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1. General Component Questions

1.1 (2) Elements

Proposal Overview

Cambium Assessment, Inc. (CAI) is a large business corporation and a leading provider of online assessment solutions for K–12 students throughout the United States. Our headquarters is based in Washington, DC. CAI reaches beyond state-of-the-art practices to deliver innovative models, materials, and strategies that advance the field of measurement and improve the validity of student scores. CAI delivers grades 3–8 English language arts (ELA) and mathematics testing in 20 states and territories; science and/or social studies assessments in 17 states; statewide alternate assessments in 10 states; and English Language Proficiency (ELP) assessments in 10 states.

CAI is committed to the principles of quality, management, technical and technological precision, customer service, and innovation and continuous improvement, and CAI supports these principles in the Indiana Department of Education's (IDOE) approach to the development of Indiana's assessment system. We are deeply experienced, innovative, and dedicated to the success of our partners.

Quality

CAI has embedded the recommendations from the "Operational Best Practices for Statewide Large-Scale Assessment Programs" (The Council of Chief State School Officers & Association of Test Publishers, 2013 Edition) into our operational processes. As described further in Section 1.26 (3y), CAI has an established Business Process Management (BPM) system using IBM Blueworks Live as our central repository, as well as the BPM modeling and management tool. All processes, from contract initiation to the final delivery of score reports, are documented and organized to support the sequence of tasks, work activities, and critical hand-offs.

CAI has mature and documented policies and practices, and we strive for the delivery of error-free products and services. Client-facing defects rarely occur and are addressed immediately and with full transparency. Should an error occur that is directly caused by CAI, was not detected and corrected by CAI during our quality control activities, and later exposed and discovered in the operational environment, we will do the following:

- Immediately notify IDOE when the error(s) is discovered in the operational environment
- With input from IDOE, develop a plan for correcting the error
- Take responsibility for correcting the error(s) at CAI's expense
- Conduct analyses to identify the root cause and extent of errors

Similarly, should an error or defect occur that is not caused by CAI, we will work with IDOE to develop a plan for correcting the error to ensure that the program and its deliverables run smoothly for the students, educators, and IDOE.

Management

CAI is proud of our work with IDOE, and we look forward to maintaining a communicative, collaborative, and productive relationship that advances the assessment field and serves Indiana educators, students, and parents. Our collective success over the past several years testifies to the effectiveness of CAI's management processes. The management processes are described here:

- Close management in every area of the program, using a set of structured management tools and documents designed to facilitate solid planning, tracking, and managing change
- Efficient processes, clearly defined and consistently applied to areas of work
- Foresight in assessing, managing, and reducing the risks inherent in such a complex project
- Clear and ongoing communications, training, and customer support for educators and administrators to reassure and educate stakeholders about everything involved in administering Indiana's assessments
- A cross-program schedule created by program staff experienced in state assessments
- Dependencies across the multiple programs clearly defined for IDOE review; risks mitigated alongside customer feedback well in advance

Building on a strong foundation of established methods for program management, our team can easily customize services specific to each client. We have successfully applied these methods to state programs, including Indiana's Learning Evaluation Assessment Readiness Network (ILEARN), the Indiana Reading Evaluation and Determination (IREAD-3), and Indiana's Alternate Measure (I AM), and have shown that we can adapt to meet evolving program requirements. In addition to our proven processes, CAI currently has a core team that has experience understanding Indiana's requirements and delivering on them, including experience with program management, software engineering, content development, and psychometrics.

Technical and Technological Precision

CAI offers a testing management system that has successfully supported state testing programs since the early 2000s, developing innovative and customized standards-based assessments using a variety of test designs, test administration plans, and other program-specific factors.

Test forms are built by experts in academic content and psychometrics. CAI psychometricians provide comprehensive documentation on the technical quality of state assessment systems. CAI has also successfully supported our state clients through peer review. CAI is widely recognized as the industry leader in assessment psychometrics. In nearly every state where CAI has implemented an online or adaptive testing system, including the adaptive system we designed and built for the Smarter Balanced Assessment Consortium, our superior technical support has resulted in a Substantially Meets Requirements rating from the U.S. Department of Education. We aim to consistently apply and develop the most rigorous and technically sound scientific methods and to document these methods for a broad audience that includes education stakeholders, policymakers, researchers, and practitioners.

CAI's Centralized Reporting System (CRS) is a feature-rich system that is closely integrated with all of CAI's other online systems. It provides student reports as soon as test administration is completed in the Test Delivery System (TDS) and the test scores have been validated in the Quality Monitor (QM) System. CRS can provide individual student scores, school/district/state aggregates, aggregates for a custom group of students, and their performance over school years based on reporting requirements.

Customer Service Orientation

CAI is committed to using the best measurement technologies to support state accountability systems and inform school and district instruction. We believe that accountability focuses educators on a common mission to help students master state-adopted learning standards. This focus guides educators, especially as they support those students who are most in need.

With all of our state testing programs, CAI has proven our ability to develop and deliver easily understood reports based on accurate and reliable data. Student results can be reported immediately in CRS so that educators can act on assessment results immediately. The system is intuitive and
user-friendly, and educators can use CRS to find and examine data for multiple assessments. One of CAI's newest innovations is our web-based Family Portal, which is available as an additional option for clients and allows parents to directly access their students' assessment data. For CAI, continuing to meet and exceed the needs of students, educators, and IDOE is of the highest priority.

CAI highly values building strong relationships with our state clients, effectively working as one team to create solutions and an unparalleled assessment system for students and educators. In building solid and reliable relationships, IDOE can rest assured that all communications from CAI to Indiana students, educators, and IDOE personnel will be respectful, responsive, and professional. We believe this is crucial in a positive, productive, and successful program.

Innovation and Continual Improvement

Along with our commitment to our clients, innovation and continuous improvement are at the core of what we do at CAI. Because of our original technological innovations, CAI has the most mature,
well-tested, and scalable online test delivery system and computer-adaptive testing systems in the industry. CAI is the only organization to have successfully delivered statewide adaptive assessments at scale for 10 years in ELA, mathematics, and science. CAI has supported more than one-half dozen states as they transitioned almost instantly from a paper-pencil testing system to a virtually all-online assessment, including rural states (e.g., New Hampshire, Vermont), isolated states (e.g., Hawaii), and very large states (e.g., California).

CAI continues to innovate internally in many areas, and several new ideas are included throughout this proposal. Additionally, increasing the value of our services and materials through continual improvement and collaboration with internal and external partners is of the highest importance. We greatly enjoy continuing to find the best ways to execute on deliverables and provide the best service to Indiana students, educators, and IDOE. For example, CAI recently created a solution to streamline the assessment experience for students taking the I AM assessments and have No Mode of Communication, which is detailed in Section 1.9 (3h).

Lessons learned discussions, which collect feedback on successes and challenges at micro- and macro-levels of the program, are a regular part of CAI's process and culture and are held both internally as well as with IDOE. We find these to be positive and innovative moments, creating opportunities to celebrate successes, ideate, and create even better solutions moving forward by implementing lessons learned. We look forward to all such discussions with IDOE.

In addition, CAI teams constantly seek and produce new assessment research, technological innovations, and ideas. CAI will be very excited to share these with IDOE for consideration and discussion on a regular basis.

Test Timing and Test Window

CAI will work with the Department to ensure that average testing times for students participating in three ILEARN assessments (ELA, Mathematics, and Science or Social Studies depending on grade level) remain under the eight-hour limit, that the timing of each assessment is appropriate and concise, that assessments are untimed for students while maintaining adequate technical rigor and quality, and that impacts on test times are well understood prior to any changes in blueprint or test design.

The administration of I AM assessments for each subject area will be concise but will be untimed for students while maintaining adequate technical rigor and quality.

CAI looks forward to working with the Department during the 2023 test administration and beyond to revisit the I AM test design and to discuss and plan the scope change and schedule for implementation. As the I AM item bank grows, one idea to explore could be to transition the I AM assessments to an item adaptive test design, allowing test information to be better targeted to student ability while meeting all blueprint requirements. This would be consistent with the ILEARN test design.

CAI will work with IDOE to establish test administration windows for both online and paper testing that support the needs of the testing populations, align with the instructional calendar, and ensure delivery of individual and aggregate reports by the specified critical reporting dates.

See Exhibit 1.1-1 for an overview of the test administration windows and critical reporting dates in the 2022–2023 school year, which closely mirror these same dates from 2021–2022, per the RFP. However, as an alternative to the dates shown in Exhibit 1.1-1, CAI strongly recommends moving the Spring ILEARN summative assessments for grades 3–8 test windows to begin and end one week earlier. For example, the 2022–2023 window would be April 10–May 5, 2023. CAI would be happy to discuss this shift with IDOE upon being awarded the contract.

Exhibit 1.1-1: 2022–2023 Test Administration Windows for ILEARN, IREAD-3, and I AM

Assessment	Online Test Window*	Critical Reporting Dates
ILEARN Biology End-of-Course Assessment (ECA) (Fall)	November 28, 2022 – December 15, 2022	March 7, 2023*
ILEARN Biology ECA (Winter)	February 6, 2023 – February 23, 2023	May 16, 2023*
IREAD-3 (Spring/Primary Administration)	March 6, 2023 – March 17, 2023	April 14, 2023*
I AM (Spring)	April 3, 2023 – May 12, 2023	July 1, 2023
ILEARN Summative Grades 3–8 (Spring)	April 17, 2023 – May 12, 2023	July 1, 2023
ILEARN Biology ECA and U.S. Government ECA (Spring)	April 17, 2023 – May 19, 2023	July 1, 2023
IREAD-3 (Summer/Retest)	May 22, 2023 – July 14, 2023	August 11, 2023*

* Final test windows and some final critical reporting dates will be established with IDOE during program planning. The dates herein are proposed dates for preliminary planning purposes.

1.2 (3a) Background

Laws and Regulations

CAI has thoroughly reviewed the current Indiana Assessment Policy Manual located at https://www.in.gov/doe/students/assessment/indiana-assessments-policy-manual/ and the cited legislation, and is fully prepared to comply. We recognize the purposes of the assessments and that they must support these uses.

Peer Review

CAI will work with IDOE to continue to achieve a *Partially Meets* rating or higher for the ILEARN system. No organization can guarantee the outcome of a peer review unless an existing assessment that has already been approved is used to measure the same standards for the same purposes. We propose to continue delivering the ILEARN assessment, and since there are no changes to the test design or how the test is administered, the expectation is that peer review decisions would be at least at the level of the current rating. Nevertheless, we will work with IDOE to provide evidence to improve this rating.

CAI will work with IDOE to a) conduct all work to the highest professional standards; b) create the necessary materials for peer review submission; and c) respond to any inquiries arising from peer review or mitigate any identified deficiencies. After IDOE submits its Peer Review documentation to the U.S. Department of Education (USDOE), CAI will continue its support by providing any additional documentation that has already been created as a contract-required deliverable. If IDOE requires additional documentation, the new documentation will be included in a contract change amendment.

We are confident that the proposed system will partially meet (or surpass) peer review requirements and expectations for the ILEARN system. We have substantial experience developing custom testing programs for many clients. For example, all states in which CAI's Independent College and Career Readiness (ICCR) item banks are used have been found to substantially meet peer review guidelines. These states include New Hampshire, North Dakota, West Virginia, and Wyoming, which all use adaptive pools, as well as Arizona, Florida, Ohio, and Utah, which use CAI's ICCR item bank to augment their state-developed banks.

The Smarter Balanced system has been fully approved in two states. In September 2018, Vermont's implementation of the Smarter Balanced assessments was evaluated as "Substantially Met" according to peer review requirements. That same month and year, South Dakota became the first Smarter Balanced member state to meet all federal peer review requirements for the high school Mathematics and ELA/L assessment. The federal peer review letter with this confirmation also served as notification that Smarter Balanced meets all USDOE statutory and regulatory peer review requirements for the general assessments in Mathematics and ELA for high school. Most recently, this August, Nevada received notification that it met peer review requirements for grades 3–8 using Smarter Balanced's assessment system.

We summarize the evidence submitted and our plans for compiling evidence for ILEARN in Section 2, *Assessment Criteria and Evidence Questions*.

CAI will similarly support IDOE on the I AM assessment once approval status has been granted.

1.3 (3b) Test Administration Modes

CAI has successfully deployed the online and paper-based test administrations of the ILEARN, I AM, IREAD-3, and ISTEP+ for more than three years.

Comparable Online and Paper-and-Pencil Assessments

CAI will partner with IDOE to develop, administer, and score Indiana's online assessments. A comparable paper-and-pencil fixed form will be produced for students who cannot be assessed online.

Online assessments will be delivered through the Student Interface in CAI's Test Delivery System (TDS). The Student Interface can be accessed on a standard or touchscreen computer or tablet and provides a user-friendly environment for students participating in either the alternate or general-education assessment. The Student Interface is accessed through the CAI Secure Browser, which restricts access from other platforms while testing, to maintain the integrity of the assessment. Students who are able can actively engage with the computer or touchscreen interface and select their responses. For alternate assessment students who cannot respond using a computer or touchscreen interface, Test Administrators (TAs)

will enter the response on their behalf using the Data Entry Interface (DEI) on a device separate from the one being used for test delivery.

Paper-and-pencil assessment formats provided will include regular print, large print, and braille for all grades and subjects. CAI will work with a third-party vendor to develop contracted and uncontracted braille paper-and-pencil forms. Printed Spanish forms will also be produced for Mathematics, Science, and Social Studies.

ILEARN Paper-and-Pencil Assessments

Exhibit 1.3-1 identifies the subject areas, grades, and modes that CAI can support in collaboration with IDOE for ILEARN.

Exhibit 1.3-1: ILEARN Paper-and-Pencil Assessments

Subject Area	Grades	Mode
ILEARN English/Language Arts (ELA)	3–8	Regular print Large print Contracted braille Uncontracted braille
ILEARN Mathematics	3–8	Regular print Large print Contracted braille Uncontracted braille Spanish
ILEARN Social Studies & U.S. Government	5 and U.S. Government	Regular print Large print Contracted braille Uncontracted braille Spanish
ILEARN Science & Biology	4, 6, and Biology	Regular print Large print Contracted braille Uncontracted braille Spanish

CAI will work with IDOE to analyze and refresh ILEARN paper-and-pencil forms each year, removing any released items and refreshing at least 10% of item content. CAI will use items from item banks described in Section 1.9 (3h) to update the forms as needed. CAI understands we will not be responsible for item development, with the exception of supporting field-testing and data review tasks.

IREAD-3 Paper-and-Pencil Assessments

CAI understands that the IREAD-3 assessments include four forms (Forms A–D) that are rotated during each test administration. Exhibit 1.3-2 identifies the modes that CAI can support in collaboration with IDOE for IREAD-3.

Exhibit 1.3-2: IREAD-3 Paper-and-Pencil Assessments

Grade and Subject Area	Mode
I READ-3 (Grade 3)	Regular print Large print Contracted braille Uncontracted braille

I AM Paper-and-Pencil Assessments

I AM paper-and-pencil assessments include two parts, just as the online test does. Both parts of the paper-and-pencil test booklets are packaged together as a kit. Each kit includes all subject area booklets for the respective grade. Students with a print accommodation will receive either a regular print assessment or a large print assessment depending on the type of print accommodation. Kits are shrink-wrapped before delivery to schools and corporations.

