAAR 100% online in this LEA?

	A: Current total			B: Total number needed for STAAR 100 percent CBA		
Personnel category	Number	M (SD)	Range	Number	M (SD)	Range
LEA technology directors	815	1.09 (0.83)	0–7	767	1.24 (5.14)	0–100
LEA technology managers	798	0.73 (1.42)	0–15	754	0.87 (3.89)	0–100
Network administration specialists	800	1.13 (1.98)	0–26	755	1.27 (4.10)	0–100
Database administration specialists	794	0.54 (0.98)	0–7	743	0.76 (3.80)	0–100
Instructional technology specialists	798	1.81 (4.44)	0–58	755	2.33 (6.03)	0–100
Classroom teachers who also serve in an LEA-level technology support role	796	1.99 (8.52)	0–150	753	3.05 (12.08)	0–200
Repair technicians	802	3.27 (6.96)	0–80	758	3.93 (11.28)	0–200

Note: Median values indicated in parentheses. Responses in the "Other" category included a variety of specific titles for various types of LEA- and campus-level technology personnel.

18. How many *additional* LEA- and campus-level technology personnel in each of the categories below does this LEA anticipate hiring during the remainder of FY 2019–20 due to the COVID-19 situation?

	Additional personnel due to COVID		
Personnel category	Number	M (SD)	Range
LEA technology directors	800	0.02 (0.1)	0–2
LEA technology managers	800	0.02 (0.2)	0–3
Network administration specialists	800	0.04 (0.2)	0–3
Database administration specialists	799	0.02 (0.2)	0–2
Instructional technology specialists	799	0.12 (1.1)	0–18
Classroom teachers who also serve in an LEA-level technology support role	801	0.12 (1.4)	0–35
Repair technicians	800	0.09 (0.5)	0–9

Note: Median values indicated in parentheses. There were 36 responses in the "Other" category, most of which included hiring additional online instructional or service desk support staff.

19. Column A: What is the total number of LEA- and campus-level personnel who support STAAR testing in a non-technical role (e.g., preparation for testing, test administration or proctoring, building monitoring, etc.) currently working at the LEA or campus level?

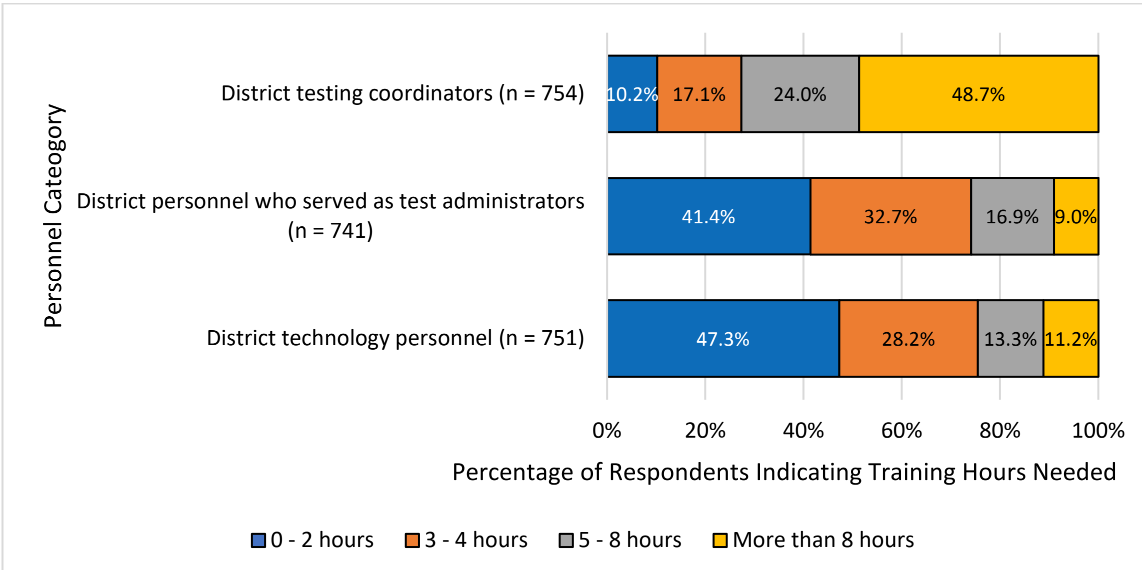
    Column B: Assuming the current online testing windows for spring STAAR testing, what is the total number of non-technical personnel needed in each category to administer the STAAR 100% electronically in this LEA?

	A: Current total			B: Total needed for 100% CBA		
Personnel type	Number	M (SD)	Range	Number	M (SD)	Range
Assessment program staff (e.g., LEA and campus testing coordinators, campus administrators)	801	20.6 (106.6)	0–2,676	773	16.1 (51.7)	0–900
Test administrators (e.g., personnel serving as test proctors)	780	242.8 (665.9)	0–10,000	763	211.8 (626.1)	0–10,000
Temporary staff	770	7.8 (28.2)	0–400	751	8.7 (29.9)	0–400

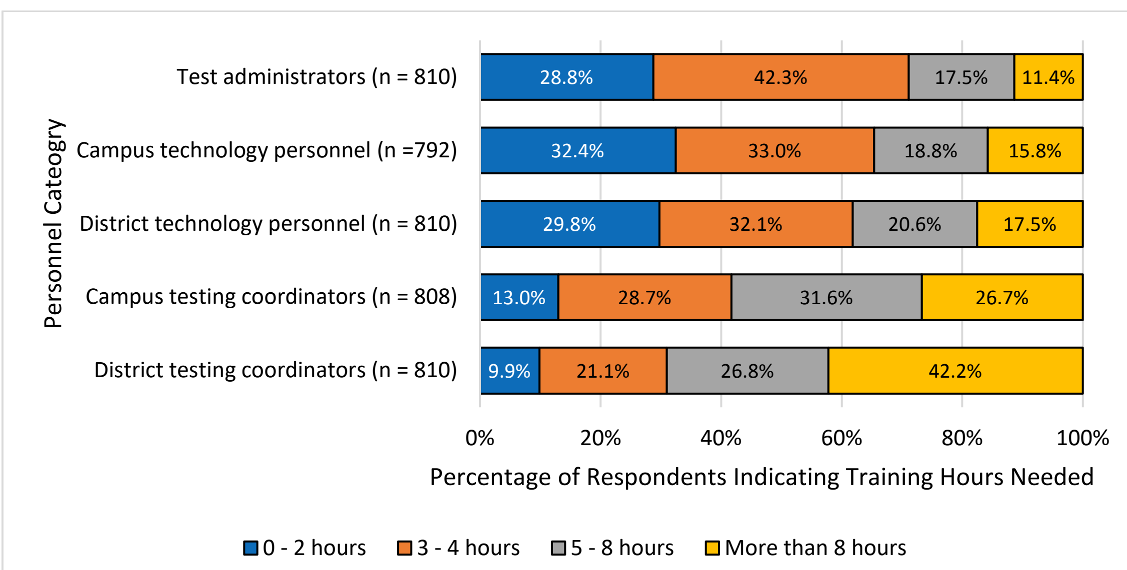
Note: Median values indicated in parentheses. There were 110 responses in the "Other" category, most of which included test monitors serving in various roles.

*****Question 20 was asked only of LEAs that indicated in Question 2 that they had participated in online testing in 2018–19.**

20. What was the approximate number of training hours spent in preparation for STAAR CBA per LEA-level staff member in 2018–19 for each of the following categories?

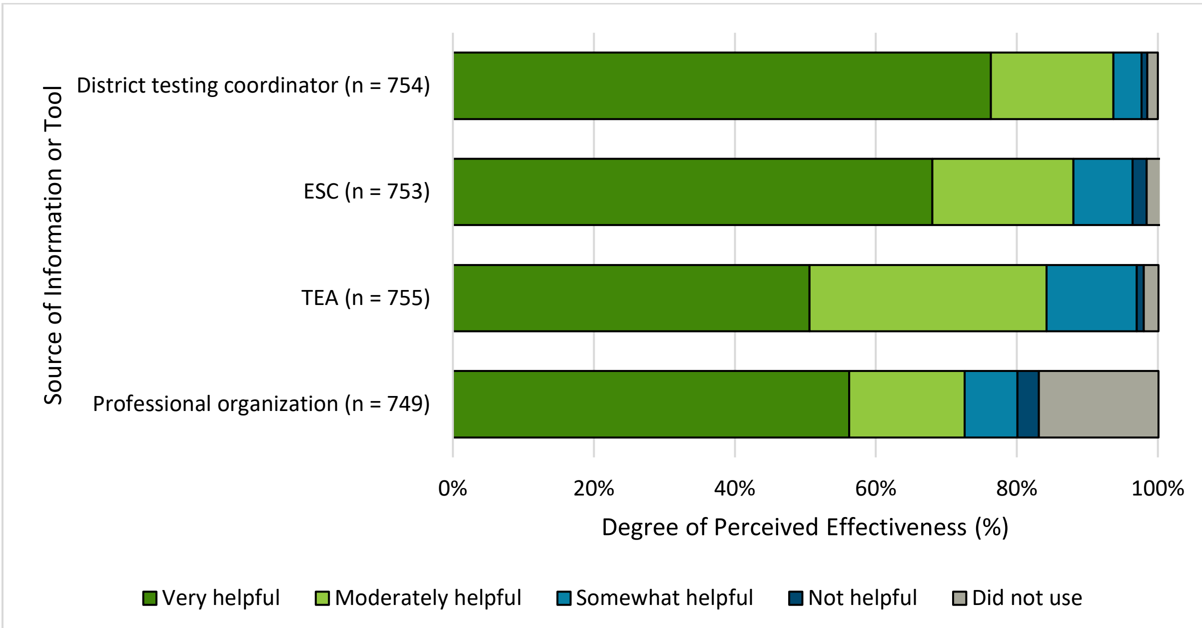


21. To move to successful STAAR 100% CBA, what would be the approximate number of training hours needed to prepare for STAAR electronic testing, per staff member, for each of the following categories?

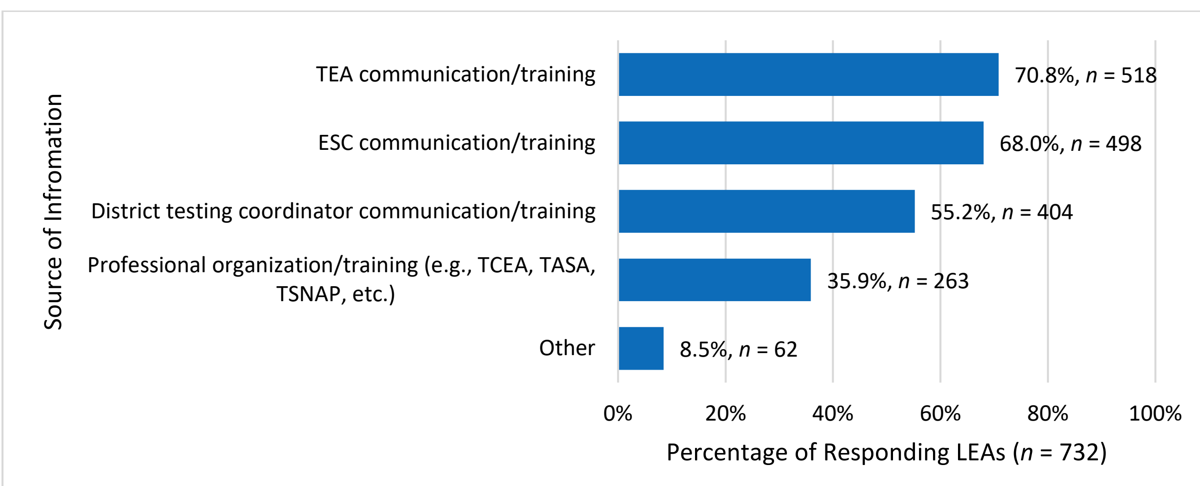


*****Questions 22–25 were asked only of LEAs that indicated in Question 2 that they had participated in STAAR CBA in 2018–19.**

22. Rate the effectiveness of each of the following sources of information or tools that this LEA used for STAAR electronic testing.