High school test booklets are separated into two kits. One kit includes grade 10 ELA, grade 10 Mathematics, and Biology. These are shipped to corporations that have a grade 10 student requiring a print accommodation. The other kit includes only Biology. The Biology kit is shipped to corporations with students in grades 9, 11, or 12 who require a print accommodation. Exhibit 1.3-3 identifies the subject areas, grades, and modes that CAI can support in collaboration with IDOE for I AM.

Exhibit 1.3-3: I AM Paper-and-Pencil Assessments

Subject Area	Grade	Mode
I AM ELA	3–8	Regular print Large print Contracted braille Uncontracted braille
I AM Mathematics	3–8	Regular print Large print Contracted braille Uncontracted braille
I AM Social Studies	5	Regular print Large print Contracted braille Uncontracted braille
I AM Science	4, 6, and Biology	Regular print Large print Contracted braille Uncontracted braille

*Each kit contains the following: Part 1, Part 2 Form A, Part 2 Form B, and Part 2 Form C.

1.4 (3c) Online System Requirements

1. Introduction

CAI currently delivers online statewide summative assessments to approximately one-third of the nation's students from the following states and jurisdictions: Arkansas, California, Connecticut, Delaware, Florida, Hawaii, Idaho, Indiana, Iowa, Louisiana, Montana, Nebraska, New Hampshire, North Dakota, Ohio, Oregon, Rhode Island, South Carolina, South Dakota, Texas, U.S. Virgin Islands, Utah, Vermont, Washington, West Virginia, and Wyoming.

Many of the states we support conduct almost all of their testing online, with paper-and-pencil testing provided as an accommodation or offered to communities that avoid technology for religious or cultural reasons. More than half a dozen of our clients have used our system to transition, within one year, from an all paper-and-pencil system to one that is exclusively online. These clients include California, Connecticut, New Hampshire, South Dakota, U.S. Virgin Islands, and Vermont.

In this section, we provide an overview of our proposed online testing system that we have been using to successfully deliver Indiana's ILEARN, IREAD-3, and I AM assessments.

Technical Architecture of System Components

The CAI online testing system is made up of a set of several integrated modules.

CAI's modules are depicted in Exhibit 1.4.1-1. Of these, four are user-facing systems, including:

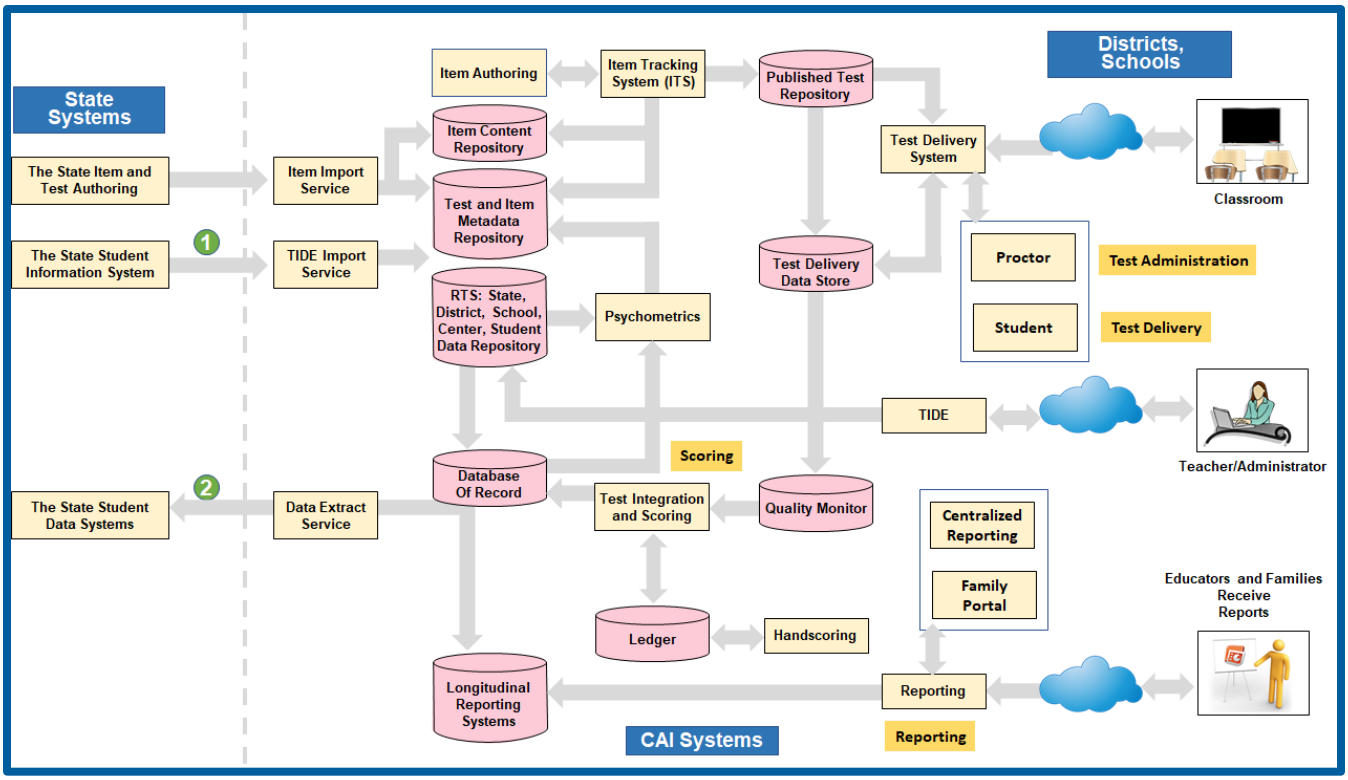
1. The portal, which hosts relevant information and provides access to the other systems
2. The Test Information Distribution Engine (TIDE), our administrative system
3. The Test Delivery System (TDS)
4. The Centralized Reporting System (CRS)

Other systems, also depicted in Exhibit 1.4.1-1, execute behind-the-scenes data processing, transfer, and storage. They include the following:

1. The Test Integration System (TIS)
2. The Database of Record (DOR)
3. The Ledger

The user-facing components are accessed through our identity provider, Red Hat Single Sign-on (RH-SSO), which provides single sign-on authentication across systems. Once logged in, users can navigate the various components of the system securely and seamlessly.

Exhibit 1.4.1-1: Overview of CAI Architecture



CAI's architecture is built for both paper-and-pencil and online tests. Results for both computer-based and paper-and-pencil tests are naturally integrated by the system in real time as test results are processed. Data file generation is highly configurable and based on mature and reliable software systems. Exhibit 1.4.1-2 summarizes each module and its role in the overall system. Here, we provide an overview of the key components of the system and their capabilities, followed by a description of how data flow throughout our online system.

Exhibit 1.4.1-2: Summary of Systems for Data Flow

System	Description
Test Information Distribution Engine (TIDE)	TIDE is responsible for registering students, gathering demographic data, providing participation reports, and ordering materials.
Test Delivery System (TDS)	The TDS's Test Administrator (TA) Interface provides the platform through which TAs establish and monitor test sessions and authenticate student users. The Student Interface is the testing system on which students take tests. The TDS delivers tests to students, records responses, and forwards data to downstream systems.
Test Integration System (TIS)	The TIS is responsible for the automated virtual stitching of the test record where there are hand-scored responses. Because hand-scored items go through a different process than machine-scored items, TIS takes the machine-scored items of a test opportunity and integrates them with the hand-scored items of the same test in an XML file. This file is then uploaded into the DOR and sent to the CRS.
Ledger	Ledger manages the flow of responses to and from hand-scoring, predicting workflows to optimize training and staff allocations, and then tracking each student response as it moves through the hand-scoring process.
Quality Monitor (QM) System	The QM System receives both paper-and-pencil and online test data, verifies the validity of the tests administered and the scores assigned, gathers statistical data for ongoing quality reports, and forwards data to the DOR and the CRS.
Database of Record (DOR)	The DOR maintains the authoritative records of tests administered and completed. Data in the DOR reflect appeals, verifications, and other post-administration adjustments.
Centralized Reporting System (CRS)	The CRS provides a secure interface to access assessment data and associated demographic information. It provides educators with a powerful tool to explore the data and turn them into actionable information.
Online Portal	The online portal provides a customized one-stop-shop for educators and other stakeholders, and provides access to other systems, practice sites, training sites, tutorials, and additional resources.

TIDE, our student registration system, gathers nightly files for both students and accommodations from IDOE, and stores this information in the Roster Tracking System (RTS), a flexible database system shared by TIDE, the TDS, and the CRS. The RTS maintains data about the educational networks in the State, such as which schools are in which corporations,

which teachers are in which schools, and which students are in which classes. TIDE maintains fully configurable data about the attributes of the various entities in the system, such as school addresses, student demographics, and virtually any other information that the State would like reflected in the final data delivered. Once system specifications are established in concert with the State, our systems are fully functional and capable of independent operations between local agencies and CAI, with no required state-level mediation.

TIDE also maintains authentication and role data, so it knows which personnel are authorized to administer tests and allows them to log in and define sessions. This configuration allows TIDE systems, and other CAI online systems, to align with the roles and responsibilities of users in the field. CAI will continue to work with Indiana to review the various roles used in the field and implement any necessary modifications. Users can have multiple roles and be associated with multiple schools or corporations.

Completed tests are passed downstream to the QM System for real-time quality checks. The QM System confirms test integrity and compiles statistics that our psychometricians review to ensure that each test and each item is performing as expected. The QM System's quality checks are typically completed within one second of the data receipt.

The QM System identifies responses that need to be routed for hand-scoring and sends them to our hand-scoring tracking system, Ledger. Scores for online assessments are assigned by automated systems in real time, integrating hand-scoring information as it becomes available. The hand-scoring processes include rigorous training, validity, reliability monitoring, and back reading to ensure accurate scoring. Hand-scored responses are returned through Ledger, which records the transaction and passes the data to our TIS. Hand-scored items are married with the machine-scored items by our TIS. The integration is based on identifiers that are never separated from their data.

The next stop is our test scoring engine, which calculates

- any other scores that will be used in the reporting system along with standard errors of measurement (SEMs);
- derivative measures from those scores (e.g., proficiency designations); and
- other indicators, such as attemptedness or unscorable tests.

The test scoring system is a mature, well-tested, real-time system that applies client-specific scoring rules and assigns scores from the calibrated items, including calculating performance-level indicators, subscale scores, and other features, which then pass automatically to the CRS and DOR. The scoring system is tested extensively before deployment, including reviewing scored tests and large-scale simulations to ensure that point estimates and standard errors are correct. Once complete, the data are transmitted to the CRS and DOR. Additionally, all scores are verified with a second, independently written scoring engine known as METRICS. This is a tool that CAI has made available to the public and to all of our clients for performing score verifications independently.

Test Registration System

CAI's TIDE supports all enrollment-related data management for paper-and-pencil and online test administration. TIDE is a mature system that has been in use for nearly 14 years, currently supports 26 states and jurisdictions, and manages student data for over one-third of the nation's grades 3–8 students. Like all CAI systems, in addition to being sound and stable, TIDE is feature-rich and highly customizable.

TIDE supports state departments of education and corporation and school personnel throughout the testing process. TIDE is a singular resource for all required administrative testing activities, including:

- Managing system users via integration with state and corporation student information systems through file uploads or through its user interface (UI)
- Managing students, including student demographic data and testing accommodations, via integration with state and corporation information systems through file uploads or through its UI
- Ordering paper testing materials and tracking paper order shipments
- Managing test administration and tracking student participation and status of ongoing administrations
- Executing administrative functions, such as identifying and reconciling duplicate student records, reopening tests, and rescoring tests

TIDE is centered around administrative tasks performed by users throughout the school year and permits users to enter information, with nearly real-time integration across CAI systems, manually through the UI or through a file upload. TIDE supports extensive search features, allowing users to easily look up information, make updates, and create reports.

TIDE also supports direct integration with student information systems through nightly file transfers and through web service application programming interfaces (APIs).

TIDE dramatically reduces workload and stress levels in schools and corporations by incorporating a bulk upload feature into all its UIs. Information uploaded into TIDE becomes available almost instantly to all CAI systems, including the TDS and the CRS. There is no need to roster students into testing sessions; once enrolled, students are made eligible for tests through configurable business rules and can sign in to a testing session without a TA having to create testing rosters.

Student data can be verified and adjusted at any time, starting from the day TIDE opens. This reduces the rush and compressed work at the end of the testing window that often leads to errors. The tools for editing student information are not limited to online testing but extend to paper-and-pencil testing, as well.

TIDE is highly customizable. Indiana has tailored TIDE to meet its own specific needs, and CAI will continue to work with IDOE to review and modify TIDE as necessary to support the State. Many features allow the configuration of sophisticated business rules, from determining a student's test eligibility, to managing a user's permission to administer a test, to performing calculations for quantities of paper materials, to validating student data across multiple data elements. Implementing digital business rules frees up the end users from manual work and improves reliability.

User Management

TIDE provides an integrated system for adding, editing, and deleting users and assigning them different authorizations based on roles; gathering and managing student enrollment data; provisioning role-based access for adding and editing student accommodation data, test assignments, form assignments, and class rosters; and tracking student access and test participation.

TIDE supports the state and test coordinators as they prepare for testing. It is a one-stop-shop for all administrative activities required for testing; this includes managing user account information and student information, executing administrative functions (such as test rescores or reopens), and performing other functions that support test coordinators and the State as they prepare for, execute, and follow up on testing.

We discuss user management in detail in Section 1.4 (3c) under *User Role Configuration, Assignment and Revisions.*

Student Registration

One of the most common ways to add students in TIDE is by means of a bulk upload, either through the TIDE UI or through a file transfer from a state or corporation student information system. The bulk upload interface in TIDE is fast, intuitive, and provides detailed feedback to the users uploading the file by flagging validation errors and giving upload confirmation. Once data are uploaded in TIDE, data become available to other systems.

An alternative to performing file uploads is to add student records manually in the TIDE UI. This interface uses the same validation rules as are used for file uploads. This method provides a convenient way to add a last-minute (even a few minutes prior to testing) enrollment. Access to this UI can be configured such that only users with certain roles will be shown this page.

We refer readers to Section 1.4 (3c) under *User Role Configuration, Assignment and Revisions* for more details on TIDE.

Test Delivery System

We refer readers to Section 1.4 (3c) under *Test Delivery Platform* for details on our TDS. Here we provide an overview of our TDS.

Our TDS is characterized by the following:

1. We have designed our system to work within the constraints of real schools, with what we refer to as a small technological footprint.
2. Our system does not require proctor caching or local caching servers, and we optimize our system and tests to minimize bandwidth usage.
3. Our assessments are designed to require virtually no technology expertise on site within schools.
4. Our system is infinitely scalable.
5. The TDS does not require advanced test scheduling or testing rosters.

Small Footprint

Our system works within the existing school infrastructure. It functions on the newest tablets and the oldest desktops because we know that schools must work with the technology available. This small technological footprint within schools has enabled swift, low-cost, and smooth transitions to online testing.

Caching

Our system does not require proctor caching or local caching servers. Such caching mechanisms require extra hardware at schools, intermittent reinstallation, and a higher level of technical support. Our caching mechanism works invisibly in the memory of the students' machines. Removing caching servers significantly reduces the need for help desk support, and no state in which CAI has worked has ever requested or needed a caching server.

Further, we optimize our system and tests to minimize bandwidth usage. Optimization enables schools to test many students with a fraction of the typical bandwidth. We do not expect schools to upgrade their Internet service or internal networks to support the test; rather, the test is designed to work within existing bandwidth constraints. A typical test requires only 15–40 kilobits of bandwidth per second per student, depending on the media included in the assessment.

Technology Expertise

Our assessments are designed to require virtually no technology expertise on site at schools. We know that schools and corporations often lack access to skilled technicians. Our system requires only a single piece of software—the CAI Secure Browser—and no special hardware. The CAI Secure Browser can be installed quickly and simply, either on a single machine or across a large network. Once installed, it takes care of itself.

Scalability

We designed our system's architecture to be virtually infinitely scalable. Given the expected usage and concurrency rates of a client or state, we simply need to add hardware to meet those needs. This architecture is currently used to deliver statewide assessments in several large states. In California, we test more than 99.99% of the 3.2 million grade-eligible students online with adaptive tests. States such as Connecticut, Indiana, Ohio, Oregon, and Washington, among many others, test most of their students online using our platform. The maximum simultaneous load experienced in the field in 2019 was 859,668 students testing. However, we maintain substantially more capacity than we will use in any given year. We currently have the capacity to support a combined simultaneous load approaching 3 million students.

Test Scheduling

CAI's TDS does not require advanced test scheduling or testing rosters. Setting up a new test session takes just a few seconds, and any student can sign in to this test session, as long as the TA approves the student's request.

CAI supports walk-ins for online and paper-and-pencil-testing students. Using the student management module in CAI's TIDE, students can be added at any time throughout the school year. Additions and edits are reflected in real time across all online systems. Once students are added, configurable business rules take effect to make these students eligible for tests, after which students can take tests immediately without the need for rostering. Students testing online can start testing as soon as they are added in TIDE.

Reporting System

CAI proposes providing Indiana teachers and administrators with an enhanced, modernized online reporting system that will replace the current online reporting system for Indiana's ILEARN, IREAD-3, and I AM assessments. The new system is similar to the system currently in use, but with additional updated and streamlined features and capabilities. With all of our state testing programs, CAI has proven our ability to develop and deliver easily understood reports based on accurate and reliable data. Student results are reported immediately in our CRS so that educators can act on assessment results immediately. The system is intuitive and user-friendly, and educators can use the CRS to find and interpret data for multiple assessments. We refer readers to Section 1.4 (3c) under *Data Reporting System* and Section 1.16 (3e) for a detailed discussion of the CRS.

2. User Role Configuration, Assignment and Revisions

CAI's Test Information Distribution Engine (TIDE) provides an integrated system for adding, editing, and deleting users and assigning them different authorizations based on roles; gathering and managing student enrollment data; provisioning role-based access for adding and editing student accommodation data, test assignments, form assignments, and class

rosters; and tracking student test participation. This system is the same secure online data collection system that is currently being used to support Indiana's state assessments.

TIDE supports a simple and intuitive user interface (UI), so users can easily access the different tasks available throughout the school year and enter information manually through the UI or through a file upload. TIDE supports extensive search features, allowing users to easily look up information and make updates or create reports. TIDE is currently customized and configured to support Indiana requirements and over the past several years has been functioning well for all Indiana administrative activities.

Creating and maintaining user accounts in TIDE is easy. TIDE offers an intuitive web-based interface to add, edit, and upload user accounts.

Exhibits 1.4.2-1 and 1.4.2-2 show the process of uploading users from a file.

Exhibit 1.4.2-1: Uploading a User File

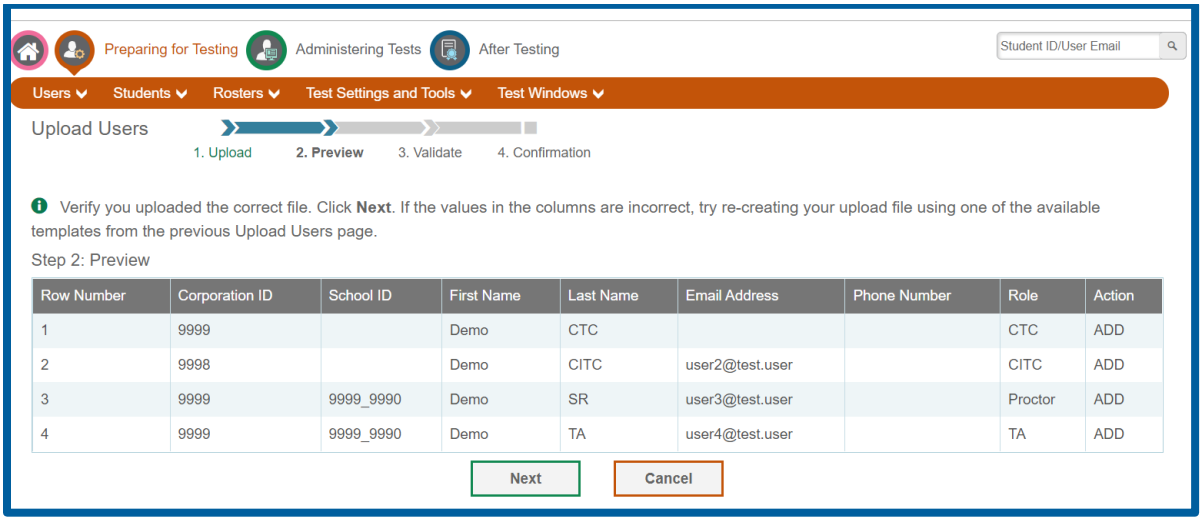
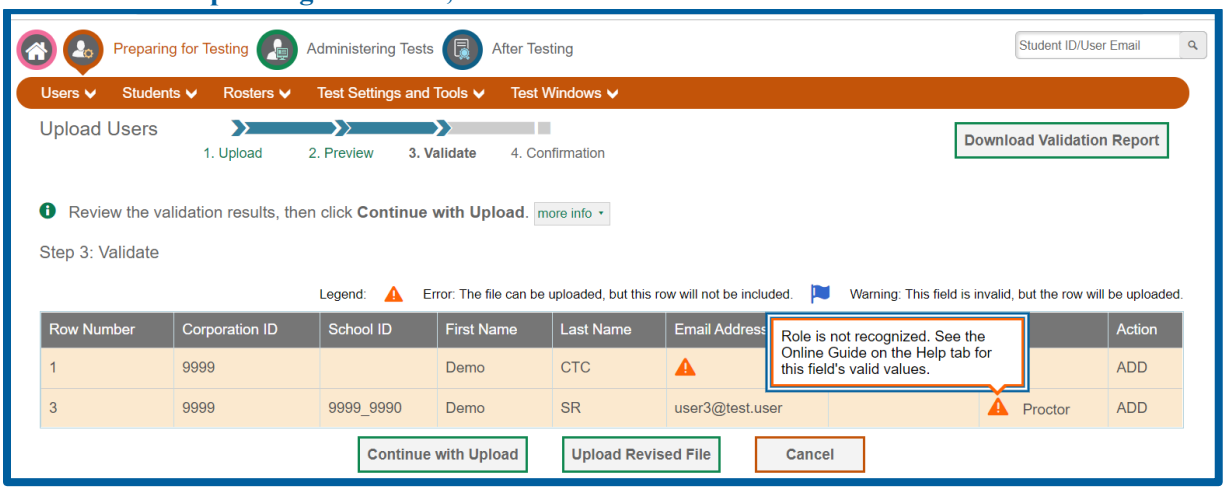
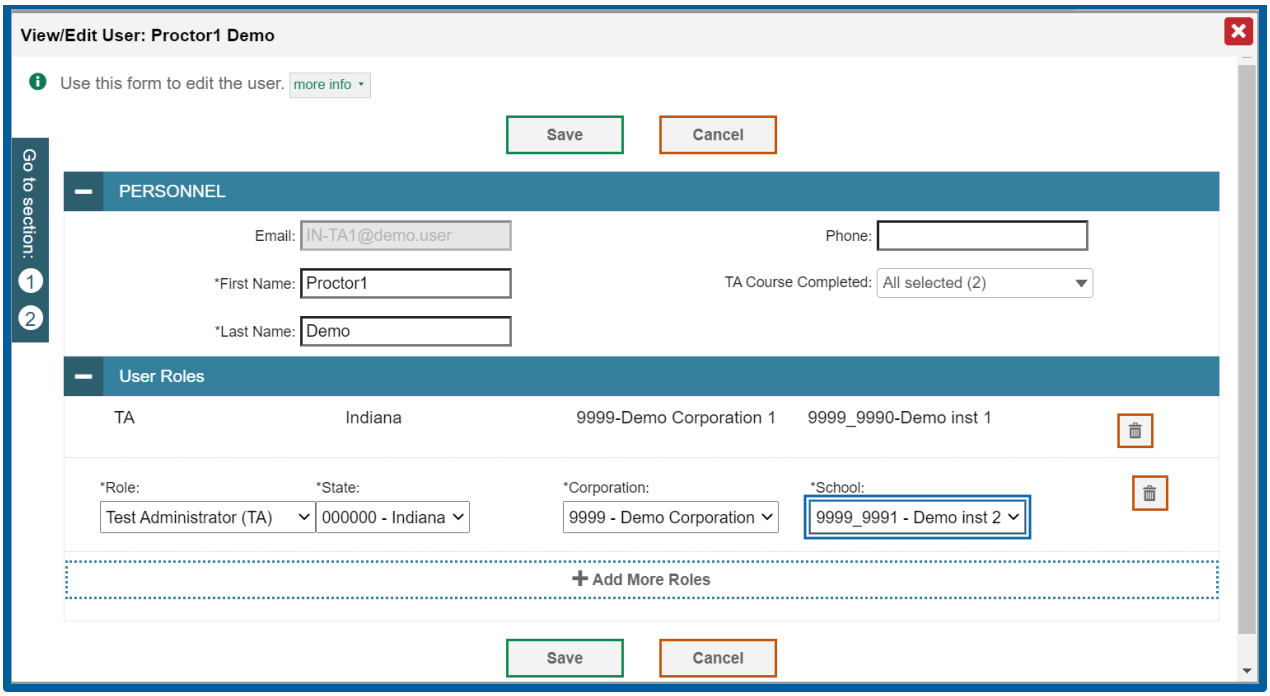


Exhibit 1.4.2-2: Uploading a User File, with Validation Error



Once a user is loaded into TIDE, it is easy to add or remove roles or change data fields for the user. Exhibit 1.4.2-3 shows a View/Edit User screen where an additional role is being added for a user.

Exhibit 1.4.2-3: View/Edit User Screen



TIDE adds, edits, and deletes users and assigns them different authorizations based on each role's designated permissions. Since role creation is configurable, CAI will work with IDOE to define a sufficient number of differentiated roles to support workflows at schools and corporations throughout the state.

CAI will work with IDOE to establish a user role hierarchy. Based on this hierarchy, TIDE can be configured so that users at higher levels can delegate tasks by adding users to other roles. A typical setup would be something like the following:

- State-level users can upload corporation-level users.
- Corporation-level users can add school test coordinators and principals.
- Principals can add teachers and test administrators.

A user's rights are tied to specific system functions. This type of access (whether a user can view only or can view and edit) is configurable and determined in collaboration with IDOE. Exhibit 1.4.2-4 shows an example of which roles have access to a given system's functions as documented in the TIDE specifications.

Exhibit 1.4.2-4: Indiana User Roles

		STATE	CTC	CITC	COOP	CR	NPSTC
Parent Task Type	TASK LABEL	State Administrator (STATE)	Corporation Test Coordinator (CTC	Corp. Information Technology Coordinator (CIT	Co-Op (COOP)	Corporation Reporting (CR	School Test Coordinat
Manage Account	Change Role	Yes	Yes	Yes	Yes	Yes	Yes
Manage Account	Reset Password	Yes	Yes	Yes	Yes	Yes	Yes
Manage Account	My Contact	Yes	Yes	Yes	Yes	Yes	Yes
Manage Account	Role	View Only	View Only	View Only	View Only	View Only	View Only
Manage Account	Email	View Only	View Only	View Only	View Only	View Only	View Only
Manage Account	First Name	Edit	Edit	Edit	Edit	Edit	Edit
Manage Account	Last Name	Edit	Edit	Edit	Edit	Edit	Edit
Manage Account	Phone	Edit	Edit	Edit	Edit	Edit	Edit
Students	View/Edit/Export Students	Yes	Yes	Yes	Yes	No	Yes
Students	Reporting ID	Hidden	Hidden	Hidden	Hidden	N/A	Hidden
Students	STN	View Only	View Only	View Only	View Only	N/A	View Only
Students	Student's Last Name	View Only	View Only	View Only	View Only	N/A	View Only
Students	Student's First Name	View Only	View Only	View Only	View Only	N/A	View Only
Students	Student's Middle Name	View Only	View Only	View Only	View Only	N/A	View Only
Students	Gender	View Only	View Only	View Only	View Only	N/A	View Only
Students	Date of Birth	View Only	View Only	View Only	View Only	N/A	View Only
Students	Grade	View Only	View Only	View Only	View Only	N/A	View Only
Students	Alternate Tester	View Only	View Only	View Only	View Only	N/A	View Only
Students	Identified English Learner	View Only	View Only	View Only	View Only	N/A	View Only
Students	Special Education	View Only	View Only	View Only	View Only	N/A	View Only
Students	Section 504 Plan	View Only	View Only	View Only	View Only	N/A	View Only
Students	Home Language	View Only	View Only	View Only	View Only	N/A	View Only
Students	Primary Disability	View Only	View Only	View Only	View Only	N/A	View Only

IDOE corporation staff are currently using TIDE for online test administration and are familiar with the user management process in TIDE. TIDE is currently configured to support Indiana-specific roles such as Corporation Test Coordinator, Corporation Information Technology Coordinator, and Co-Op.

User roles may be customized according to state-specific requirements during annual specifications review and finalization. IDOE can decide which roles have access to various tasks and data elements within CAI's online systems. CAI technical staff will then configure the roles in TIDE according to IDOE's specifications.

Our systems use role-based security models to ensure that users can only access the data to which they are entitled and that limit their ability to change that data. User rights have two dimensions: (1) the user's role and (2) the user's data access rights (his or her jurisdiction). The user's role determines what actions a user can take, which types of reports he or she can view, and similar functional limitations. Data access rights tell, for example, which principal can view which teacher and student data. Data access rights are governed by relationships among entities in our Roster Tracking System (RTS), along with a configurable set of business rules that enforce client-specific policies and describe which access rights correspond to which relationships. CAI will work with IDOE to maintain current business rules and to adjust them as needed.

As discussed previously, TIDE allows for adding, editing, and deleting users and assigning them different authorizations based on roles. TIDE supports importing user data, and the import can take place either through automated data exchanges between IDOE and CAI or by allowing state, corporation, or school users to upload data directly into TIDE. Authorized users can also manually create users and update user roles.

An example of the TIDE user guide can be found here: https://ilearn.portal.cambiumast.com/resources/test-administrators-and-educators/2021-2022-tide-user-guide

The TIDE user guide covers a wide range of tasks in TIDE, including how to log in and navigate TIDE, manage user accounts, and manage student information and accommodation settings.

3. Test Administration Platform

CAI is proposing our Test Information Distribution Engine (TIDE) to support data management for paper-and-pencil and online test administration. TIDE is the same system that Indiana's corporation and school users have been using for several years in support of Indiana's state assessments. TIDE supports state, corporation, and school personnel throughout the testing process. We refer readers to Section 1.4 (3c) under *Introduction* for an overview of TIDE.