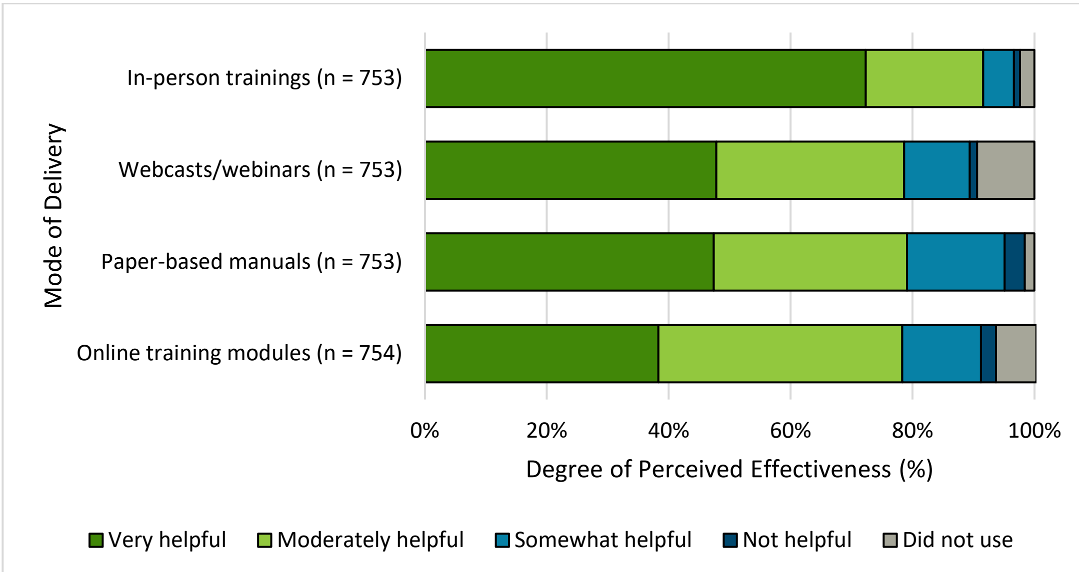


23. From which of the following sources would this LEA like to see more information regarding STAAR CBA? Select all that apply.

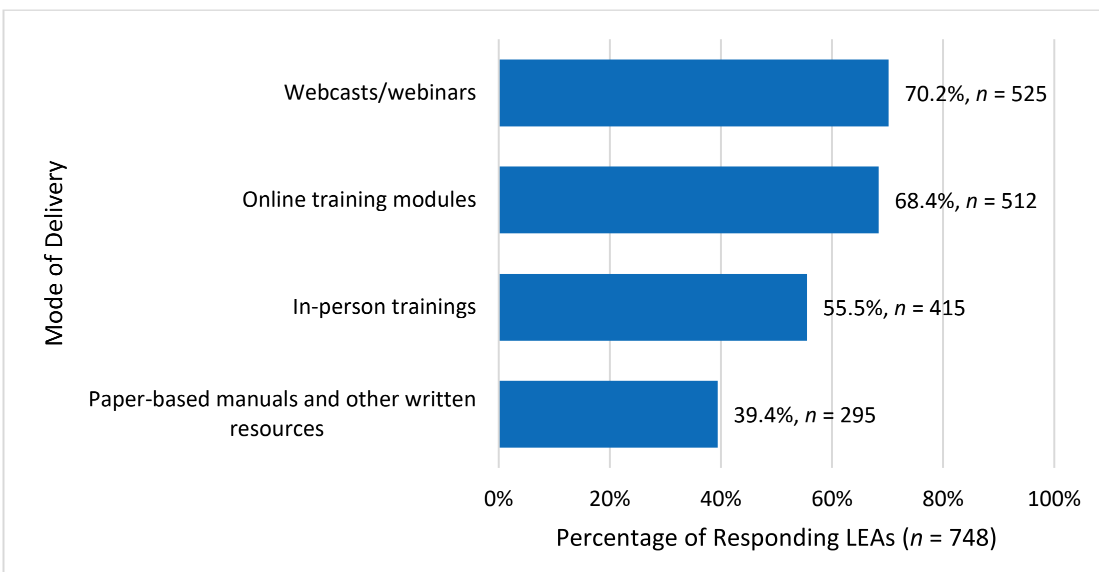


Note: Other sources from which LEAs would like to see more information included testing vendors, special services personnel (i.e., special education or English-language learner), and other LEAs.

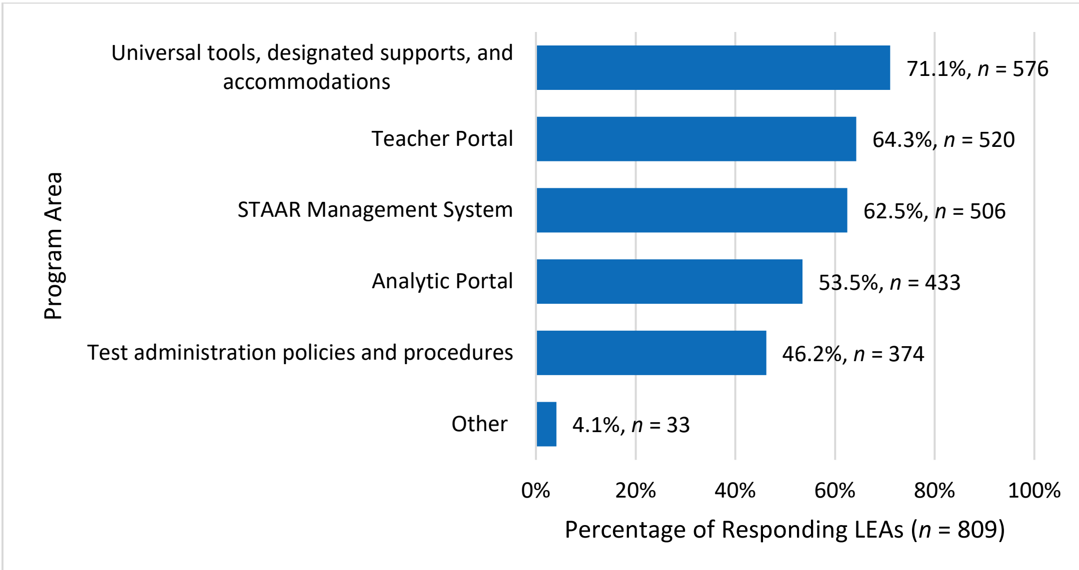
24. Rate the effectiveness of each of the following modes of delivery of information or tools that this LEA used for STAAR CBA.



25. From which of the following modes of delivery would this LEA like to see more information regarding STAAR CBA? Select all that apply.

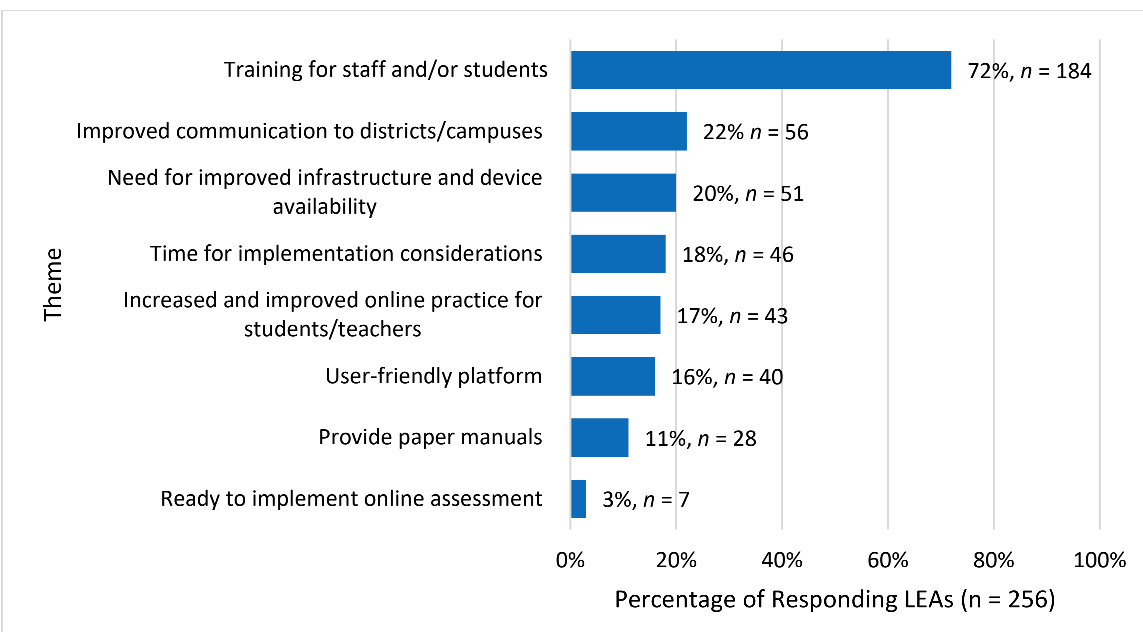


26. In what areas of the STAAR CBA program do personnel in this LEA require more training? Select all that apply.



Note: Responses in the "Other" category focused mainly on training from specific test vendors on how to use testing platforms.

27. Please share any additional feedback this LEA may have in regard to training, information, or resources for STAAR electronic testing.
    The graph below provides a summary of themes from the open-ended responses and percentage of LEAs addressing each theme in their responses.



Financial:

The table below summarizes LEA responses to questions 28–30. These three questions asked LEAs to consider annual and one-time costs for hardware, network infrastructure, and personnel/training for the previous fiscal year (2018–19) and the current fiscal year (2019–20), as well as plan the anticipated spending for the next four fiscal years, to support this LEA's transition to and maintenance of STAAR 100 percent CBA. For brevity's sake, the tables focus on year one implementation costs in each of the three areas across responding LEAs.

	Number	Minimum	Maximum	Sum	Mean	Standard Deviation
Hardware ongoing costs	595	$0	$7,500,000	$129,630,349	$217,866	$680,466
Hardware one-time costs	569	$0	$14,554,955	$88,172,607	$54,961	$874,709
Network ongoing costs	594	$0	$8,000,000	$113,229,984	$190,623	$620,536
Network one-time costs	558	$0	$11,000,000	$105,944,005	$189,864	$866,934
Personnel ongoing costs	556	$0	$2,948,500	$20,379,704	$36,654	$212,380
Personnel one-time costs	533	$0	$2,100,000	$4,796,042	$8,998	$125,605

The table below summarizes the total costs in each of the three areas across responding LEAs.

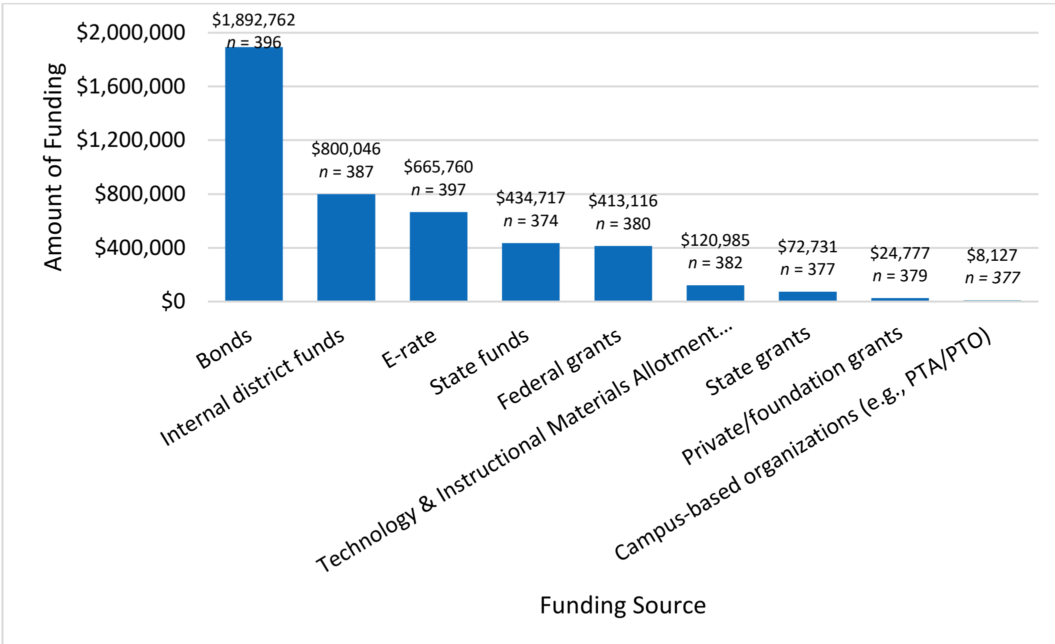
	Number	Minimum	Maximum	Sum	Mean	Standard Deviation
Hardware ongoing maintenance costs	566	$0	$6,400,000	$111,199,765	$196,466	$586,687
Hardware one-time maintenance costs	540	$0	$5,793,480	$52,547,141	$97,310	$491,198
Network ongoing maintenance costs	561	$0	$6,000,000	$87,861,196	$156,615	$459,057
Network one-time maintenance costs	530	$0	$11,550,000	$59,042,640	$111,401	$704,562
Personnel ongoing maintenance costs	542	$0	$3,348,769	$21,797,563	$40,217	$229,166
Personnel one-time maintenance costs	525	$0	$2,600,000	$5,330,696	$10,154	$143,166

31. Did this LEA allocate funding in the 2018–19 fiscal year to obtain technology that could be used for STAAR electronic testing?

	Number	Percent
Yes	474	66.8
No	236	33.2
Total	710	100.0

*****Question 32 was asked only of LEAs that indicated in Question 2 that they had participated in online testing in 2018–19.**

32. Approximately how much funding did this LEA obtain and allocate in the 2018–19 fiscal year from each of the following sources to support technology that could be used for STAAR electronic testing?



33. What is this LEA's typical device refresh/replacement cycle?

Refresh/replacement cycle	Number	Percent
Less than 3 years	17	2.3
Every 3 years	120	5.9
Every 4 years	157	20.8
Every 5 years	250	33.1
Every 6 years	41	5.4
More than every 6 years	50	6.6
None; this LEA doesn't have a typical device refresh/replacement cycle	120	15.9
Total	755	100.0

34. For how many years does the current technology or fiscal plan for technology acquisition and replacement extend for this LEA?

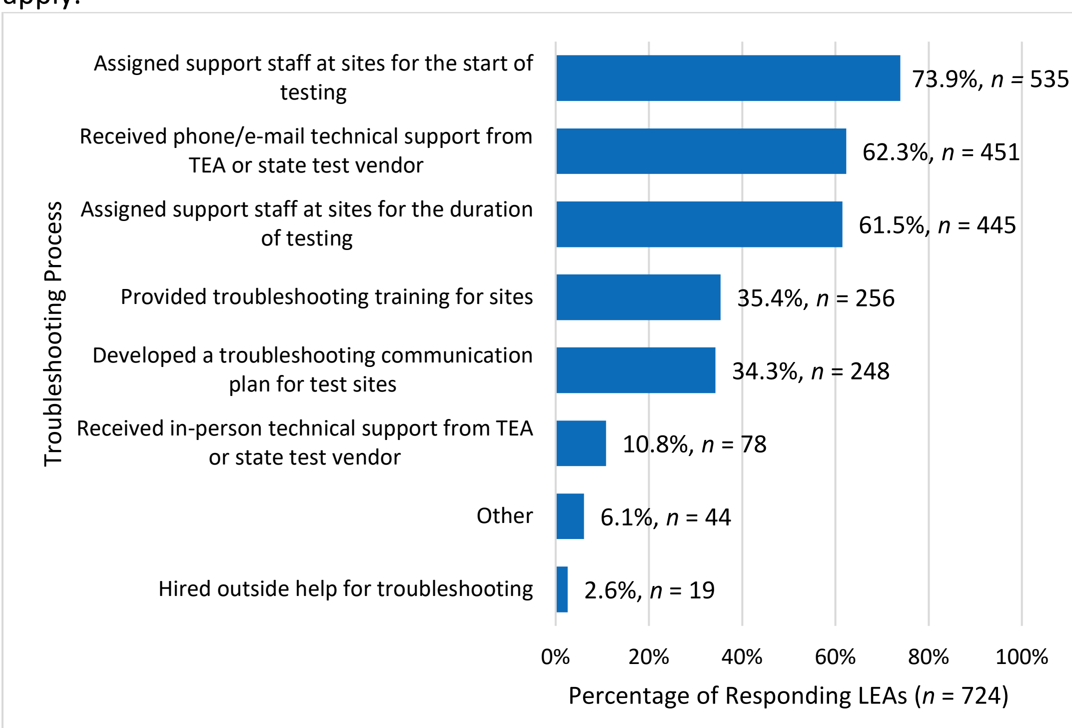
Fiscal plan for technology	Number	Percent
Less than 1 year	45	6.2
1 year to under 2 years	161	22.1
2 years to under 3 years	132	18.2
3 or more years	389	53.5
Total	727	100.0

35. Does this LEA have a disaster recovery plan that covers technology infrastructure?

Disaster recovery plan	Number	Percent
Yes	461	63.1
No	270	36.9
Total	731	100.0

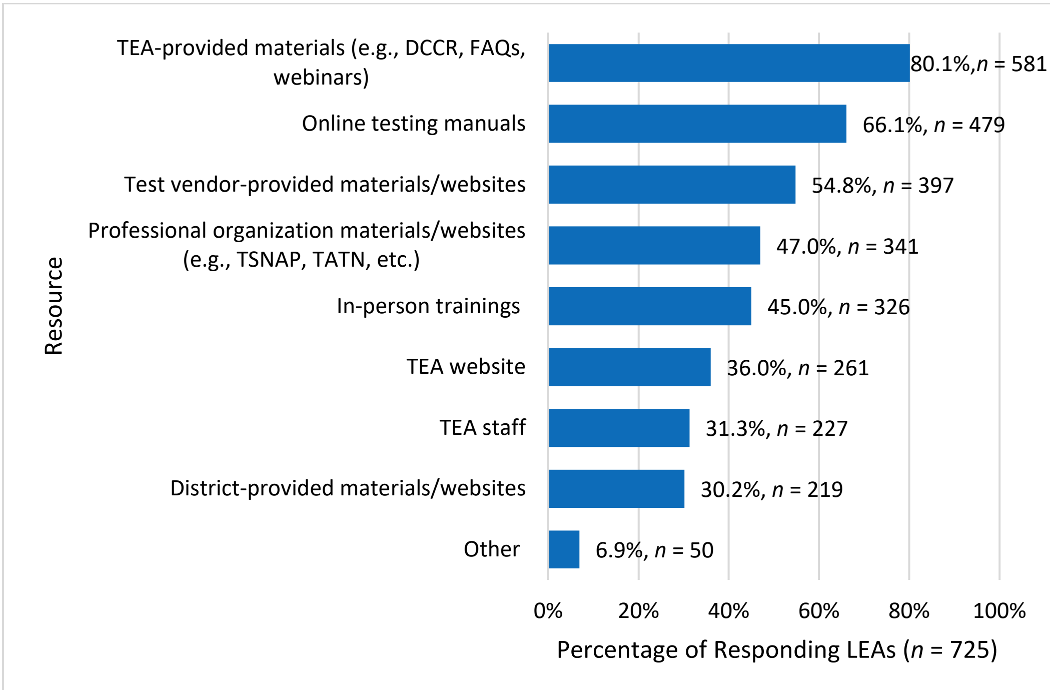
*****Questions 36–37 were given only to LEAs that indicated participation in STAAR online testing in 2018–19.**

36. What processes did this LEA use for troubleshooting STAAR electronic testing (e.g., content or technical challenges that could deter test administration)? Select all that apply.

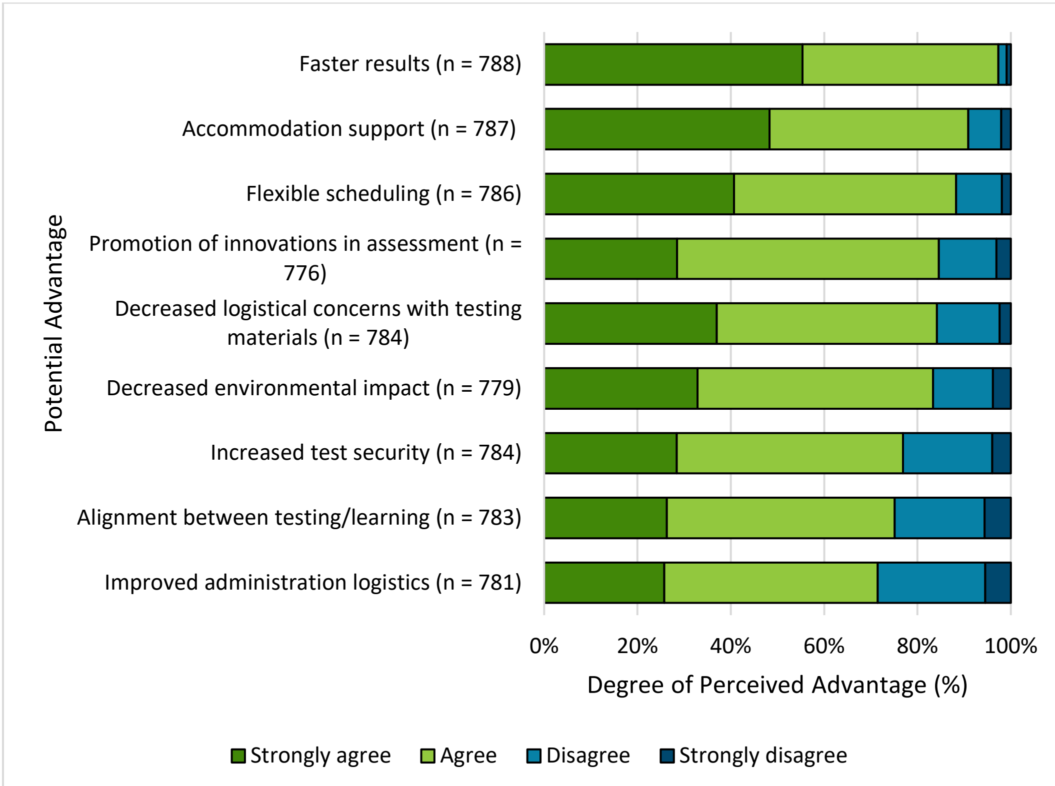


Note: A majority of responses in the "Other" category described specific LEA processes, while other responses mentioned specific professional organizations used in troubleshooting.

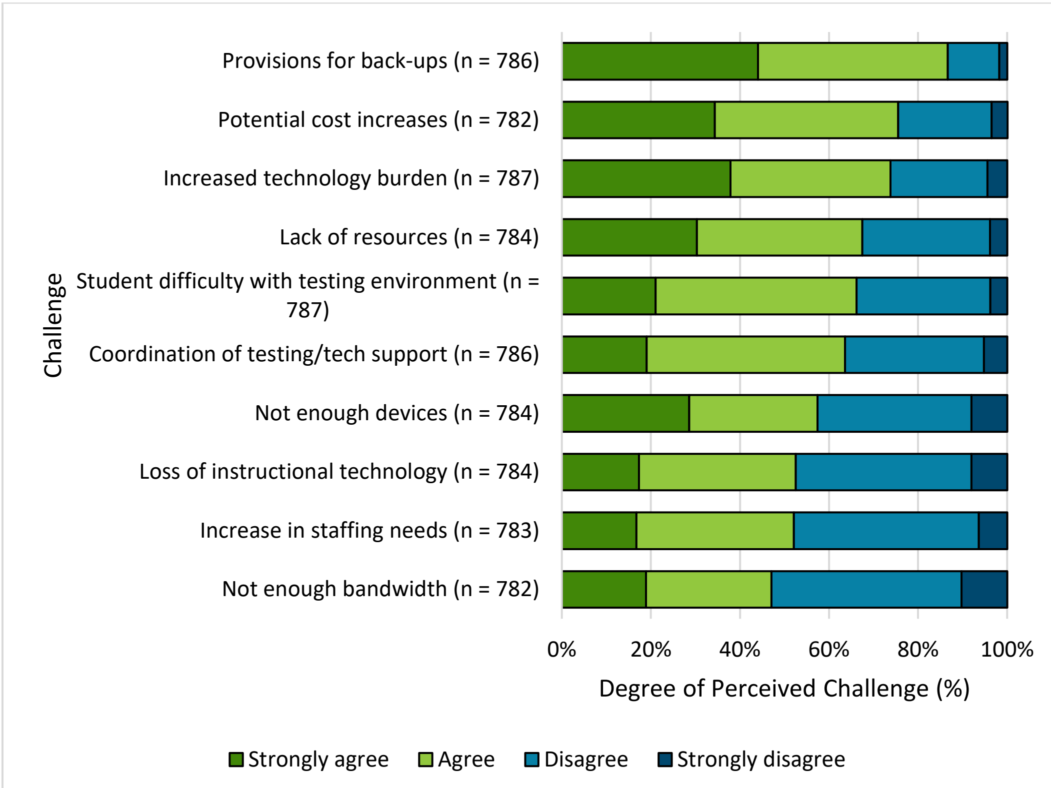
37. Which resources were most useful to help this LEA find solutions and answers to STAAR CBA testing challenges? Select all that apply.