Auditability

TIDE audits all user activity around student data access and updates. TIDE logs details on all user activities around student data, such as student searches and viewing of search results, as well as student record updates and deletions. TIDE also logs details of administrative procedures initiated in TIDE, such as test invalidations and reopening test administrations.

Prior Year Data

TIDE stores historical student enrollment data from one year to the next, and this data are made available to the Centralized Reporting System (CRS). Although prior year enrollment data are removed from visibility in the TIDE user interface (UI) at the start of each test administration year, that student enrollment data are retained in the Roster Tracking System (RTS) database for the lifetime of the contract and may be referenced and extracted upon request by IDOE.

User Roles

TIDE allows for extensive configuration around user roles and users' access to tasks and data. Refer back to Section 1.4 (3c) under *User Role Configuration, Assignment, and Revisions* for a discussion of user role management options and an illustration of Indiana's current role specifications.

Student Data Management

Continuous Enrollment and Immediate Availability of Data

TIDE allows continuous enrollment throughout the school year whereby users can add or edit student information, even on testing day. Integration between TIDE and the Test Delivery System (TDS) is such that any student information added or edited in TIDE reaches the TDS in near-real time. This system works well for "walk-in" students and on-the-fly

corrections on testing day. Any missing students can be added on testing day and students can expect to test immediately. The ability to correct data is not limited to just student demographics, but is extended to include all student accommodations, even when day-of-testing updates affect eligibility for a specific test.

Corrections to student data are not limited to online tests. Paper-and-pencil tests can also make use of the on-demand labels to correct any student information. The on-demand labels reflect student information as of the time the label is printed and will account for any edits to student data. Users can also print on-demand labels for new students as soon as they are added into TIDE. On-demand labels ensure that answer documents can be linked back to the student record with as much precision as preID labels or consumable booklets.

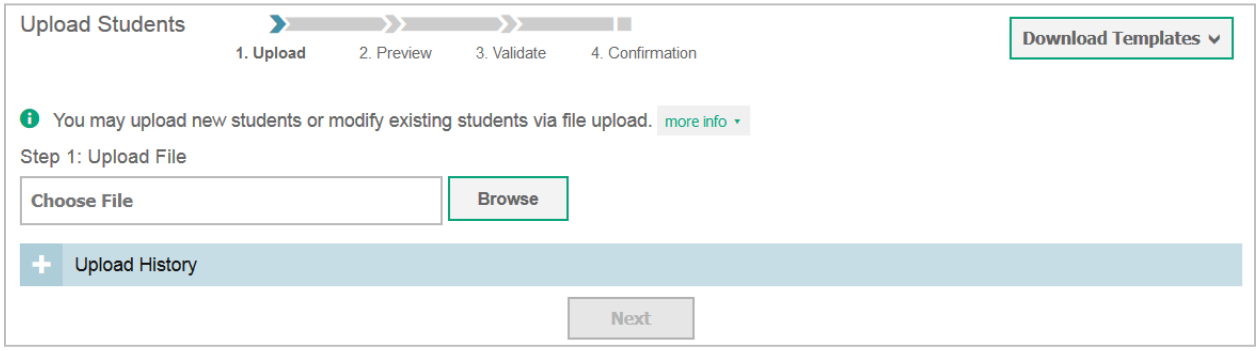
Enrolling Students in TIDE

One of the most common ways to add students in TIDE is by means of a bulk upload, either through the TIDE UI or through a file transfer from a state or corporation Student Information System (SIS). The bulk upload interface in TIDE is fast, intuitive, and provides detailed feedback to the users uploading the file by flagging validation errors and giving upload confirmation. Once data are uploaded in TIDE, data become available to other systems.

Uploading a file in the TIDE UI is a quick four-step process:

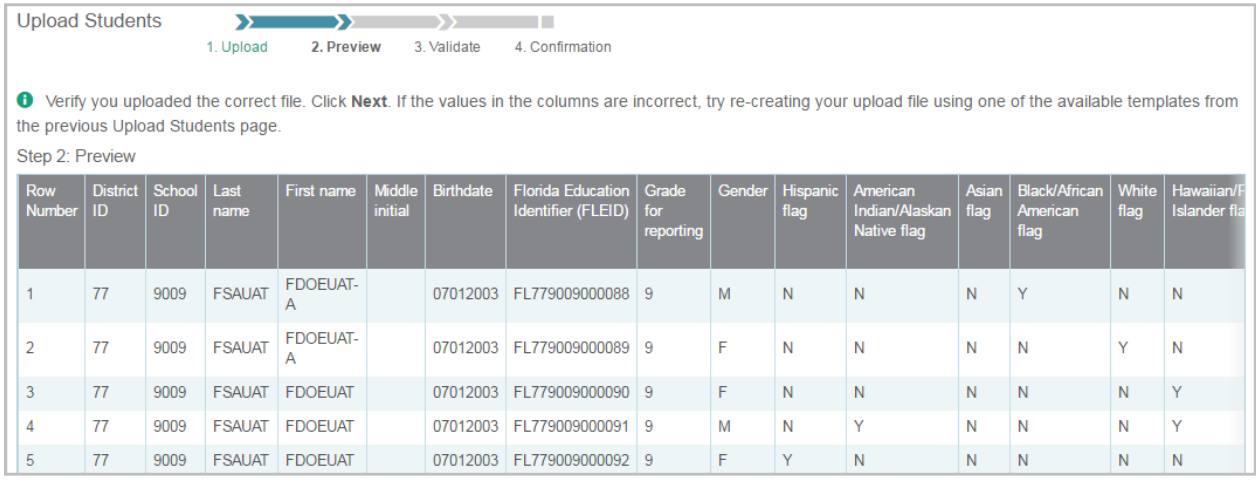
1. Download the template available in TIDE, fill in the student information, and upload it (see Exhibit 1.4.3-1).

Exhibit 1.4.3-1: Sample Student Upload Page



2. TIDE provides a quick preview of the first few records so that users can confirm that they are uploading the correct file (see Exhibit 1.4.3-2).

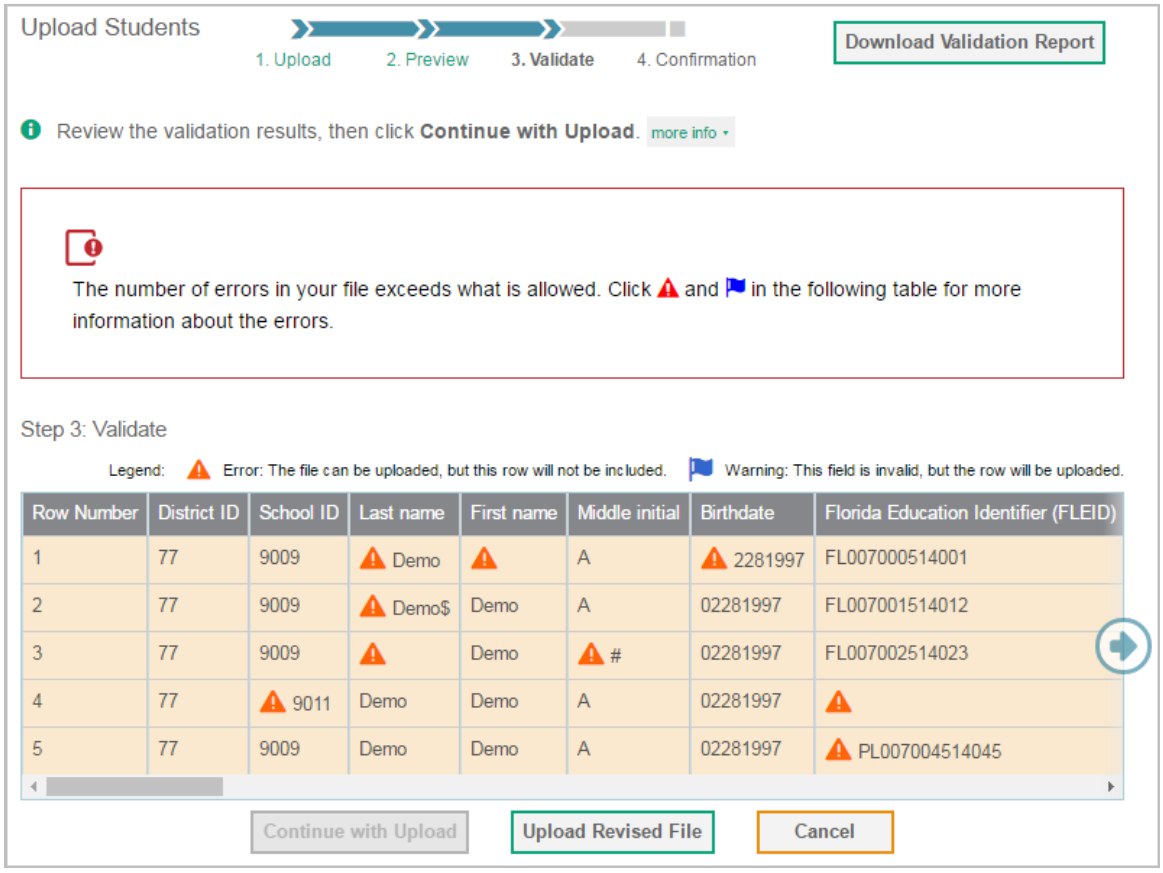
Exhibit 1.4.3-2: File Upload Preview (Partial View)



Row Number	District ID	School ID	Last name	First name	Middle initial	Birthdate	Florida Education Identifier (FLEID)	Grade for reporting	Gender	Hispanic flag	American Indian/Alaskan Native flag	Asian flag	Black/African American flag	White flag	Hawaiian/P Islander fla
1	77	9009	FSAUAT	FDOEUAT-A		07012003	FL779009000088	9	M	N	N	N	Y	N	N
2	77	9009	FSAUAT	FDOEUAT-A		07012003	FL779009000089	9	F	N	N	N	N	Y	N
3	77	9009	FSAUAT	FDOEUAT		07012003	FL779009000090	9	F	N	N	N	N	N	Y
4	77	9009	FSAUAT	FDOEUAT		07012003	FL779009000091	9	M	N	Y	N	N	N	Y
5	77	9009	FSAUAT	FDOEUAT		07012003	FL779009000092	9	F	Y	N	N	N	N	N

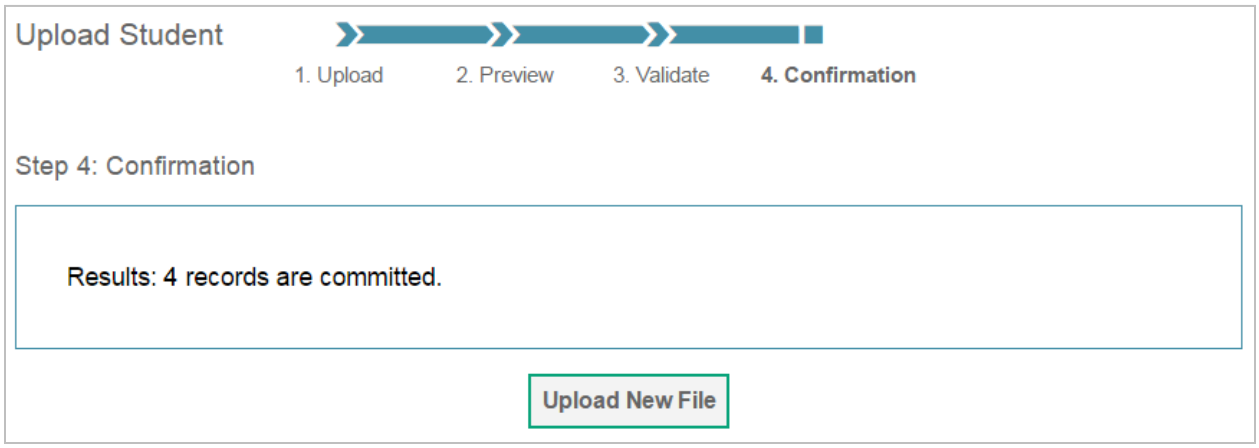
3. TIDE can generate a detailed validation report with feedback in each cell that provides clear instructions to the user on how to fix a particular validation error (see Exhibit 1.4.3-3).

Exhibit 1.4.3-3: Sample Validation Page



4. TIDE confirms that records have been entered into the database, along with a report on the number of records successfully uploaded, the number of records that were rejected because of errors, and a distribution of the number of records uploaded by school, corporation, or grade (see Exhibit 1.4.3-4).

Exhibit 1.4.3-4: Confirmation Page



Test Eligibility Assignment

TIDE offers a configurable rules-based eligibility assignment process. Rather than having to import students into a particular test administration, rules are configured to make students eligible for specific tests based on data attributes such as enrolled grade, limited English proficiency (LEP) flag, or paper-and-pencil and online test indicators.

Online test eligibility is assigned automatically at the time the student is imported, based on student registration data. For example, a student in grade 5 could be assigned eligibility for grade 5 English/Language Arts (ELA) and Mathematics tests. Changing the student's grade from 5 to 6 makes the student eligible for grade 6 ELA and Mathematics tests. This test eligibility data are available immediately in the TDS.

Searching and Viewing Student Enrollment Data

TIDE offers helpful searching and reporting features for reviewing student data. The student search form and search results table columns may be customized according to IDOE's preferences during annual specification review. Additionally, TIDE allows on-screen customization by the user to remove unneeded columns from reports prior to exporting. TIDE makes it easy to export and download student data in Microsoft Excel or CSV formats.

Exhibit 1.4.3-5 shows a sample student search results table.

Exhibit 1.4.3-5: Student Search Results Table

	Edit	School Information			Student Information															
		State	District	School	StudentID	Student's Last Name	Student's First Name	Student's Middle Name	Gender	BirthDate (MMDDYYYY)	Grade	Native Hawaiian or Other Pacific Islander	Asian	Hispanic or Latino	American Indian or Alaska Native	Black or African American	White	IDEA Indicator	IEP	Section 504
☐	✎	AI	AI_9999	AI_9999_9999	AI-9999-1022001099	Student	Demo		Male	11042000	03	No	No	No	Yes	No	No	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999901	Demo	Jim		Male	01011990	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999903	Demo	Stan		Male	01011992	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999904	Demo	Tricia		Female	01011993	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999905	Demo	PJ		Male	01011994	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999906	Demo	Francisco		Male	01011995	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999907	Demo	Floyd		Male	01011996	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999908	Demo	Sherif		Male	01011997	05	No	No	No	No	No	Yes	No	No	No
☐	✎	AI	AI_9999	AI_9999_9999	AI-DEMO-99999909	Demo	Jason		Male	01011998	05	No	No	No	No	No	Yes	No	No	No

Users can export results in Microsoft Excel or CSV formats. In addition to tabular format, TIDE offers a print-friendly Student Settings summary view listing key student information and any test settings assigned. Exhibit 1.4.3-6 shows a sample Student Settings and Tools Report.