38. To what extent do you agree that each item below is an <u>advantage</u> of STAAR CBA for this LEA?



39. To what extent do you agree that each item below is a <u>challenge</u> related to STAAR electronic testing for this LEA?

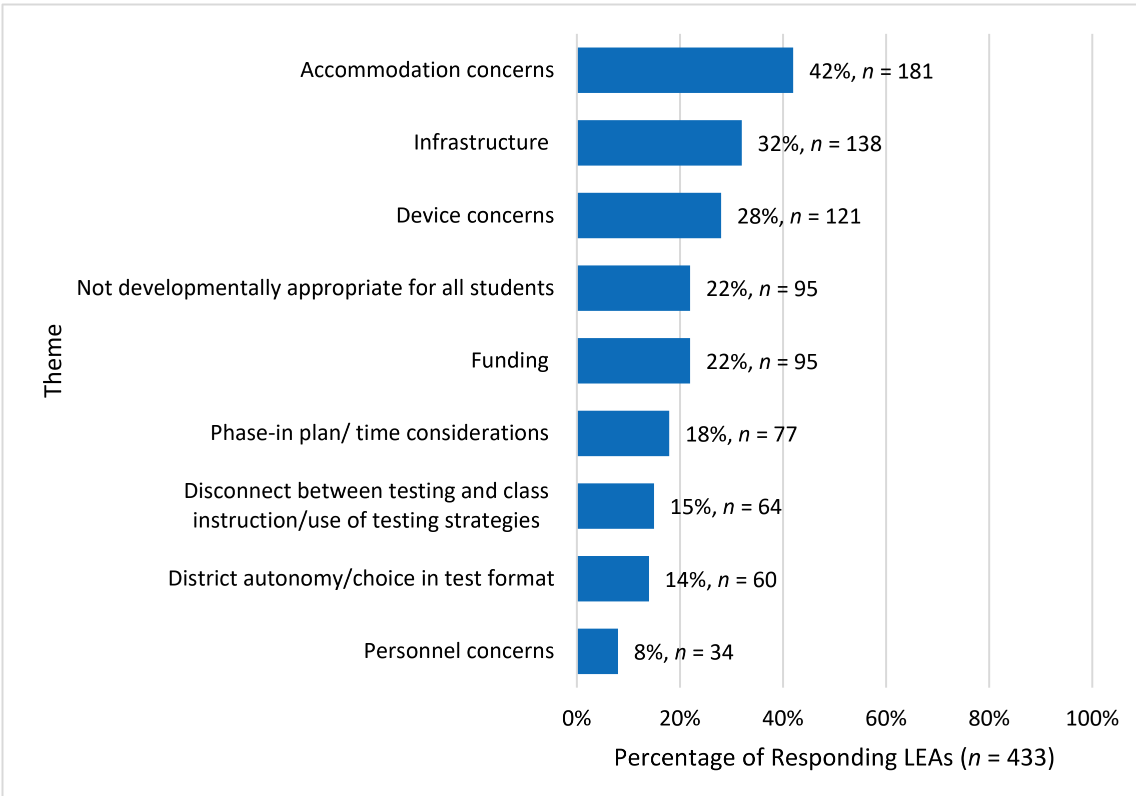


40. Overall, do the advantages of STAAR electronic testing outweigh the challenges of STAAR electronic testing for this LEA?

	Number	Percent
Yes	532	68.2
No	248	31.8
Total	780	100.0

41. What comments or suggestions would this LEA like to share in regard to moving to a STAAR 100 percent CBA program? Please write the response in the space provided below.

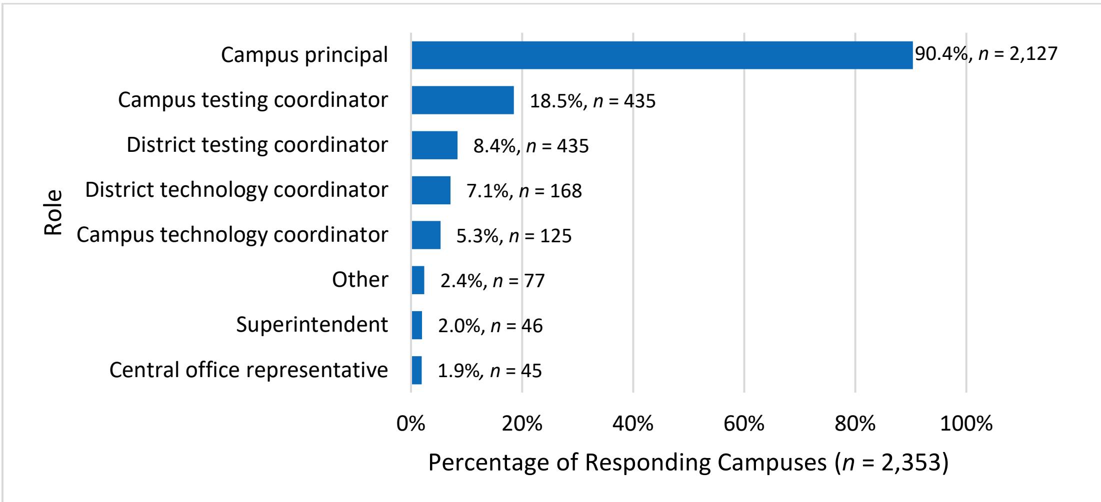
    The graph below provides a summary of themes from the open-ended responses and percentage of LEAs addressing each theme in their response.



STAAR Online Testing Needs Assessment Campus Survey

Getting Started:

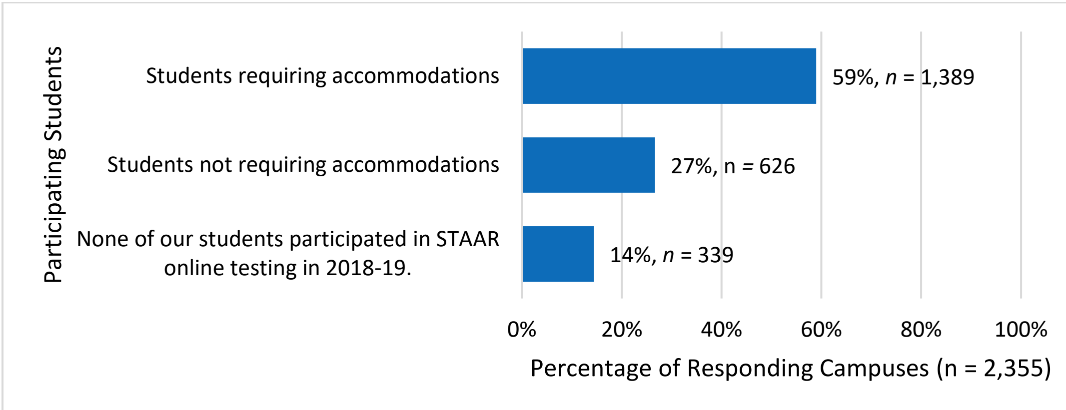
1. Who is providing information to complete the survey for this campus? Select all that apply[3].



Note: Other types of responding personnel included assistant principals, academic deans, and LEA-level personnel.

[3] On any question in which participants were allowed to select more than one answer, the total number of responses may exceed the total number of responding campuses. In all cases, the percentage depicted reflects the percent of the total respondents who selected each category.

2. Which of the following student groups on your campus participated in <u>online</u> administration of State of Texas Assessments of Academic Readiness (STAAR) during the 2018–19 school year? Select all that apply. *Do not include retests or STAAR Interim participation*.



Note: Campuses were able to select both options for student groups, if applicable. Just over 25 percent of campuses (*n* = 604) indicated that students **both with** and **without** accommodations participated in STAAR CBA in 2018–19.

Network/Infrastructure:

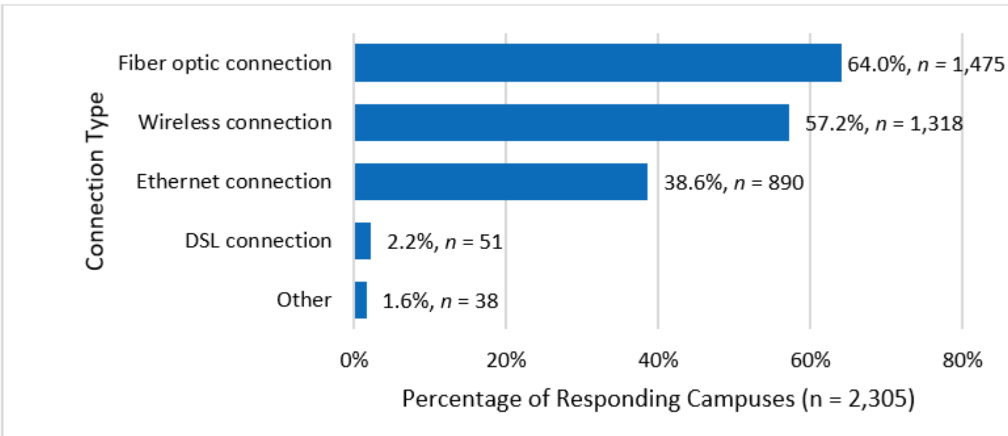
3. Which of the following best describes the age of this campus's main academic facilities?

	Number	Percent
This campus's main academic facilities were built within the last 10 years.	436	19.6
This campus's main academic facilities were built between 11 and 20 years ago.	574	25.8
This campus's main academic facilities were built between 21 and 30 years ago.	398	17.9
This campus's main academic facilities were built more than 30 years ago.	918	41.2
Total	2,226	100.0

4. How is your LEA involved with providing internet service to campuses?

	Number	Percent
The LEA provides a central, LEA-wide solution.	64	2.8
The LEA coordinates individual campus solutions.	14	0.1
The LEA provides both centralized and individual campus solutions.	1,621	69.7
The LEA is NOT involved with providing internet service to campuses.	631	27.1
Total	2,326	100.0

5. What type of internet connection is used by this campus? Select all that apply.

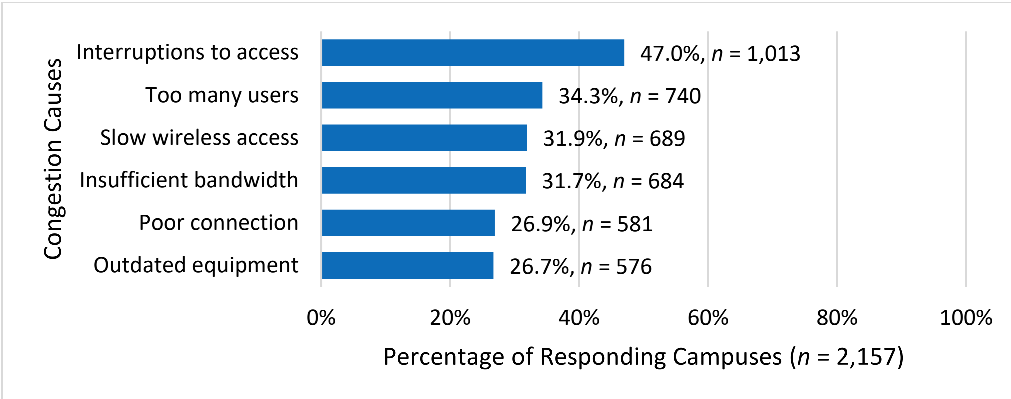


Note: A majority of respondents in the "Other" category indicated that they were not aware of the type of internet connection present at their campus.

6. Approximately how often in the last school year did this campus experience internet outages lasting more than one hour?

	Number	Percent
Daily	19	0.0
Weekly	97	4.1
Monthly	886	37.6
This campus did not experience internet outages lasting more than one hour in the last school year.	1,319	56.0
Total	2,321	100.0

7. What are the causes of network congestion at this campus? Select all that apply.



8. Is this campus equipped with onsite file server(s) that can be used for proctor caching?

	Number	Percent
This campus has its own onsite file server(s) that can be used for proctor caching.	591	26.5
This campus has a file server centrally located at the LEA that can be used for proctor caching.	1,250	56.1
This campus has a file server located somewhere other than the LEA or campus that can be used for proctor caching.	104	4.7
This campus does not have its own or a shared file server that can be used for proctor caching.	285	12.9
Total	2,230	100.0

*****Questions 9–14 were given only to 14 campuses that indicated that their LEA was NOT involved with providing internet service to campuses. Due to low response rates, questions are provided, but data are masked (*) to protect the anonymity of respondents.**

9. What is the available bandwidth of this campus's main telecommunications/internet connection to classrooms, in Megabits per second (Mb/s)? Utilize the System Check Test to determine the system's bandwidth.

	Number	Percent
0 to 150 Mb/s	*	*
151 Mb/s to under 500 Mb/s	*	*
500 Mb/s to under 1 Gb/s	*	*
Greater than 1 Gb/s	*	*
Bandwidth capacity at this individual campus is not known.	*	*
I do not have enough information to answer this question.	*	*
Total	14	100.0

10. Which response most accurately represents the typical bandwidth use on a regular school day at this campus?

	Number	Percent
0–24 percent	*	*
25–49 percent	*	*
50–74 percent	*	*
75–100 percent	*	*
Bandwidth is not monitored at this campus.	*	*
I do not have enough information to answer this question.	*	*
Total	14	100.0

11. Keeping in mind that a certain percentage of your bandwidth is (or must be) held in reserve for administrative and classroom purposes, what percentage of this campus's current bandwidth is available for online testing?

	Number	Percent
1 percent to 25 percent	*	*
26 percent to 50 percent	*	*
51 percent to 75 percent	*	*
76 percent to 99 percent	*	*
100 percent—We do not cap our bandwidth.	*	*
I do not have enough information to answer this question.	*	*
Total	14	100.0

12. Based on a recommended standard of at least 1Mb/s per student, how much <u>additional</u> bandwidth does this campus need to be able to deliver all STAAR assessments electronically?

	Number	Percent
This campus's current bandwidth presently meets the recommended standard.	*	*
This campus would need two times its current bandwidth to meet the recommended standard.	*	*
This campus would need three times its current bandwidth to meet the recommended standard.	*	*
This campus's current physical connection cannot meet the recommended bandwidth standard.	*	*
I do not have enough information to answer this question.	*	*
Total	14	100.0

13. Does this campus have redundant internet service provider paths?

	Number	Percent
Yes	*	*
No	*	*
I do not have enough information to answer this question.	*	*
Total	14	100.0

14. Does this campus use Quality of Service (QoS) technology to manage network congestion?

	Number	Percent
Yes	*	*
No	*	*
I do not have enough information to answer this question.	*	*
Total	14	100.0

Facilities/Hardware/Software:

15. What is the student-to-device ratio of devices that meet the minimum system requirements for STAAR CBA on this campus?

	Number	Percent
More than one testing device per student	87	3.8
1 student per testing device	870	37.8
2–3 students per testing device	673	29.3
4–5 students per testing device	360	15.7
6–7 students per testing device	116	5.0
8–9 students per testing device	45	.02
10 or more students per testing device	149	6.3
Total	2,300	100.0

For the answer to Question 16 below, respondents were asked to consider reasonable campus-specific limitations, such as space limitations; extended time requirements for some students; electrical power considerations; or the number of computing devices that could be dedicated to online state testing for the duration of the testing window.

16. Considering the number of students who are eligible to take STAAR at your campus, what is a reasonable estimate of the maximum number of students who could test within each of the windows below?

	Allocated time per day					
	One 4- to 5-hour window			Two 4-hour windows		
Testing window length	Number	M (SD)	Range	Number	M (SD)	Range
1-day window	1,635	38.1 (25.3)	0–100	1328	42.4 (28.6)	0–100
1-week window	946	58.5 (30.0)	0–100	765	50.9 (35.5)	0–100
2-week window	669	59.6 (34.4)	0–100	582	49.2 (38.2)	0–100
3-week window	562	59.2 (36.2)	0–100	538	47.3 (39.1)	0–100
4-week window	517	59.1 (37.1)	0–100	514	47.1 (40.0)	0–100
5+ week window	510	57.8 (37.9)	0–100	510	46.7 (40.4)	0–100

Personnel/Staffing/Training:

17. How many hours per week does this campus typically have an onsite technology support staff person available?

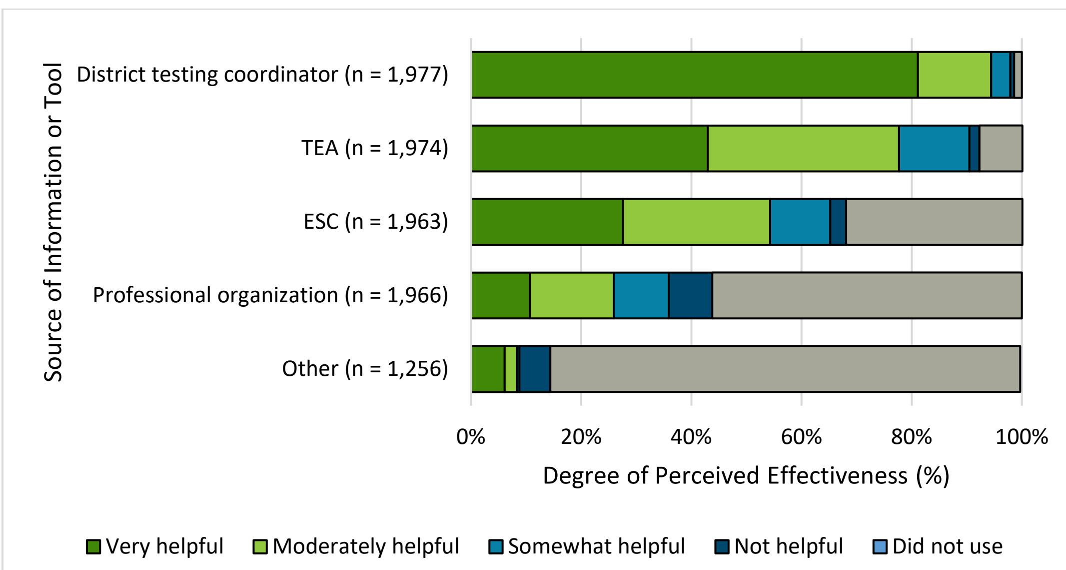
	Number	Percent
Technology support staff are not typically onsite at this campus.	502	21.7
0–8 hours	713	30.8
9–16 hours	211	9.1
17–24 hours	211	9.1
25–32 hours	84	3.6
33–40 hours	581	25.1
Total	2,315	100.0

*****Questions 18–22 were given only to campuses that indicated participation in STAAR electronic testing in 2018–19.**

18. Did this campus reallocate staff time or hire additional staff to support the administration of STAAR CBA?

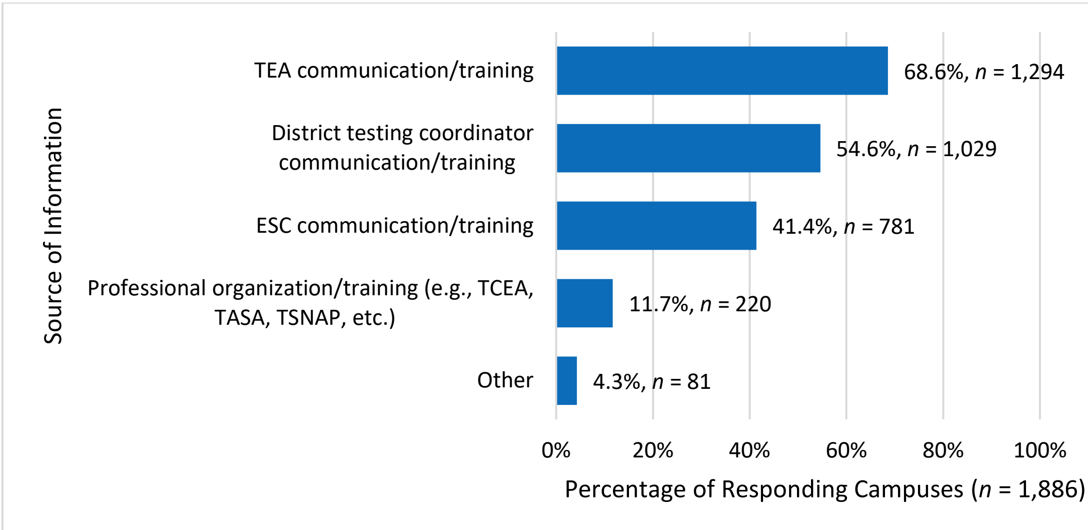
	Number	Percent
Yes, this campus reallocated staff time to support the administration of STAAR online.	43	2.2
Yes, this campus hired additional staff to support the administration of STAAR online.	662	33.4
Yes, this campus reallocated time <u>and</u> hired additional staff support the administration of STAAR online.	220	11.1
No	1,056	53.3
Total	1,981	100.0

19. Rate the effectiveness of each of the following <u>sources</u> of information or tools that your campus used for STAAR CBA.



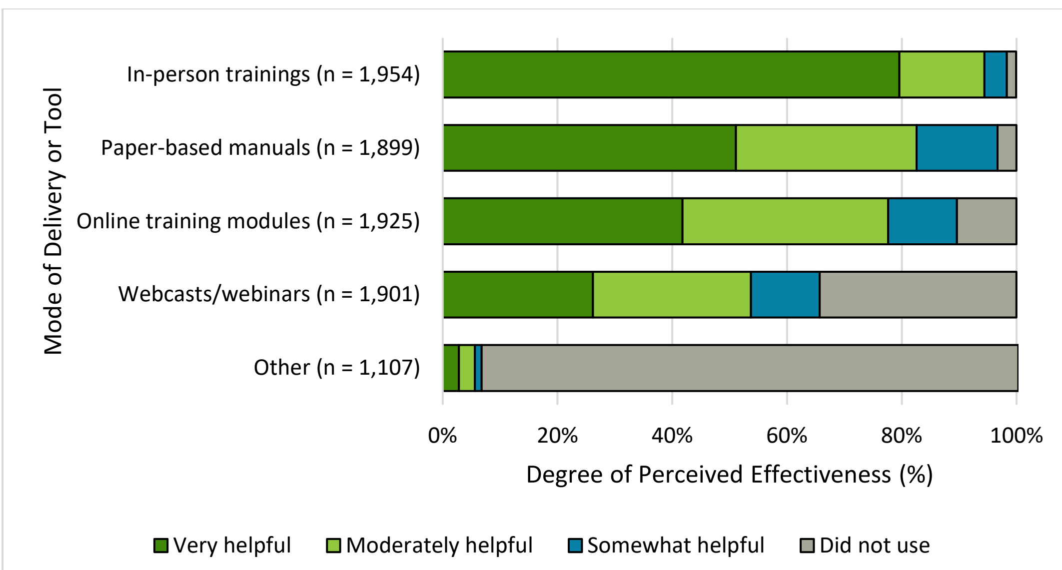
Note: Responses in the "Other" category included campus testing coordinators or similar roles, as well as specific professional organizations not listed as examples in the question.

20. From which of the following <u>sources</u> would this campus like to see more information regarding STAAR CBA? Select all that apply.



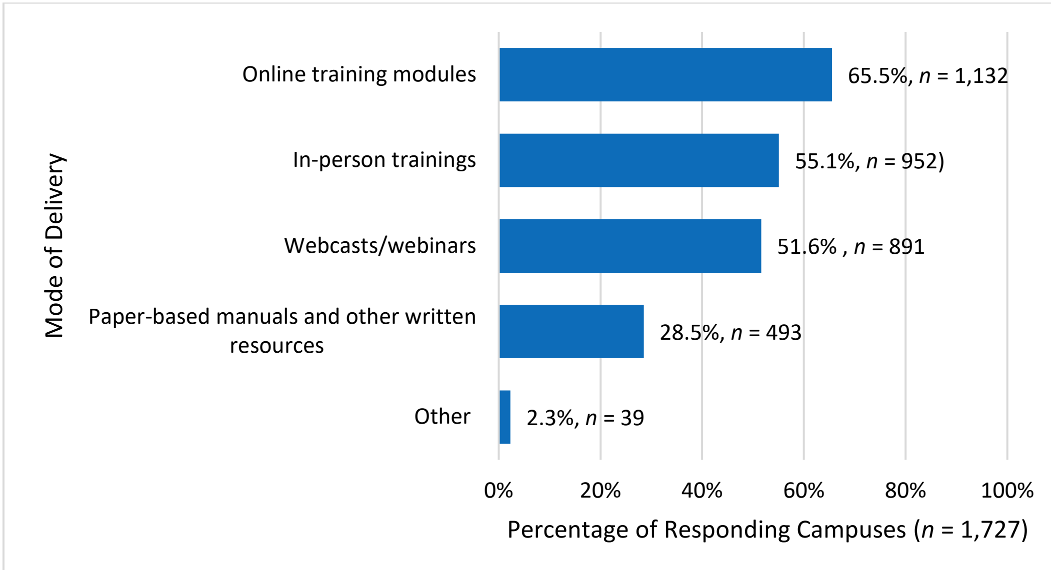
Note: Other sources from which campuses would like to see more information included testing vendors, special services personnel (i.e., special education or English-language learner), and other LEAs.