Exhibit 1.4.3-6: Student Settings and Tools Report

Student Name	Student ID	Enrolled Grade	School	District	Test Settings and Tools
STUDENT, DEMO	AI-9999-1022001099	03	AST DEMO SCHOOL 9999 (AI_9999_9999)	AST DEMO DISTRICT 9999 (AI_9999)	**ELA** Text-To-Speech:Instructions Passages and Items
LASTORSURNAME, FIRSTNAME	AI-9999-001183679	08	AST DEMO SCHOOL 9999 (AI_9999_9999)	AST DEMO DISTRICT 9999 (AI_9999)	**ELA** Permissive Mode:On
T, T	AI-9999-98990056	10	AST DEMO SCHOOL 9998 (AI_9999_9998)	AST DEMO DISTRICT 9999 (AI_9999)	**Mathematics** TTS Tracking:On
WILMES_TTS, CARSTEN	AI-9999-17000002	05	AST DEMO SCHOOL 9999 (AI_9999_9999)	AST DEMO DISTRICT 9999 (AI_9999)	**ELA** Text-To-Speech:Instructions Passages and Items **Mathematics** Text-To-Speech:Instructions Passages and Items **Science** Text-To-Speech:Instructions Passages and Items

CAI has supported nightly file transfer options for Indiana for the past several years. If desired by IDOE, CAI will work with IDOE to explore an application programming interface (API)-based approach so that enrollment data are refreshed more frequently. CAI is committed to interoperability and supporting established standards such as OneRoster. CAI's TIDE supports OneRoster v1.1 data exchanges for importing corporation, school, user, and student information. CAI continues to enhance our support of OneRoster.

Rosters

Because TIDE can automatically determine student eligibility for tests, there is no need to create a roster of students that are scheduled for a test in advance. Starting a test session on testing day is very simple, and so is the process by which students enroll in that session. Test proctors need to select only the set of tests that they will be administering, and students need to select the appropriate test, if there are multiple available, as they join the session. For example, a Test Administrator may create a session to administer grade 5 ELA tests, as well as a make-up session for grade 4 ELA for students absent on that day. Students can only see and select those tests for which they are eligible. This real-time means of creating and allowing students to participate in sessions removes the burden of setting up test sessions in advance. It also allows for late-entry students to participate in test sessions with no additional administrative effort. Rosters are used primarily to manage access to student results in the CRS.

Managing and Monitoring Test Administration

TIDE supports managing and monitoring test administration through several features.

TIDE Participation Reports

TIDE offers a suite of tools for monitoring test progress, which we refer to as Participation Reports, both at the individual student level and aggregated across the organizational hierarchy. The tools allow users to closely monitor progress and identify potential lapses or other issues. Most of the reports are in near- real time, allowing analysis and decisions about intervention to be made expediently.

CAI offers each of our clients a high-level Client Dashboard that displays the number of tests started, completed, and not yet started, grouped by sets of related tests. These data are updated nightly. The dashboard also displays, in near-real time (updated about every two minutes), a graphic representation of the percentage of total system capacity currently in use and an indicator of the system's operational health.

For users planning and managing testing, TIDE offers near-real-time information about test status at the student level. These data are updated continuously, but during peak loads, the information may lag by a few minutes. The same intuitive search capability that is used to view and edit student demographic and accommodation information is also used to search for student test status details. There are additional filter options related to testing activity, such as searching for students who have started, but not completed, testing, searching for students whose test opportunities will expire in a certain number of days, and searching for students by proctor name or by testing session. This information is available continuously throughout the test window.

On testing day, TIDE displays a Session Monitoring Report, which details all activity in tests started, paused, and completed that day. This report allows school administrators to monitor classroom activity. If sessions are not progressing as anticipated, school administrators may react by adjusting the bell schedule or activating other interventions.

Test Completion Rate Reports include the percentage calculations per test aggregated at the school level, corporation level, and for the state of Indiana. The data are broken down into number of tests started and number of tests completed. These Test Completion Rate Reports are exportable as Microsoft Excel or CSV files.

Test Completion Rate Reports, as most features in TIDE, can be made available to certain sets of user roles and be configured for different levels of access based on user role. The data are limited to the user's school or corporation jurisdiction. High-level reports are available so that school and corporation users can determine the percentage of students who have completed each of the assessments.

In addition to test participation and test status reports, individual student record view includes information on eligible tests started or not started by a specific student.

TIDE Test Windows

The TIDE Test Windows feature supports applying further constraints to the dates during which tests may be administered within the overarching test window set in the TDS. This feature has been used for Indiana for several years to support early or late extended test windows for individual schools by special permission by IDOE.

Paper-and-Pencil Test Ordering

TIDE allows for the easy identification of students who need paper materials based on predetermined rules. Using student identification, quantities of paper materials are automatically calculated, and student information is used to print consumable test booklets and answer documents. TIDE also allows printing of on-demand labels, which have the same fidelity as scannable information on the consumable documents. Users can print labels from TIDE and affix them to paper-and-pencil test booklets even minutes before testing.

Identifying Students for Paper-and-Pencil Testing

The identification of students who need paper documents is a simple process in TIDE. Students eligible for paper-and-pencil tests can be identified in the following ways:

- Add an optional field in student file imports that identifies students who will be taking paper-and-pencil tests. There could be different columns for each subject, or the field could be common across subjects. If this field is not populated, IDOE can decide that the student will be given an online test.
- Add a paper-tester flag on the Add/Edit Student page. Users can manually mark students requiring paper-and-pencil tests.
- Configure a separate file upload that has only three columns: (1) Student identifier (typically the Statewide Student Identifier [SSID]), (2) test subject area, and (3) paper-tester flag. Having this upload format allows users to easily set paper-and-pencil-testing students in bulk.

CAI can also work with IDOE to define rules that automatically qualify students for paper-and-pencil tests (including large print or translated versions) based on student testing accommodations.

Students taking paper-and-pencil tests are identified based on factors such as grade and testing accommodations. The Orders module in TIDE automatically calculates the number of consumable documents needed per school and per corporation. Optional overage quantities of generic materials can be added into the quantities to be shipped to the regional information centers. The business rules for material calculations are configurable, and CAI will work with IDOE to revisit detailed specifications for this module.

Order Windows

TIDE supports paper material ordering during an initial order window, as well as during a separate additional materials order (AMO) window for orders not placed in time to be included during the initial order window.

Initial Order Window

During the initial order window, TIDE supports paper material quantity calculations based on the following:

- Paper-tester designations and other attributes in the student enrollment data
- Order quantities provided by IDOE to CAI in an order file that is loaded into TIDE
- Quantities input directly into TIDE by corporation or school staff
- A hybrid of all three approaches

Different paper materials can have different quantity calculation rules configured for them, in accordance with IDOE's specifications. For example, one type of test material can be shipped based on a count of students who have a "Paper Tester" flag assigned, while a different type of test material could be shipped to schools based on requested quantities input directly by corporation or school staff.

Additional Materials Order Window

After the initial period for paper order shipments has passed, corporations and schools may order paper-and-pencil test materials during the AMO window when corporation or school staff directly input the quantities of paper-and-pencil test materials that they need into the AMO entry interface in TIDE.

Additional material ordering in TIDE is highly configurable, right down to allowing for different rules for each individual material. IDOE can choose to require State review and approval for material requests above a certain count threshold, or to allow all additional material orders to be submitted for fulfillment without requiring IDOE review. Additionally, TIDE can support making different paper-and-pencil test materials available to order during different time periods. This is helpful in cases when the window for ordering some specific subset of paper-and-pencil test materials needs to be shorter than the overarching AMO window for all other materials.

Secure Inbox

CAI's online management systems include a secure mailbox feature known as Inbox which is well suited to support delivering electronic communications to corporations and schools. The Inbox has been used to support delivery of read-aloud scripts and other secure materials to corporation and school staff.

The Inbox serves as a central repository for files and secure documents that can be accessed by users from any CAI system. Inbox can be accessed independently from the portal or its content can be accessed from different applications like TIDE and the CRS. All files stored in the Inbox are encrypted at rest, have a policy to be automatically archived after a configurable number of days, and are secured by the same means used to secure other CAI online sites. Inbox is integrated with CAI Single Sign-on (SSO) and uses the same roles and authorization model as CAI's online suite of systems. Inbox supports a variety of common file formats that a user might wish to upload.

One of the primary features of the Inbox is that it provides an organization with the ability to distribute information to a wide audience in a secure manner and with ease.

Authorized users, such as Corporation Test Coordinators, can log in to the SSO and access Inbox. In the Inbox they can either access secure files or, based on their role and position within the organizational hierarchy, send mass information to all other users at or below their level in the organizational hierarchy. Users can choose if they want to send the information to all users with a given role in their school or corporation, or to specific users according to usernames. This way, organizations can reach a wide range of audiences easily and securely.

Furthermore, users have the ability to specify which user roles have access to a document uploaded to the central repository. The documents are made available to only those users who have privileges to the documents.

4. Test Delivery Platform

CAI's Test Delivery System (TDS) is designed to provide a simple, clear, and secure testing experience for the student and to minimize administrative burdens on the school. The Student Interface provides users with a clear, uncluttered interface while supporting a rich set of features, tools, supports, and accommodations. The Test Administrator (TA) Interface allows the TA to create a test session, admit students into the test session, and adjust the test settings for individual students. Unlike many other testing platforms, school staff do not have to create sessions and roster students into those sessions. Rather, students request entry into the session and the TA simply admits student entry into the assessment session. During testing, the TA Interface tracks each student's progress through the test. The TA can pause any student's test at any time and can end the session, effectively stopping all students in the session from testing.

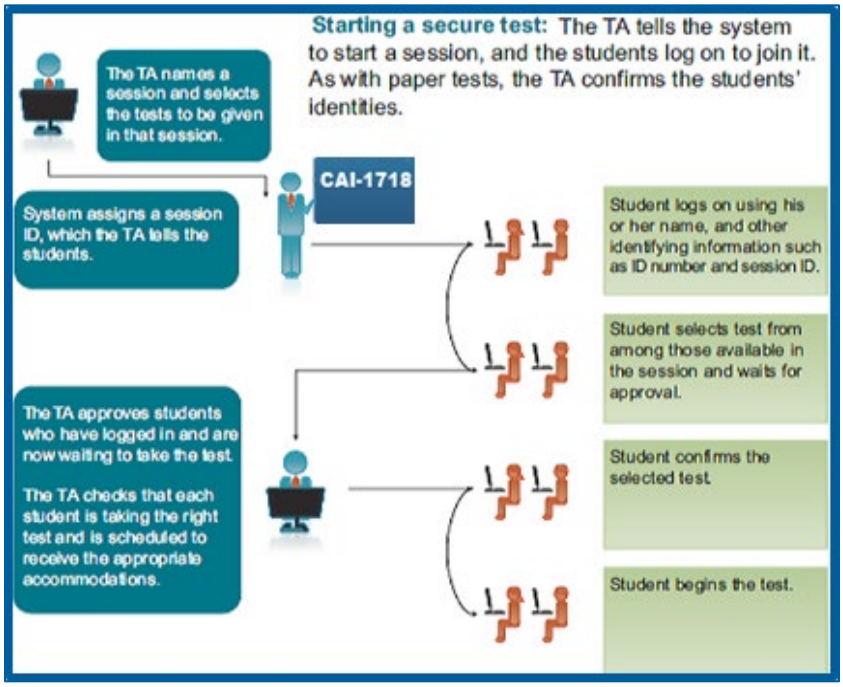
The student application securely delivers the test to the student. When a student logs in, the system issues a request to the TA for admission into the session. After verifying the student's identity, the TA admits the student from his or her workstation or mobile device. This process provides more security than a simple password system and simplifies the administrative tasks around test administration.

Test Administrator Interface

CAI's TA Interface enables TAs to create and manage test sessions easily for all online assessments. This interface allows authorized TAs to administer test sessions, monitor activity, and respond to test-related issues in one convenient application. The secure interface helps ensure that a designated student is taking the appropriate test and lets the TA focus on test administration.

Student authentication is managed through a simple interaction between the TA and the student, as summarized in Exhibit 1.4.4-1. Students can test only when the TA is logged on and has created an active testing session. After a student pauses a test, the TA must re-admit that student to the session.

Exhibit 1.4.4-1: Starting a Secure Test



Creating a Test Session

TAs can create a test session simply by selecting the tests that will be made available. The system assigns a session ID, and the student login serves as a request to enter a session. When students join the session, they can select from among the tests that are being offered in the session and those they are eligible to take. A TA may administer multiple tests in a single session; however, individual students may access only those tests for which they are eligible.

Students use the session ID to log in to a test session. Session IDs are unique to each test session. When a student enters the session ID, the system links the student requesting access to the TA, who then approves or denies the student's request. When a student joins a session by entering the session ID, the TA verifies his or her identity and then admits the student into the session. Once admitted, students are given a final chance to confirm that they have requested the correct test. Upon confirmation, the test begins.

Notice that this process does not require pre-rostering or establishing sessions in advance. Similarly, it does not rely on secure test tickets or other secure artifacts that must be managed in the schools. Students need to provide only their name and ID number. This vastly reduces test administration work within the schools and corporations.

Reviewing and Approving Test Settings

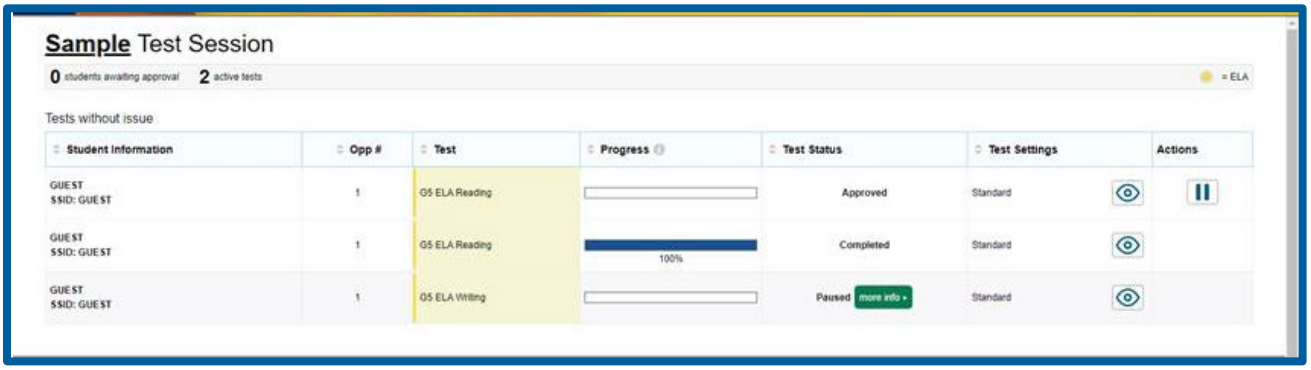
During authentication, TAs have an opportunity to review or adjust a student's test settings. These settings include any accommodations for which the student is eligible. These accommodations can, and should, be set in advance in the Test Information Distribution Engine (TIDE); however, we recognize that schools may not enter this information into TIDE in advance. Hence, we make it possible for TAs to assign some or all accommodations (at the discretion of the State) when admitting a student to a test session.

The availability of access features, embedded supports, and accommodations is completely configurable. The State will be able to determine whether TAs can adjust settings at the beginning of the session or if access to specific features requires higher-level authorization. For example, one state provides TAs with broad authority to adjust most features, but only authorized state users can grant access to the read-aloud accommodation for English Language Arts (ELA) passages.

Monitoring Students and Other TA Tools

Once testing begins, the TA can monitor student progress and, if necessary, stop one student or all students from testing. The system is designed to notify a TA automatically of events that require action on his or her part. For example, students with the appropriate accommodation may want to print a passage, and such requests alert the TA to perform this task. Exhibit 1.4.4-2 shows a TA Interface during an active test session with three approved students.

Exhibit 1.4.4-2: Test Administrator Interface During an Active Session



During an active test session, the TA can add additional tests. This feature is useful if, for example, a student joins a test session to make up or complete a test that was offered or started earlier. The list of students currently participating in the session shows the TA who is administering the tests, which test each student is taking, and how many items have been delivered to each student.

The TA can view approved individual student accommodations by clicking the binocular icon and can pause and restart individual tests or the entire test session at any time. Student actions that require TA intervention appear in the "Requests" column. For example, our secure print-on-demand feature prompts the TA to authorize the request and retrieve the hard copy from the authorized printer.

Student Interface

Students take secure tests through the Student Interface, which is essentially a secure website accessed through the CAI Secure Browser. This browser is the only software needed to take a secure test and is simply a secure build of the Mozilla Firefox browser or a secure testing application for tablets and other devices.

The CAI Secure Browser operates in full-screen mode, disables access to other applications, and prohibits navigation away from the test. It is designed to intercept all operating system hot-key combinations and print capabilities; it enables keyboard combinations specifically designed for test navigation. The system verifies that the test is being launched in the CAI Secure Browser and prevents the test taker from continuing if the test launches in another browser. No test content is stored on the local disk, and no content is retained in memory when the application closes.

Students are always presented with the same authentication sequence and interactions with the TA, regardless of which test is being administered. To access an assessment, a student logs in using his or her name and other identifying information, such as ID number and test session ID. This information is displayed on both the student's and TA's workstations.

Practice tests can be administered in a non-secure mode (Guest Mode), which allows anyone to log in to the system anonymously and take any test offered. The practice test in Guest Mode can be directly accessed via any non-secure browser and does not require a TA to open a session and admit students. Practice tests are discussed in more detail in Section 1.15 (3n).

Intuitive Design

The Student Interface begins with a simple and customizable look and feel. Each test can have its defaults for font, layouts, and other components. Our platform has a great deal of flexibility in the presentation of passages and items. We can format the appearance of items in virtually any way needed; layouts are based on style sheets that are specific to each client and assessment.

Incorporation of Tools and Accessibility Features

CAI's Test Delivery System (TDS) offers the industry's most robust array of accommodations, embedded supports, and testing tools. These can be configured as universally available or available by designation to authorized individual users. Embedded supports are supplied to any student who wants them; accommodations are features that are available only when deemed appropriate to improve access for the individual student.

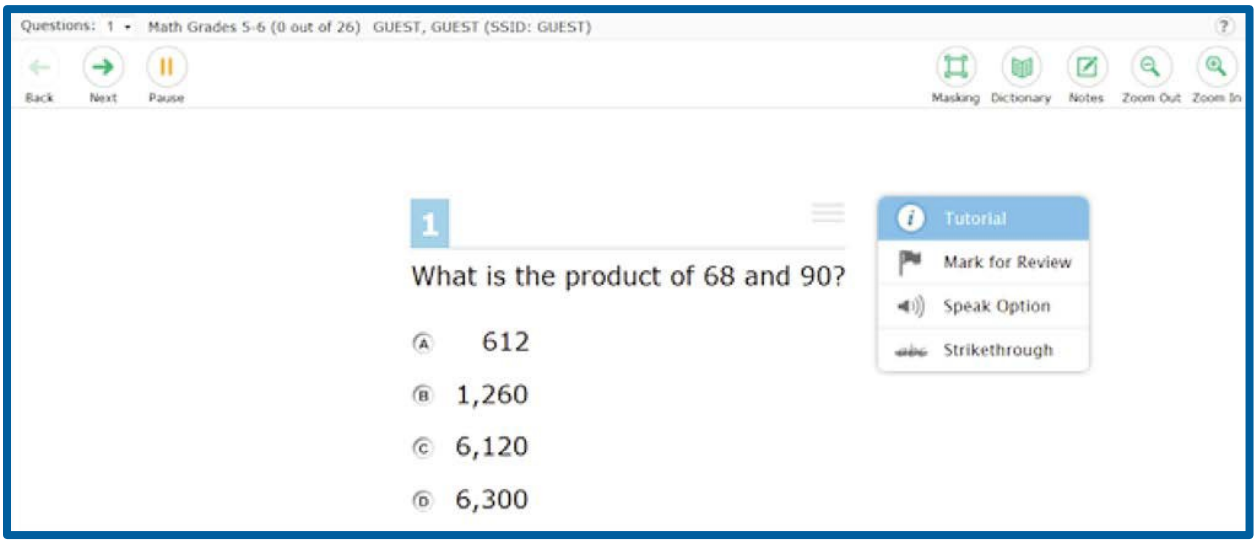
CAI's team of accessibility specialists put items through a series of review steps to ensure that accessibility tagging is accurate and adheres to the approved specifications. We refer readers to Section 1.11 (3j) for details on accommodations and accessibility tools.

The Student Interface is not cluttered with tools or options but is simplified in two ways:

1. The selection of accessibility tools or accommodations precedes the test. CAI usually recommends that these selections be made when the student is registered to test. It is also possible to configure the system to allow the TA to adjust settings at testing time.
2. Context menus are used to allow students access to available tools and supports. This approach serves two purposes. First, it is part of CAI's strategy to ensure that the entire system is navigable using a few keyboard commands. This strategy supports alternate input devices, such as switch arrays, that provide access for eligible students. Second, it supports all students by making all tools and options available in the contexts in which they are relevant, helping students to find what they need, when they need it. Because students test so rarely, we cannot and do not expect them to become expert users of the testing software. Rather, we support students' navigation of the testing environment by presenting tools and options when and where they will be useful.

Exhibit 1.4.4-3 illustrates CAI's context menu strategy. One click (or keystroke) brings up the menu, which presents all the relevant options in the context. In this case, the menu includes viewing the tutorial, marking the item for review, using text-to-speech (TTS) for the question, and selecting a strikethrough option. When selecting text on the screen, students may also have the option to highlight the text or hear TTS for the selected portion of the text.

Exhibit 1.4.4-3: Context Menus Ensure Keyboard Accessibility and Find-as-Available Functionality



Seamless Testing Experience

Saving Student Responses and Recovering from Interruptions

Tests are associated with students and not machines. If a school experiences an Internet outage or a machine crashes, all of the students' responses are saved in our servers, not in local caches, and once computers or tablets are back online, students can resume testing from any machine right from where they left off.

CAI's architecture does not require any local caching servers or any additional devices at the local schools. CAI's Secure Browser is the only application installation required on school-owned student machines. CAI does not store any test content on the student machines, either.

Typical client latencies—the amount of time that a student waits between clicking the *Next* button and the item rendering fully onscreen—are under 0.5 seconds. We have a patented feature called *prefetch* that retrieves the item (and its content) approximately 1–2 items before the student sees it; when the student reaches that item, the response time is immediate. A typical assessment requires only 15–40 kilobits of bandwidth per second per student, depending on the media included in the assessment.

As students work through the test, some responses, such as multiple-choice item responses, are saved to our servers as soon as the answer is selected. Other responses, such as equations and essays, are saved at configurable intervals (usually set to two minutes) and each time the response box loses focus (when the student clicks outside of the response box). With each save, the system asynchronously waits for confirmation of a successful save. If confirmation is not received within the designated time span (usually set to 30–90 seconds), the system will prevent the student from performing any more work until connectivity is restored. The student is offered the option of asking the system to try again or pausing the test and returning to it at a later time.

If connectivity is lost and restored within the designated time span, the student may be unaware of the momentary interruption. If connectivity cannot be restored silently, the student is prevented from testing and given the option to log out or retry the save. If the system fails completely, upon logging back into the system, the student returns to the item at which the failure occurred.

The system is designed to make multiple attempts to reach the server; therefore, even if connectivity is temporarily lost, no work on the assessment is lost. Often, the connection is re-established without the student ever being aware that it was temporarily lost. This same process protects data if a power outage occurs. Responses are submitted immediately upon student response or automatically and frequently during longer response times. If the power goes out, then the student responses made before the outage are already saved on CAI's servers. Our system protects against any interruptions, regardless of source or scope, by protecting student responses, allowing students to seamlessly rejoin their assessment in the same session or any other session, and protecting the test's integrity in the process. Our widespread success across the country testifies to the effectiveness of this approach.

Ability to Navigate the Complete Test

The system can be configured to allow students to navigate the entire test forward and backward. However, allowing students to navigate forward without answering a question defeats the purpose of an adaptive test; items would have to be selected without information about student performance.

We therefore recommend that students taking a computer-adaptive test be required to answer each question before moving on. We also recommend that students be allowed to return to items to check their work and revise answers on an adaptive test. In order to provide a valid measure of what a student knows and can do, the adaptive process must not prevent the student from showing his or her best work. Some vendors offering adaptive tests prevent students from changing answers or reviewing their work, which contradicts best testing practices. A decision-tree type of algorithm (a very unsophisticated, brute-force approach to adaptation) may require that student answers remain immutable. Our algorithm recalculates a best estimate of student performance with each new response, including any changed response.

As an example, suppose that after completing Item 20 on an assessment, a student decides to review some responses, and returns to Item 10 to correct an answer. An effective adaptive algorithm recognizes this change. Of course, Items 11–20 will not be re-administered (it is an algorithm, not a time machine); however, the selection of Item 21 will reflect this correction. The selection of Item 21 will be based on a higher estimate of student performance than it would have been if the student had not changed his or her answer to Item 10.

In this example, preventing the student from making the change would have produced a downward bias in the student's score (the student actually *could* perform the task set for him or her in Item 10, despite his or her initial failure to do so). Allowing scores to change, even on an adaptive test, still reflects best testing practices.

Ending a Test

Exhibit 1.4.4-4 shows the navigation keys that are displayed when students reaches the last item on an assessment. Notice the red "End Test" button, which appears only on the last item screen. After pressing it, students are asked whether they are sure they want to end the test. If they do, they advance to the next screen, which allows them to review their responses. Any responses that were left blank or flagged for review are highlighted on this screen (see Exhibit 1.4.4-5). After pressing the "Submit Test" button on this screen, the student sees a confirmation dialog box. Students receive a final warning before submitting their test.

Exhibit 1.4.4-4: "End Test" Button Appears on the Last Item Screen

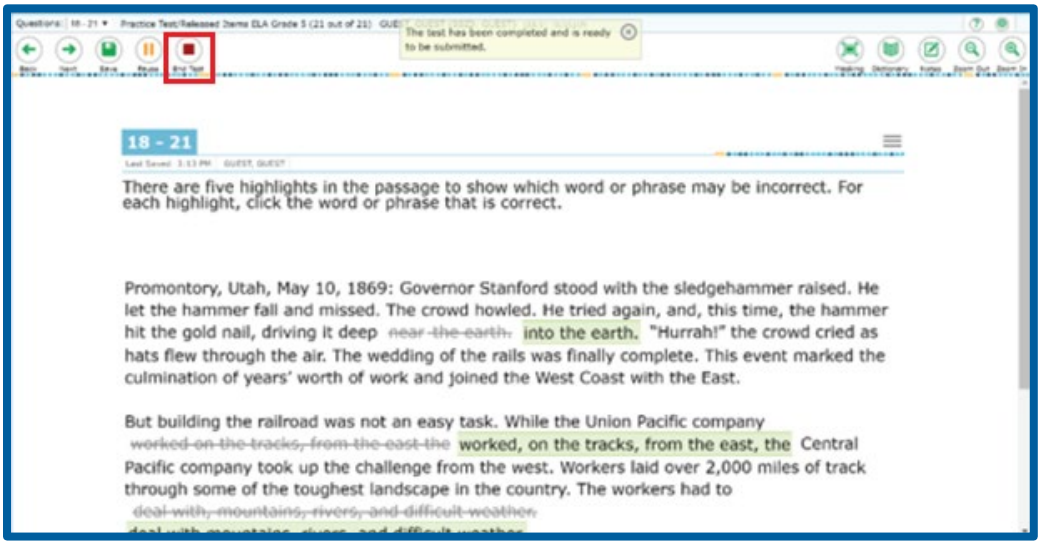
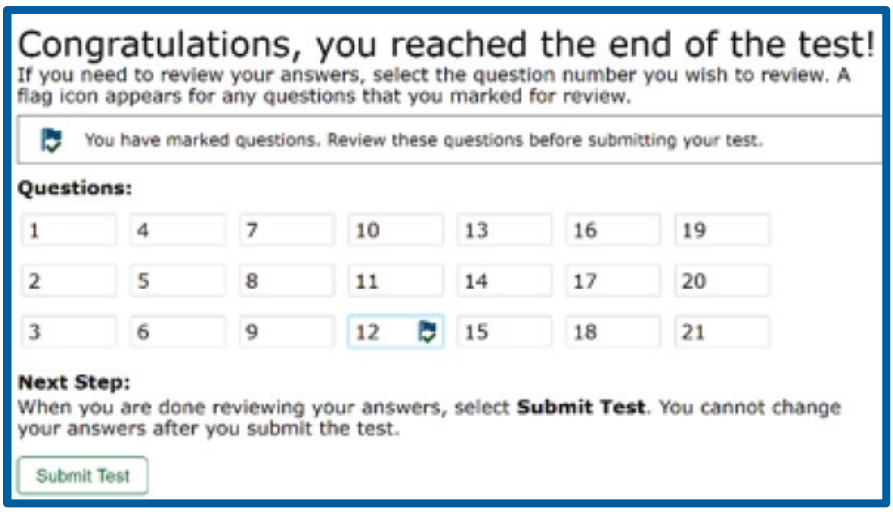


Exhibit 1.4.4-5: Review Screen Allows Students to Go Back to Any Item, and Highlights Those Flagged or Left Blank



Pausing and Resuming a Test

During testing, the TA Interface tracks each student's progress through the test. The TA can pause and restart individual tests or the entire test session at any time. Similarly, a student can pause a test at any time, and with proper authentication and approval, may resume the test on any computer in any proctored session. When returning to the test after pausing or exiting, students return to the exact spot where they left off at. No data will be lost when resuming the test.

We offer configurable security rules and generally recommend that students be prevented from returning to items after a pause of 20 minutes or more, but this choice is entirely up to IDOE.

As with pausing a test, if a student exits a testing session, the TA must re-admit that student to the session. Students are always presented with the same authentication sequence and interactions from the TA, regardless of the test being administered. To access an assessment, a student logs in using his or her name and other identifying information, such as ID number and test session ID.

System Availability

CAI's systems are readily available outside of our maintenance windows. Our systems have proven to be fully reliable and are always available throughout our online testing experience. Other assessment providers have infrastructure that requires secure access and encrypted test content to be available only within certain hours of the day. However, CAI's architecture does not limit to a specific time period authorized users' access to full tests. Our systems are available all the

time unless a maintenance window is pre-defined and scheduled. These maintenance windows are scheduled far in advance and communicated with all clients.

Maintenance Windows

CAI software maintenance windows are clearly defined and scheduled. The maintenance schedules and associated downtimes are established and communicated prior to the start of the school year. Detailed release notes accompany all software maintenance updates, from major releases to smaller patching deployments.