21. Rate the effectiveness of each of the following <u>modes of delivery</u> of information or tools that your campus used for STAAR CBA.

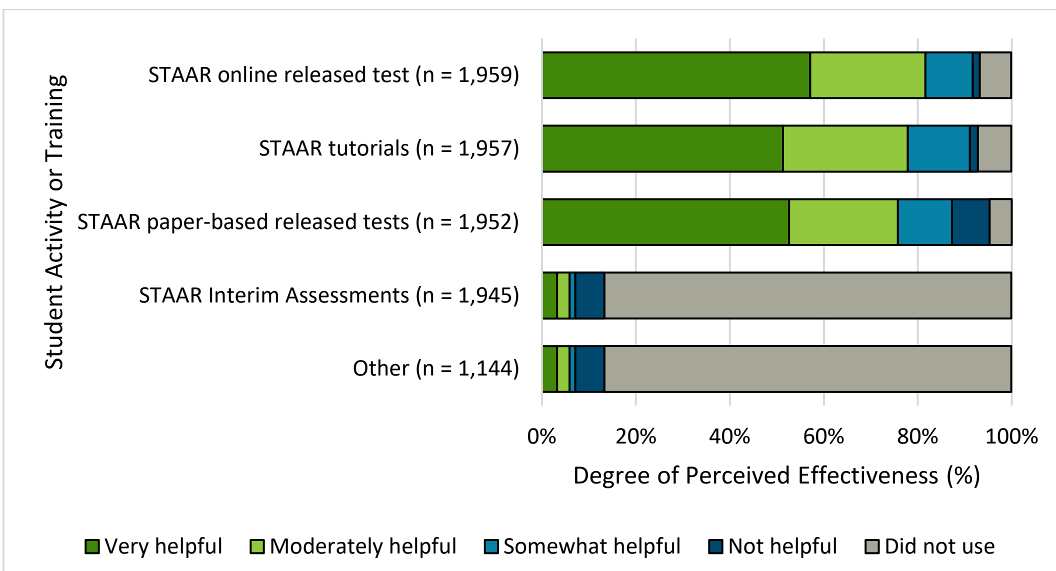


Note: Responses in the "Other" category included campus-level trainings, training videos for later reference, and collaborative groups with other educators.

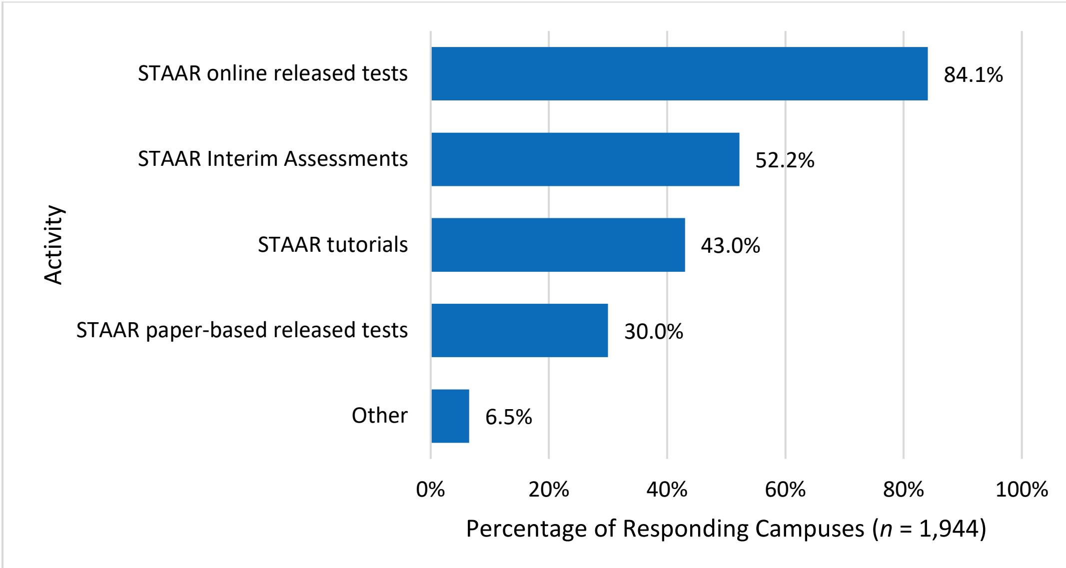
22. From which of the following modes of delivery would this campus like to see more information regarding STAAR CBA? Select all that apply.



23. Rate the effectiveness of each of the following activities or trainings available for students to prepare them for STAAR CBA.

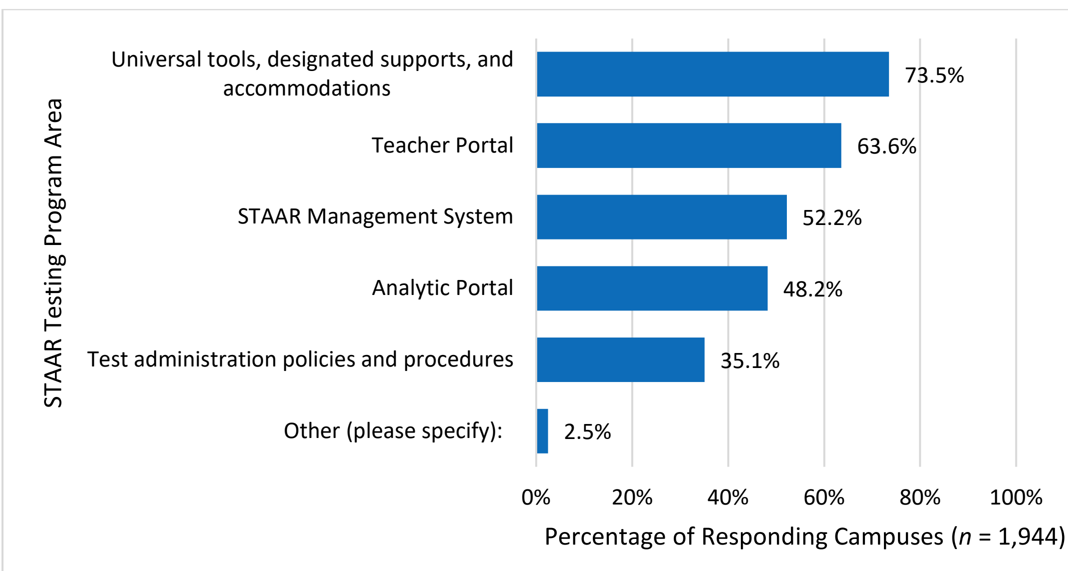


24. From which of the following sources would this campus like to see more student-focused activities to prepare students for STAAR CBA? Select all that apply.



Note: Responses in the “Other” category included student trainings focused on procedures for online testing or practice sites specific to testing vendors.

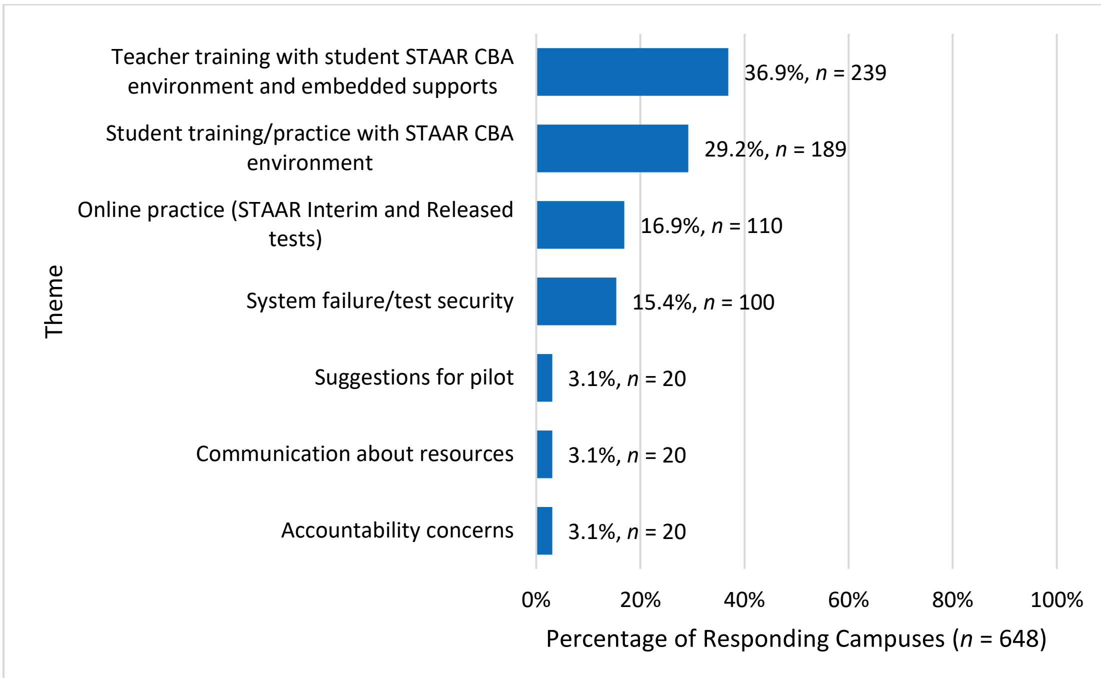
25. In what areas of the STAAR electronic testing program do personnel on this campus require more training? Select all that apply.



Note: Responses in the “Other” category included troubleshooting trainings related to test administration.

26. Please share any additional feedback this campus may have in regard to training, information, or resources for STAAR electronic testing.

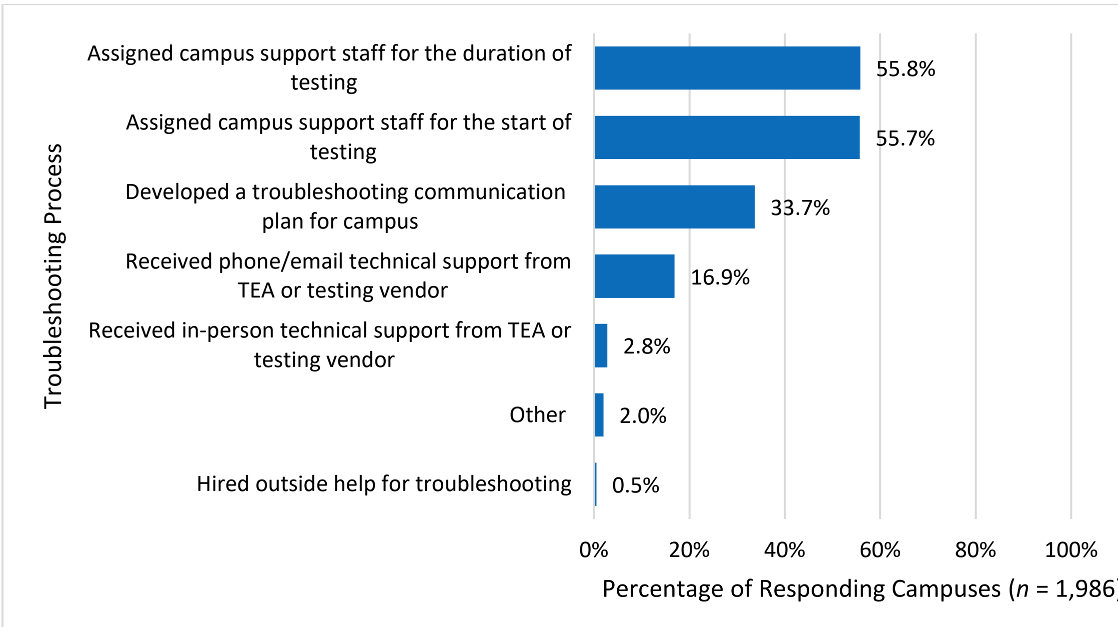
    The graph below provides a summary of themes from the open-ended responses and percentage of campuses addressing each theme in their response.