Scheduled unavailability and maintenance with associated downtime are planned in advance and communicated proactively. CAI's program manager will contact IDOE staff in advance of changes to the production system that could impact the student testing experience. CAI will report to IDOE within 24 hours any problems with the system that might impact testing. While these incidents are rare, if a system interruption that impacts student testing should occur, the Indiana project team will report the incident to IDOE within one hour of identifying the issue. We understand the importance of simple, proactive communication that provides clear information regarding the nature of the issue and details on impacted users, resolution efforts, credible timeline for resolution, and any immediate work-arounds that may reduce disruption.

All routine system maintenance is performed strictly in off hours, with no impacts to testing. In addition to issuing major software releases, CAI conducts monthly software patching. High-priority bugs, if any, are fixed immediately. Smaller fixes and improvements are bundled together in a monthly patch. The software patching schedule for the entire year is established and communicated in advance. Software patching is conducted typically on the third Saturday of every month, except during peak testing periods, when patching may be suspended, after reviewing the issues list with IDOE. Operating system (OS) updates and server patching are performed to keep servers up to date with the latest security and performance supports. OS updates occur in lower environments first, before being applied to production servers. Production OS updates are conducted typically on the second Saturday of every month. This maintenance schedule is established and communicated one year in advance.

All code deployment activities—from major releases to software updates and OS/server patching—are followed by automated testing, shakeout testing, security penetration testing, and testing of specific cases that are relevant to the deployment.

System Capacity

Platform Capacity and Scalability

CAI's TDS is virtually infinitely scalable. The architecture separates permanent storage from test delivery and enables us to deliver tests from servers called *satellites*. Each satellite consists of a database server and multiple web servers. Up to four satellites are arranged in *pods* behind a common firewall, and they share a backup server, called a *pod reserve*, that continually pulls updated data from the satellites. The pod/satellite setup allows us to scale every part of the system, including bandwidth (by adding pods) and processing capacity (by adding satellites). Other components of the system are similarly scalable.

CAI's TDS consists of hundreds of servers organized into four constellations. Each constellation is shared by a set of clients and can be scaled virtually infinitely. Although test delivery servers are shared, we maintain substantially more capacity than we will use in any given year. For example, in 2019, we had capacity to deliver 1.9 million simultaneous tests, but reached a peak concurrent load of only 859,668. These concurrent tests were delivered well within average database latencies of 90 milliseconds, and most of these transactions were for computer-adaptive tests, where item selection is dependent on student responses to previously administered and scored items. Our system scales linearly, and we have the ability to scale it up by adding devices. All of our capacity is tested in automated load tests.

Similarly, we conducted a simulated system performance test of 3.11 million concurrent students in the TDS during a 105-minute period. The results of the 3.11 million student simulation demonstrate that the TDS managed the projected concurrent student testing volumes with latencies well under the thresholds established for a successful end-user experience.

Exhibit 1.4.4-6 summarizes the concurrent testing statistics across all clients for 2016–2017, 2017–2018, and 2018–2019 and presents the numbers of actual simultaneous users in operational testing.

Exhibit 1.4.4-6: Peak Number of Simultaneous Users in Actual Operational Testing by Year

Metric	SY 2016–2017	SY 2017–2018	SY 2018–2019
Concurrency Count	661,288	750,758	859,668
Concurrency Increase	25%	13.5%	14.4%
Day	Tuesday	Tuesday	Tuesday
Date	May 9, 2017	May 8, 2018	May 7, 2019
Time	12:18 p.m. ET	12:19 p.m. ET	12:19 p.m. ET

Exhibit 1.4.4-7 presents the total number of tests completed, by client. As these figures indicate, we delivered more than 60 million tests in 2018–2019, and more than 40 million tests in 2020–2021. (Numbers for 2019–2020 are not included since testing was substantially disrupted in spring 2020 due to the COVID-19 pandemic). Total assessments completed during the school year include the following tests taken by actual students: summative, interim, benchmark, and practice. The online TDS has been architected to use the same computer hardware to serve all test types.

Exhibit 1.4.4-7: Total Number of Online Tests Completed, by Client

State/Client	SY 2016–2017	SY 2017–2018	SY 2018–2019	SY 2020–2021
California	22,356,914	24,439,667	26,298,263	11,584,374
Ohio	6,912,011	6,758,254	6,794,096	5,440,360
Washington	4,906,215	5,158,737	5,318,704	460,625
Indiana	Added in 2018	Added in 2018	4,940,040	5,522,790
Arizona	3,323,240	3,612,909	3,434,296	2,287,330
Florida	4,938,729	4,369,605	2,953,274	4,190,340
Connecticut	1,326,910	1,610,733	1,883,838	1,413,946
West Virginia	1,649,050	1,072,856	1,606,139	969,287
Oregon	1,393,469	1,415,776	1,416,410	189,496
Idaho	1,044,522	1,276,794	1,349,107	1,187,946
Wyoming	1,836	599,690	761,325	636,206
Hawaii	659,228	518,080	574,345	361,610
South Dakota	453,021	482,540	443,944	431,107
Delaware	373,192	426,339	443,597	208,876
ClearSight	N/A	N/A	427,150	451,039
New Hampshire	351,346	335,151	407,167	457,462
Montana	314,264	340,211	355,902	289,681
College Board	Added in 2017	23,906	282,715	534,787
Vermont	236,602	280,537	276,143	209,865
Iowa	130,877	163,485	177,429	129,593
North Dakota	223,904	116,943	174,799	187,122
Arkansas	158,536	164,878	168,943	161,103
Louisiana	Added in 2017	104,907	119,068	112,654
Nebraska	82,975	89,900	96,004	88,825
Rhode Island	Added in 2017	34,358	62,270	77,141
South Carolina	41,704	12,003	16,031	13,020
U.S. Virgin Islands	41,349	Paper-pencil testing due to hurricanes	10,044	45,165
Bureau of Indian Education	647	706	1,713	N/A
Utah	3,040,724	3,113,612	N/A	2,437,635
SHAPE	Added in 2017	1,524	N/A	N/A
Total	**53,961,265**	**56,524,101**	**60,792,756**	**40,079,385**

List of Outages and Prior Issues

We refer readers to Appendix D, where we include a list of outages and prior issues, per the RFP requirements, that CAI's clients have asked our assessment programs to rectify during the past several years.

Prior Experience in Online, Large-Scale, High-Stakes Summative Assessments

CAI has been conducting online assessments since 2007, with Oregon as our first client administering online assessments. In addition to ELA and mathematics assessments, CAI also delivers science assessments, social studies assessments, alternate assessments for Students with Disabilities (SWD), and English Language Proficiency (ELP) tests. Exhibit 1.4.4-8 shows the list of states/jurisdictions and types of assessments that CAI is delivering in them.

Exhibit 1.4.4-8: CAI Clients and Assessment Programs

Client	Duration (Base Contract)	Contract	ELA/Mathematics 3–8 &/or High School	Science and/or Social Studies	Alternate for SWD	ELP
Arizona	2014–2021	Prime	x			
Arkansas	2016–2021	Prime				x
California	2014–2022	Sub	x	x	x	x
Connecticut	2014–2022	Prime	x	x	x	
Delaware	2009–2022	Prime	x	x		
Florida	2014–2023	Prime	x		x (sub)	
Hawaii	2006–2022	Prime	x	x	x	
Idaho	2014–2024	Prime	x	x	x	
Indiana	2017–2022	Prime	x		x	
Iowa	2015–2021	Prime				x
Louisiana	2016–2021	Prime				x
Montana	2019–2022	Prime	x	x		
Nebraska	2016–2021	Prime				x
New Hampshire	2014–2021	Prime	x	x		
North Dakota	2015–2022	Prime	x			
Ohio	2002–2021	Prime	x	x	x	x
Oregon	2007–2024	Prime	x	x		x
Rhode Island	2017–2022	Prime		x		
South Carolina	2021–2028	Prime			x	
South Dakota	2014–2025	Prime	x			
Texas	2020–2024	Prime	x	x	x	x
Utah	2021–2031	Prime	x	x		
U.S. Bureau of Indian Education	2016–2021	Prime	x			
U.S. Virgin Islands	2014–2022	Prime	x	x		
Vermont	2014–2021	Prime	x	x		
Washington	2014–2022	Prime	x	x		x
West Virginia	2014–2022	Prime	x	x		x
Wyoming	2014–2022	Prime	x	x	x	

CAI has vast experience in hosting and supporting online test administrations. Over the past 15 years, we have deployed and administered online tests across more than 28 states and jurisdictions. Of those online tests, CAI has implemented almost 20 million online adaptive tests just in 2018–2019. We have deployed more online adaptive tests to our nation's students than any other vendor in the industry.

Exhibit 1.4.4-9 illustrates our experience with each state as described through our extensive coverage of the student population, the percentage of student population that is now testing online, the start of CAI's contract year with the state, and the maximum number of concurrent test takers observed to date. Highlights of the table include the following:

1. Across the states in which CAI is working, we are currently serving a combined total of 15.36 million students. The state with the highest concurrency tested 663,666 students simultaneously.
2. CAI has worked across 25 states and state departments of education, supporting the design and transition of their various assessment programs.
3. A majority of these states, including large states such as Arizona, California, and Ohio, have been testing 90% online and above.

Exhibit 1.4.4-9: CAI Online Testing Experience

State	Number of Grades	Average Student Population per Grade	Total Student Population	Percentage Tested Online from SY 2018–2019[1]	Percentage Tested on Paper from SY 2018–2019	Percentage Tested Both Online and on Paper from SY 2018–2019	Maximum Concurrency of Test Takers	Start of Contract Year	Number of Years with CAI
Arizona	11	70,745	778,191	90.347%	9.545%	0.108%	159,788	2014	7
Arkansas	14	3,034	42,473	80.134%	0.056%	19.810%	380	2016	5
California	13	472,386	6,141,021	100%	0%	0%	663,666	2013	8
Connecticut	13	33,741	438,634	100%	0%	0%	37,593	2014	7
Delaware	11	10,713	117,846	99.864%	0.061%	0.075%	11,790	2009	12
Florida	11	181,036	1,991,398	53.332%	45.975%[2]	0.693%	305,833	2014	7
Hawaii	15	9,348	140,217	99.997%	0.001%	0.002%	16,916	2006	15
Idaho	13	15,856	206,127	100%	0%	0%	21,547	2014	7
Indiana	11	77,070	847,768	98.887%	0.766%	0.347%	129,522	2017	4
Iowa	14	2,733	38,258	77.963%	0.025%	22.012%	615	2016	5
Louisiana	15	2,318	34,765	76.295%	0.046%	23.659%	129	2016	5
Montana	18	6,692	120,460	99.997%	0.001%	0.001%	7,018	2015	6
Nebraska	14	1,733	24,256	70.863%	0.004%	29.133%	293	2016	5
New Hampshire	13	10,530	136,889	100%	0%	0%	8,605	2014	7
North Dakota	7	9,245	64,715	100%	0%	0%	4,435	2017	4
Ohio	15	88,625	1,329,382	96.674%	1.792%	1.534%	156,101	2002	19
Oregon	14	44,960	629,438	100%	0%	0%	24,337	2007	14
Rhode Island	8	4,021	32,167	100%	0%	0%	4,249	2017	4
South Dakota	10	9,980	99,800	99.816%	0.181%	0.003%	14,334	2014	7
U.S. Virgin Islands	8	924	7,391	8.911%	67.302%[3]	23.788%	409	2014	7
Utah	7	89,505	626,536	100%	0%	0%	47,610	2012	9
Vermont	13	3,935	51,155	100%	0%	0%	7,770	2014	7
Washington	13	86,412	1,123,358	95.481%	0.046%	4.473%	103,392	2014	7
West Virginia	15	16,686	250,290	99.617%	0%	0.383%	30,780	2014	7
Wyoming	13	6,803	88,445	99.951%	0.005%	0.044%	12,152	2014	7
			Combined Total Student Population: 15,360,980				**State with the Highest Concurrency: 663,666**		

1 States testing ELPA21 have a mandatory K–1 paper component on Writing. These states include Arkansas, Iowa, Louisiana, and Nebraska.
2 Florida's legislature requires that grades 3–6 test on paper.
3 The U.S. Virgin Islands tested mostly on paper due to the hurricane impact that year.

School System Capacity

Our system works on the newest tablets as well as the oldest desktops because we understand that schools have to use the technology that is available. We believe school technology should support teaching and learning, and assessments should work within that infrastructure.

We engineer our assessments to offer rich interactions and stimuli while requiring very little bandwidth because we know that even schools with good Internet connections can sometimes have internal bottlenecks that throttle bandwidth. Perhaps most importantly, our tests require virtually no on-site technological support. We know that schools and districts often lack access to skilled technicians. Our system requires only a single piece of software—the CAI Secure Browser–and no specialized hardware. The CAI Secure Browser is installed quickly and easily either on a single machine or across a large network. Once installed, the CAI Secure Browser takes care of itself.

Our systems support the richest set of devices, platforms, and operating systems. Please see Section 1.4 (3c) under *Supported Hardware/Software* for a more detailed description of our hardware and software capabilities.

5. Data Reporting System

CAI provides reporting systems that deliver relevant, actionable data at the state, corporate, school, classroom, and student level to support instruction and success. A good assessment system connects the results of multiple assessments and makes it clear to teachers and administrators whether students are on track to meet state standards. Further, a good assessment system highlights strengths and weaknesses and flags areas for possible improvement at the class, school, and district levels. An excellent system goes beyond simply making the data available by providing the data in an intuitive way for each group using data displays, which minimizes misinterpretation and helps people draw accurate inferences. Our Centralized Reporting System (CRS) is all this and more. It offers the following benefits:

- The CRS presents users with a summary of data about the students for whom they are responsible (e.g., a principal would see the students in the school, a teacher would see students in his or her class). The user can then search through various levels of aggregation, all the way to individual reports. The system allows users to target and access content more precisely, moving from subject area through reporting categories, and even to standards-level reports for aggregates. Finally, the system offers a longitudinal view of individual students or aggregates. Aggregate reports are available at every level, and authorized users can print or download them (or the data on which they are based).
- The CRS offers state-level users the option to either view aggregate summary reports at the state level for each test, or the state-level users can also navigate to an individual corporation's dashboard to view aggregate-level results at the corporation level and drill down to school- and even to student-level results.
- The CRS also has the ability to display student results from previous years. While CRS is designed to show test results from the current school year by default, users have the option to change the school year and time period if they want to view results from previous years. For example, when a user changes the time period to a previous year, the reports will automatically adjust to show data for the students that the user had permission to view in that time period.
- Another important feature offered by CRS is the ability to view a student's previous results as compared to their current scores in the form of a longitudinal report. This allows educators to determine how a student's performance has changed over time.
- Individual student reports (ISRs) can be produced individually or batched as PDF files through the CRS. At IDOE's discretion, the system can deliver a ZIP file containing ISRs as PDF files with a machine-readable manifest suitable for uploading into the corporation's Student Information System (SIS). Most districts have these systems and maintain a secure parent portal, providing an efficient means of delivering the ISRs to parents.

CAI's CRS can also be configured to allow for an addendum (such as a letter from IDOE or a one-page interpretive guide) to be added to the ISRs.

Please refer to Section 1.16 (3o) under *Measures and Data in CRS* for more details on the topics outlined previously.