Experience with and Perceptions of Online State Testing:

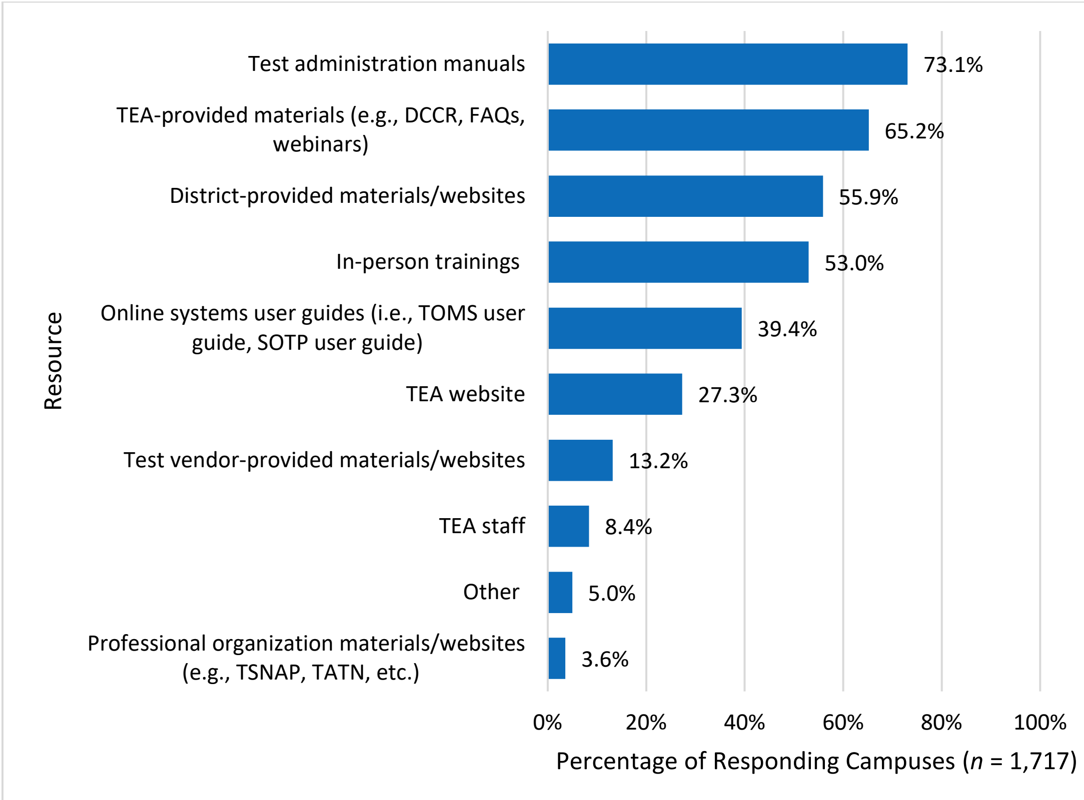
*****Questions 27–28 were given only to campuses that indicated participation in STAAR CBA in 2018–19.**

27. What processes did this campus use for troubleshooting STAAR online testing (e.g., content or technical challenges that could deter test administration)? Select all that apply.



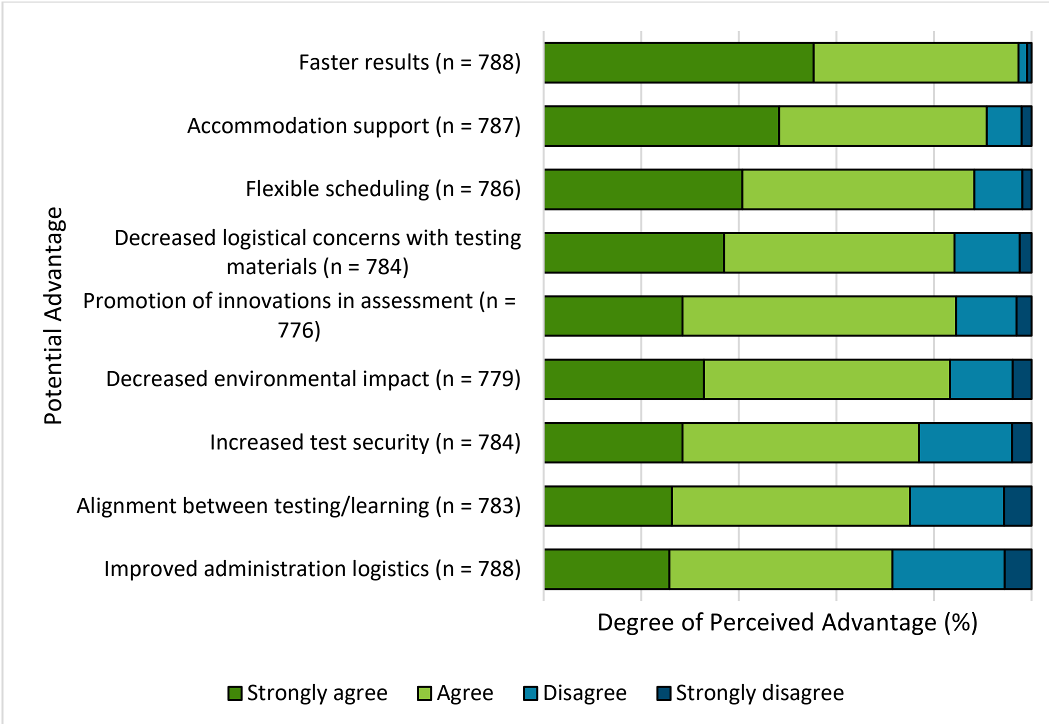
Note: Responses in the "Other" category focused mainly on assistance from LEA-level technology staff.

28. Which resources were most useful to help this campus find solutions and answers to STAAR electronic testing challenges? Select all that apply.

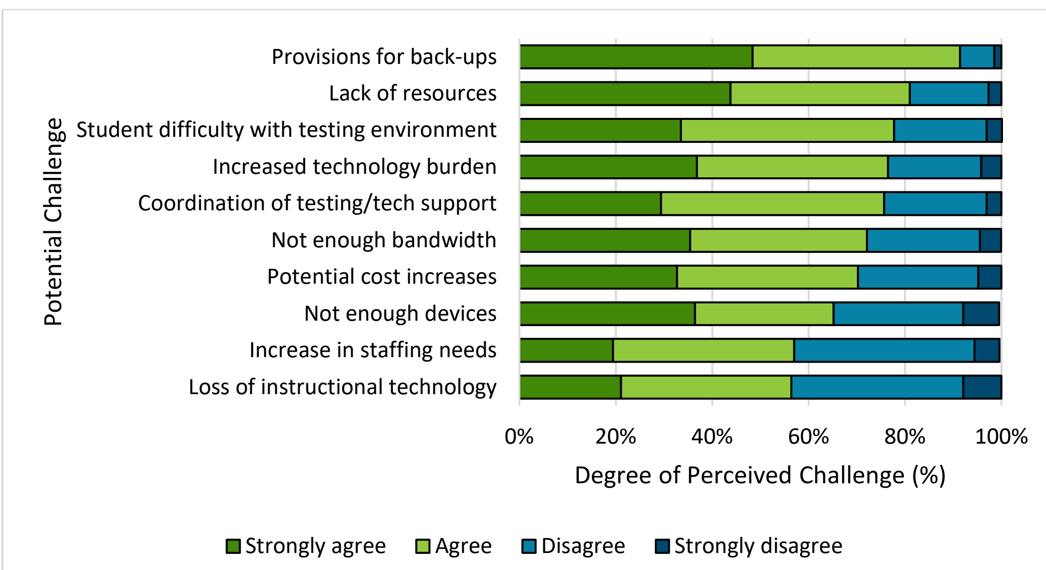


Note: Responses in the "Other" category focused mainly on contact LEA-level testing personnel.

29. To what extent do you agree that each item below is an advantage of STAAR CBA for this campus?



30. To what extent do you agree that each item below is a challenge related to STAAR CBA for this campus?

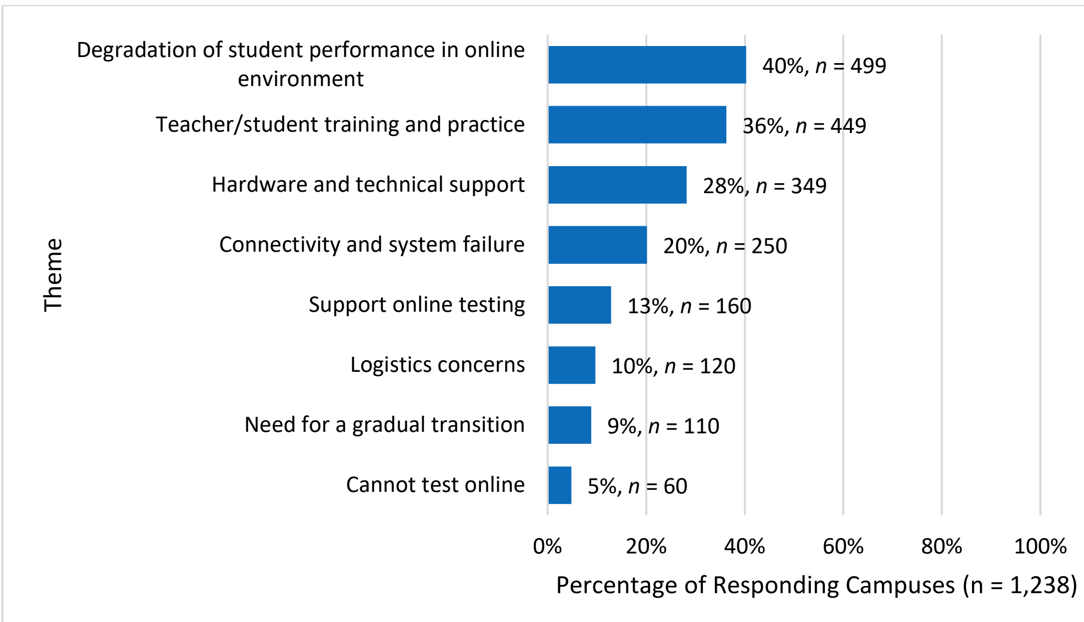


31. Overall, do the advantages of STAAR CBA outweigh the challenges of STAAR CBA for this campus?

	Number	Percent
Yes	1,314	57.0
No	991	43.0
Total	2,305	100.0

32. What comments or suggestions would this campus like to share in regard to moving to a STAAR 100 percent CBA program? Please write the response in the space provided below.

The graph below provides a summary of themes from the open-ended responses and percentage of campuses addressing each theme in their response.



APPENDIX D. Supporting Online Testing Resources

Resource	Audience	Description	Location
Texas Formative Assessment Resource	Testing Personnel, Students	Electronic formative tests aligned with state standards; can also be printed out by teachers and administered without technology	LINK
District and Campus Coordinator Resources (DCCR)	Testing Personnel	Test administrator policy and resources	LINK
Test Administration Manuals	Testing Personnel	Test administrator policy and resources	LINK
Technology Guides	Testing Personnel, Technology Personnel	Provides instructions and best practices	LINK
Calendar of Events	Testing Personnel, Technology Personnel	Provides a resource for the timing of tasks associated with the delivery of assessments	LINK
FAQs	Testing Personnel, Technology Personnel	Training	LINK
Training Videos	Testing Personnel, Technology Personnel	Training	LINK
Webinars	Testing Personnel, Technology Personnel	Training and best practices	LINK
Coordinator Training	Testing Personnel	Training	LINK
Texas Assessment Conference Presentations	Testing Personnel, Technology Personnel	Provides training and best practices	LINK
Unified Minimum System Requirements	Testing Personnel, Technology Personnel	Provides minimum system requirements for all assessment programs, for staff to determine current capacity and as a tool for purchasing	LINK

File Formats and Templates	Testing Personnel, Technology Personnel	Provides personnel with the correct format for uploading data to, and downloading data from, the assessment management system	LINK
Online Readiness Tools	Testing Personnel, Technology Personnel	Helps check systems for readiness and aids in determining testing capacity based on actual bandwidth	LINK
Support Center	Testing Personnel, Technology Personnel	Offers vendor support for all aspects of the program	(855) 333-7770
Help Desk	Parents, Testing Personnel	Offers TEA support for all aspects of the program	LINK

APPENDIX E. Statistical Models Predicting Readiness in Non-Responding LEAs

Regression models were used to estimate current number of devices, number of devices needed, and number of test administrators needed for online STAAR testing.

Hardware

Current Number of Devices

The hardware predictions focused on calculating (a) the current number of devices meeting minimum system requirements in non-responding LEAs and (b) the number of additional devices needed for 100 percent STAAR online. A total of 732 responding LEAs reported a current number of devices. An additional 475 LEAs either did not respond to the survey at all or did not report the current number of devices (n = 169). To estimate the number of devices for non-responding LEAs, regression models were created to predict the current number of devices, using the data provided by the 732 responding LEAs. The regression model predicted the number of devices using the following information: (a) reported number of current devices by responding LEAs, (b) number of unique grades 3–12 testers in the LEA in 2018–19, and (c) the type of LEA according to NCES Locale (city, suburban, town, or rural). The model also accounted for variation in the number of devices needed as a function of the number of testers in each LEA type (e.g., rural LEAs needed more additional devices as their number of testers increased than a suburban LEA did). The model was able to explain approximately 90 percent of the variability in the current number of devices LEAs reported that they had.

The regression equation predicting the current number of devices for the responding LEAs was then used to predict the current number of devices for non-responding LEAs by substituting the non-responding LEA characteristics (namely, the number of testers in 2018–19 and their LEA type) into the equation. The regression equation is provided below:

$$Y_{currentdevices} = 3600.34 + 1116.18(Testers) - 859.43(City) - 969.01(Town) - 462.73(Rural) - 102.34(Testers*City) - 325.50\,(Testers*Town) - 8.40(Testers*Rural)$$

For this equation, suburban LEAs served as the reference group. The city, town, and rural variables are dummy coded to indicate LEA type (e.g., a city LEA had its variables coded: city = 1, town = 0, rural = 0). To make the tester variable more interpretable, researchers did two transformations. First, they converted the testers variable to the number of testers divided by 1,000. Then, they subtracted the mean of all testers from each observation. Specifically, for each LEA the number of testers variable is equal to:

$$testers_i = \frac{number\ of\ testers_i - 2791}{1000}$$

where the number of $testers_i$ is the number of testers in LEA *i*, and 2,791 is the average number of testers across all LEAs. Thus, an LEA with 4,971 student testers would have a value of 2 for the testers in the equation: testers = 2 or $\frac{4791-2791}{1000}$.

Devices Needed

A total of 763 of the 901 responding LEAs reported the number of devices needed. Due to some ambiguity in the way LEA staff interpreted the question, data were checked for consistency in responses with other data and, in some cases, adjusted for alignment with the intent of the question, which was how many *more* devices the LEA would need to be able to administer 100 percent STAAR online by 2022–23 (see Appendix D for survey questions). For example, one LEA reported a 1:1 student-to-device ratio but also reported having 35,000 devices and needing another 35,000. In that case, the number of additional devices needed was then estimated to 0. Another LEA with a 1:1 ratio of students to devices reported having 7,616 devices and needing 8,538 devices, which would have more than doubled its student-to-device ratio. In cases where the number needed was higher than the current number, it was assumed that the actual number of devices needed was the difference between the current number and the devices reported as needed. Thus, these estimates should be considered the absolute minimum number, or floor, of devices needed.

Another 446 LEAs either did not respond to the survey at all or did not report the number of devices needed to be able to administer 100 percent STAAR online by 2022–23. To estimate the number of devices for these 446 LEAs, regression models were created to predict the number of devices needed, using the data provided by the responding 763 LEAs. The regression model predicted the number of devices using the following information: (a) reported number of devices needed by responding LEAs, (b) number of unique grades 3–12 testers in the LEA in 2018–19, and (c) the type of LEA according to NCES Locale (city, suburban, town, or rural). The model also accounted for variation in the number of devices needed as a function of the number of testers in each LEA type (e.g., rural LEAs needed more additional devices as their number of testers increased than did a suburban LEA). The model was able to explain approximately 33 percent of the variability in the number of devices LEAs reported that they needed.

Once the regression equation was developed for the number of devices needed based on data from the responding LEAs, the number of devices was estimated for the non-responding LEAs by substituting the non-responding LEA characteristics (namely, the number of testers in 2018–19 and their LEA type) into the equation. The regression equation is provided below:

$$Y_{devicesneeded} = 1229.42 + 119(Testers) - 303.32(City) - 65.838(Town) + 127.308(Rural) + 27.21(Testers*City) + 281.904(Testers*Town) + 372.817(Testers*Rural)$$

where suburban LEAs served as the reference group. The city, town, and rural variables are dummy coded to indicate LEA type (e.g., a city LEA had its variables coded as follows: city = 1, town = 0, rural = 0). To make the tester variable more interpretable, we did two transformations. First, we converted the testers variable to the number of testers divided by 1,000, and second, we subtracted the mean of all testers from each observation. Specifically, for each LEA the number of testers variable is equal to:

$$testers_i = \frac{number\ of\ testers_i - 2791}{1000}$$

For this equation, the number of $testers_i$ is the number of testers in LEA *i*, and 2,791 is the average number of testers across all LEAs. Thus, an LEA with 4,971 student testers would have a value of 2 for the testers in the equation: testers = 2 or $\frac{4791-2791}{1000}$.

As another illustration, to estimate the number of devices for a non-responding city LEA with 15,000 students, in the previous equation the value of city = 1, town = 0, rural = 0, and testers = 12.03 or ($\frac{15000-2791}{1000}$), and would have an estimated need of an additional 2,685 devices (see equation below).

$$Y_{devices} = 1229.42 + 119(12.03) - 303.32(1) - 65.838(0) + 127.308(0) + 27.21(12.03*1) + 281.904(12.03*0) + 372.817(12.03*0)$$

$$Y_{devices} = 2{,}685$$

Note: Five LEAs were without a known LEA type. The predicted number of devices needed for those five LEAs was estimated using an equation based on the responding LEAs that predicted devices only from the number of testers for the 2018–19 year.

Personnel

The next two predictions focused on calculating (a) the current number of technology personnel in non-responding LEAs and (b) the number of technology personnel that would need to be added to achieve the 350:1 students-to-technology personnel ratio. To do this, the total number of technology personnel across all categories (i.e., LEA technology directors, LEA technology managers, network administration specialists, database administration specialists, instructional technology specialists, classroom teachers who also serve in an LEA-level technology support role, and repair technicians) was summed for responding LEAs. The number of technology personnel needed was calculated by dividing the number of unique testers in the 2018–19 school year by 350 (the recommended number of students per technology personnel). Finally, the number of current technology personnel reported by responding LEAs was subtracted from the number needed, with the result that 627 LEAs were identified as being at or above the needed ratio. The remaining 171 LEAs did not meet the recommended ratio and needed a total of 2,146 additional technology personnel to achieve the appropriate ratio.

There were 409 LEAs without sufficient information to calculate the number of current personnel and the personnel needed to achieve a 350:1 student-to-technology personnel ratio. To estimate the number of personnel for these LEAs, two separate regression models were built based on the 798 LEAs with complete information. Similar to the way the number of devices were predicted, the regression model predicted the number of personnel needed from the number of unique testers in the LEA in 2018–19 and the type of LEA (city, suburban, town, or rural), while also accounting for the fact that the number of technology personnel needed could vary as a function of the number of testers in each LEA type. Each of the models was able to explain between 76 and 78 percent of the variability in the current number of technology personnel, as well as the number of technology personnel needed.

Once the regression equations were developed for the number of technology personnel current and needed based on the responding LEAs, the number of technology personnel current and needed was estimated for the non-responding LEAs by substituting the non-responding LEA characteristics into the equation (i.e., the number of unique testers in 2018–19 and their LEA type). The equations are provided below:

Current personnel:

$$Y_{personnelcurrent} = 11.135 + 1.509(Testers) - 0.149(City) - 2.67(Town) - 2.299(Rural) - 0.375(Testers*City) - 0.159(Testers*Town) + 0.604(Testers*Rural)$$

Needed personnel:

$$Y_{personnelneeded} = -3.161 + 1.348(Testers) + 0.149(City) + 2.67(Town) + 2.299(Rural) + 0.375(Testers*City) + 0.159(Testers*Town) - 0.604(Testers*Rural)$$

where suburban LEAs served as the reference group, the city, town, and rural variables are dummy coded (as described above in the device section), and the number of testers was the same as described in the device section, $testers_i = \frac{number\ of\ testers_i - 2791}{1000}$.

Similar to the illustration for devices, a non-responding city LEA of 15,000 students would have an estimated need of an additional 18 technology personnel to achieve a 350:1 students to technology personnel ratio (see equation below).

$$Y_{personnelneeded} = -3.161 + 1.348(12.03) + 0.149(1) + 2.67(0) + 2.299(0) + 0.375(12.03*1) + 0.159(12.03*0) - 0.604(12.03*0)$$

Note: Similar to the device estimates, five LEAs without a known LEA type were identified. In order to ensure all LEAs that had test takers in 2018–19 were included in the estimate for non-responding LEAs, the predicted number of personnel current and needed for those five LEAs was estimated using an equation based on the responding LEAs that predicted personnel only from the number of testers for the 2018–19 year.

APPENDIX F. Calculation of Last-Mile Fiber Costs for Non-fiber LEAs

Fiber cost estimates were taken from existing low- and high-end estimates of the cost of last-mile fiber to four of the six geographic regions of the United States (Columbia Telecommunications Corporation 2018). Cost estimates for non-responding LEAs were calculated based on percentages of responding LEAs located within each geographic category. The map and corresponding table provide detail on geographic regions and low- and high-end estimates within each region. Of the six geographic areas identified in the study, two (eastern mountain and western rural) are not present in Texas and were not used in cost estimates.

FIGURE F.1. U.S. Map of Geographic Regions Used to Estimate Last-Mile Fiber (Reproduced by permission of the Columbia Telecommunications Corporation.)

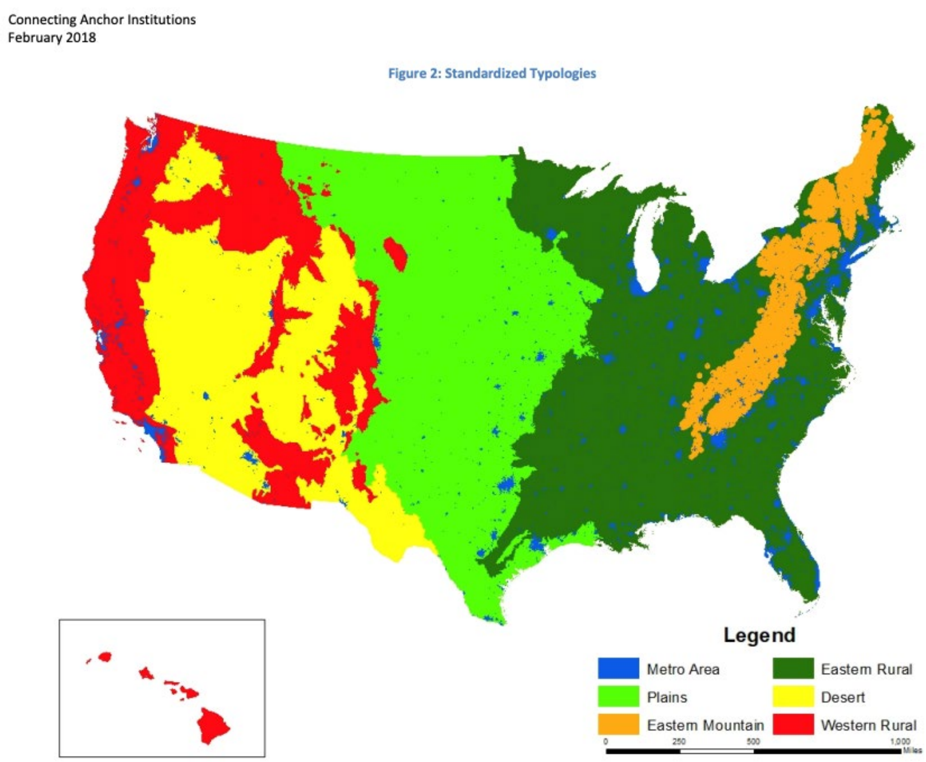


Table F.1 provides low- and high-end cost estimates for Texas geographic regions.

TABLE F.1. Last-Mile Fiber Estimates by Geographic Region

	Metro	Desert	Plains	Rural Eastern
Low-end	$34,000	$97,000	$66,000	$75,000
High-end	$47,000	$151,000	$97,000	$112,000