6. Help Desk

Introduction

To ensure that IDOE and public school staff have prompt and accurate assistance for all questions and requests, users may contact the CAI Help Desk by calling a dedicated toll-free client support line, sending an email, or chatting live online with a dedicated agent. The CAI Help Desk will be available Monday through Friday (excluding holidays), between the

hours of 7 a.m. and 7 p.m. EST year round. Outside of designated hours, users may leave a voicemail message or send an email, and they will receive a response when the CAI Help Desk reopens the next business day. CAI Help Desk agents will make initial contact regarding any inquiries within 24 hours of receipt. During testing windows, the response time will be within one hour. Most user contacts are resolved at Tier 1 with a first-call resolution rate of approximately 85% and an average call duration of under eight minutes. We resolve 90% of all cases in fewer than 24 hours.

Our Help Desk will be staffed with high-quality, trained representatives and will possess the capacity to handle the expected call volume and respond in a timely manner. To ensure accurate and consistent communication, CAI conducts project-specific trainings for Help Desk personnel and hosts a knowledge base accessible to all technical support representatives.

Escalation and resolution protocols will be established to assist authorized users with introduction and administrative and technical difficulties as they implement the computer-based assessment activities in schools. CAI provides Tier 1, Tier 2, and Tier 3 services so that schools and corporations are in contact with knowledgeable people should the complexity of particular challenges increase.

CAI can generate aggregated Help Desk reports with a variety of metrics available. Reports can be generated on a scheduled basis or by request for any reason. We discuss these reports later in this section.

CAI uses the 8×8 Virtual Contact Center (Version Package 9.5.2) to log, track, and escalate all telephone calls, emails, and chat interactions between CAI Help Desk agents and users. All case information and follow-up communication, including voicemail messages left outside of normal business hours, are systematically recorded in 8×8, and the data are captured in real time and readily available for reporting to IDOE.

CAI's current Tier 1 Help Desk IT infrastructure is designed with a high level of fault tolerance that employs multiple levels of redundancy throughout the environment, including the following:

- Two separate physical Internet circuits, with each circuit being provided by separate Internet Service Providers (ISPs).
- Dual firewalls.
- Two physical Session Initiation Protocol (SIP) trunks for delivering Voice Over IP (VoIP) services.
- Dual network routers running in active <-> active mode.
- Power generator capable of supporting an entire facility for up to 30 hours on one tank of gas. Refueling contracts are in place to ensure that the tank is refilled well before the 30-hour mark is reached.

Tiered Structure

During peak testing periods, CAI has more than 250 staff members working in our Tier 1 and Tier 2 support centers. Of those staff members, 85 are full-time employees. Our staffing constantly scales up and scales down, depending on the seasonal work volume. Our support service provides the following:

- An efficient, tiered structure that facilitates rapid resolution of client queries even if the query needs to be escalated
- A history of Tier 1 agents quickly resolving most cases
- Agents assigned primarily to other states who are cross-trained on IDOE policies and systems, allowing CAI to quickly add staff to our Indiana Help Desk during peak periods

This tiered structure is made up of Tier 1, Tier 2, and Tier 3 teams that are knowledgeable about policies and procedures specific to each client. Our Tier 1 agents are trained to answer routine questions and provide explanations and clarifications using scripted and semi-scripted responses. When a caller presents a question or query that requires more in-depth analysis, the case details are promptly escalated from Tier 1 to Tier 2. The Tier 2 agent reviews the details provided and contacts the caller as needed to (1) obtain additional information, and (2) update the caller as the case progresses. When an issue cannot be resolved at Tier 2, the case is escalated to Tier 3, where dedicated resources on the Indiana project team manage and track the progression of each case with the appropriate CAI technical team (e.g., network engineer, software engineer). This tiered structure facilitates rapid resolution of client questions by quickly moving the case to the required level of expertise.

Staffing levels at Tier 1 and Tier 2 are continuously monitored to ensure that agent resources are appropriately aligned to call volume and case load so that all cases can be assigned and addressed as they are received. CAI will work with IDOE to ensure that case escalation protocols, including escalation triggers and response times, are agreed on and implemented in 8×8. Inquiries tagged as *priority* will be escalated more quickly in the system and will include notification of IDOE staff.

In Tier 2, an open case report is monitored throughout the day and reviewed by the team leads and the CAI Help Desk management team. This ensures that an escalated case designated as priority will receive expedited attention. In addition, the team leads use this report to identify cases that need reassignment when a case owner is out of the office.

In the rare event of a major system disruption, a member of the CAI Help Desk management team, the executive team, or the technology Network Operations Center (NOC) team will send an automated Everbridge alert to our most senior CAI program managers and technical staff, instructing those notified to immediately call in to a conference call bridge. This immediate alert process ensures that key stakeholders can collaboratively diagnose the issue and agree on next steps to resolve it.

The CAI Help Desk provides technical and logistical support to anyone who needs assistance navigating our systems. Our Help Desk agents assist users in minimizing burden, disruption, and inconvenience. Indiana-dedicated service centers are located in Columbus, OH, and Reston, VA. CAI employs a distributed-service-center approach, protecting us from weather issues or power outages so that our service center is available as required to our clients.

Reports

Our call-handling software, 8×8, allows data to be captured in real time and reports to be generated on a weekly and even daily basis for IDOE review. Several Help Desk reports are available to monitor Help Desk activity, and we will work with IDOE to define any additional reports that may be required. Currently, Help Desk reports include the following:

- A weekly case analysis summary or aging report
- A daily report of all open Help Desk tickets
- A weekly report of all Help Desk activity

The weekly case analysis summary lists all the calls, emails, and online chats for the week by system, category, and status. The system filter allows clients to quickly identify which schools or corporations currently have the most questions, and the category filter identifies the nature of callers' queries. For example, users may be calling to troubleshoot installation, navigation, or printing. These filters help pinpoint the system and the kinds of questions that callers ask most frequently. Our project team will work closely with IDOE to develop and approve a list of FAQs and associated responses. It is typical that some inquiries require support from complex area/school staff (i.e., local test coordinators) and some are addressed by IDOE. CAI's Indiana project team will also work with IDOE staff to determine whether clarifying instructions to the field are needed and to include answers to recurring questions in webinars or other training materials.

In addition to the case analysis summary, we can also provide a weekly report of all CAI Help Desk activity for Indiana. This report lists all resolved and open tickets. In addition to the system and category information, a summary of each inquiry is included, allowing IDOE to understand the details of the initial question and the response provided. The daily report of activity offers the same information day by day.

In addition to these reports, CAI's Indiana project team can also send IDOE a weekly aggregated transaction report that includes the following metrics:

- Total number of incoming calls received
- Total number of incoming calls answered
- Total number of calls abandoned by the caller
- Percentage of calls abandoned by the caller
- Average time to abandonment
- Average speed to answer
- Maximum wait time to answer
- Average talk time
- Total number of emails and chat sessions answered

Summary of Average Daily Call Volumes and Client Service Wait Times

CAI's Help Desk is dedicated to resolving issues as quickly and efficiently as possible. The following data from Indiana's 2020–2021 assessment program are provided to reflect the robustness of our Help Desk processes:

- Average daily volume: approximately 36 calls per day
- Average speed to answer calls: approximately 16 seconds

Please refer to Exhibit 1.4.6-1 for sample summary reports and Exhibit 1.4.6-2 for a sample file evaluating a Help Desk queue. In Exhibits 1.4.6-3 and 1.4.6-4, we present samples of reports our Help Desk currently provides for IDOE, including an open Help Desk ticket template and a monthly Help Desk ticket log template.

Exhibit 1.4.6-1: Sample Summary Reports

Case Analysis Summary Report

version 1.2

Cases by Project

Program	Project	All Cases	Pcnt of Total	Resolved	Pcnt Referred to Tier-2	Longest Age (Work Days)	Shortest Age (Work Days)	Avg Age (Work Days)	Avg Age (HH:MM:SS)	Median Age (Work Days)
STATE A	PROJECT 1	484	33	484	0	21.4	0	0.5	4:45:17	0
STATE A	PROJECT 2	392	26	392	2	9.6	0	0.2	2:13:4	0
STATE A	PROJECT 3	604	41	604	1	19.8	0	0.2	1:39:8	0
	Program Totals	1480		1480						

Cases by CAI System

Program	System	All Cases	Pcnt of Total	Resolved	Pcnt Referred to Tier-2	Longest Age (Work Days)	Shortest Age (Work Days)	Avg Age (Work Days)	Avg Age (HH:MM:SS)	Median Age (Work Days)
STATE A	Paper-Pencil Assessment	43	3	43	0	3.2	0	0.4	3:40:8	0
STATE A	Portal-Document	30	2	30	0	3	0	0.2	2:11:49	0
STATE A	Student User Management	10	1	10	0	0.2	0	0.1	0:58:30	0.1
STATE A	TDS-Data Entry Interface	35	2	35	0	1.3	0	0.1	0:54:41	0
STATE A	TDS-Score Entry Interface	15	1	15	0	0.4	0	0.2	1:29:35	0.1
STATE A	TDS-Secure Browser	42	3	42	11	5.1	0	0.3	3:12:31	0
STATE A	TDS-Student Interface	88	6	88	7	2.6	0	0.1	1:23:9	0
STATE A	TDS-TA Interface	60	4	60	0	0.4	0	0	0:13:51	0
STATE A	TDS-Training Student Interface	7	1	7	0	19.8	0	3	30:4:17	0.4
STATE A	TDS-Training TA Interface	12	1	12	0	0.3	0	0.1	0:57:18	0
STATE A	Teacher Hand Scoring System	32	2	32	0	0.2	0	0	0:12:32	0
STATE A	TIDE	981	66	981	0	21.4	0	0.3	2:32:19	0
	Program Totals	1480		1480						

Cases by Category

Program	Category	All Cases	Pcnt of Total	Resolved	Pcnt Referred to Tier-2	Longest Age (Work Days)	Shortest Age (Work Days)	Avg Age (Work Days)	Avg Age (HH:MM:SS)	Median Age (Work Days)
STATE A	Accommodation	30	2	30	0	16.7	0	1.4	14:20:58	0
STATE A	Add-Delete-Edit-View Student	265	18	265	0	21.4	0	0.4	4:20:24	0
STATE A	Add-Delete-Edit-View User	145	10	145	0	4.2	0	0.1	1:9:58	0
STATE A	Newsletter-Email Communication	35	2	35	0	3	0	0.3	3:19:50	0.1
STATE A	Order Status-Additional	123	8	123	0	8.5	0	0.3	2:46:4	0
STATE A	Order Status-On Time	43	3	43	0	11.4	0	0.5	5:10:54	0
STATE A	Password Reset Request	108	7	108	1	3	0	0.1	0:59:1	0
STATE A	Policy-Procedure	202	14	202	0	7.4	0	0.2	1:50:34	0
STATE A	Policy-Student Test Eligibility	15	1	15	0	3.9	0	0.6	5:55:38	0.1
STATE A	Pre ID-File	40	3	40	5	3.7	0	0.2	1:51:41	0
STATE A	Pre ID-Generic Label	11	1	11	0	0.5	0	0.1	0:33:48	0
STATE A	Pre ID-Label	15	1	15	0	0.1	0	0	0:7:50	0
STATE A	Restarts-Invalidations	7	0	7	0	0.4	0	0.1	0:47:54	0
STATE A	Return- Materials Procedures	13	1	13	0	2.1	0	0.2	2:20:43	0
STATE A	Rosters	10	1	10	0	0.1	0	0	0:6:14	0
STATE A	Score Report-Query	87	6	87	0	3	0	0.2	2:25:31	0
STATE A	Session-Interruption	14	1	14	15	0.9	0	0.1	1:7:30	0
STATE A	Session-Query	149	10	149	3	19.8	0	0.2	2:29:24	0
STATE A	Suggestion-Enhancement	3	0	3	0	0.1	0.1	0.1	1:4:48	0.1
STATE A	System Access	51	3	51	1	5.1	0	0.2	2:10:36	0
STATE A	System-Installation	5	0	5	25	4.2	0	1.1	11:8:31	0
STATE A	System-Navigation	82	6	82	1	1.3	0	0	0:28:44	0
STATE A	System-Requirements	23	2	23	0	0.1	0	0.1	0:30:25	0.1

Cases referred to Tier-2

Program	Tier-2 Status	All Cases	Pcnt of Total	Longest Age (Work Days)	Shortest Age (Work Days)	Avg Age (Work Days)	Avg Age (HH:MM:SS)	Median Age (Work Days)
STATE A	REF:RPT	3	24	1.1	0	0.5	5:12:41	0.5
STATE A	REF:TDS	10	6	4.1	0.1	1.3	12:57:32	1
STATE A	REF:TIDE	1	70	1.7	0	0.6	6:14:51	0.5
	Program Totals	14						

Exhibit 1.4.6-2: Sample File Evaluating Help Desk Queue

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Queues: Transactions**												
2	Period: 06/15/2019 - 06/30/2019												
3	Granularity: date range												
4	Report Generated on: 07/10/2019 09:56:56 (GMT-5)												
5	**Time Zone:** (GMT-5) Eastern Time												
6													
7	**Media**	**Queue**	**# entered**	**# accepted**	**Answered in SLA**		**Average waiting time for accepted transactions**	**Longest waiting time before accepted**	**Total time processing transaction**	**Total time on post processing**	**Total time processing + post processing transaction**	**Average time processing transaction**	**Average time on post processing**
8					**#**	**%**							
9	Chat	STATE A	16	15	15	100.00%	0:00:08	0:00:38	2:51:47	0:19:58	3:11:45	0:11:27	0:01:19
10	Phone	STATE A	317	315	314	99.68%	0:00:09	0:00:46	33:18:44	10:33:04	43:51:48	0:06:12	0:01:57
11	Email	STATE A	170	169	164	97.04%	0:47:15	45:09:39	5:22:14	0:00:00	5:22:14	0:01:54	0:00:00
12	**Grand Totals**		**503**	**499**	**493**	**98.80%**	**0:16:06**	**45:09:39**	**41:32:45**	**10:53:02**	**52:25:47**	**0:04:55**	**0:01:17**

Exhibit 1.4.6-3: Open Help Desk Ticket Template

Case #	Project	Status	Name	Email	Phone	Company	IRN	District	District IRN	Date Case Opened	Last Case Activity	Last Follow-up	Category	CAI System	Subject	Inquiry	Resolution	Resolved	Activity	Age (Work Days)	Age (HH:MM:SS)

Exhibit 1.4.6-4: Monthly Help Desk Ticket Log Template

Case #	Project	Status	Name	Email	Phone	Company	IRN	District	District IRN	Last Follow-up	Inquiry Origin	Category	CAI System	Subject	Inquiry	Resolution	Resolved	Activity	Age (Work Days)	Age (HH:MM:SS)

Staffing and Training

Here we discuss the experience and qualifications of the CAI Help Desk staff at each tier.

Preferred Tier 1 candidates possess the following qualifications:

- Previous client service experience
- Bachelor's degree
- Excellent communication skills (verbal and written)
- Superb client service skills
- Detail-oriented work methods
- Superior listening skills
- Ability to problem-solve and troubleshoot
- Ability to multitask and manage calls
- Ability to learn and disseminate new information
- Ability to ascertain prioritization of inquiries and to possess a sense of urgency
- Familiarity with client service software applications
- Intermediate Microsoft Excel, Word, and Outlook skills

Preferred Tier 2 candidates possess the following qualifications (in addition to Tier 1 candidate qualifications):

- Bachelor's degree in computer science or related field
- Experience using Help Desk/client support software
- Excellent communication skills to understand user issues and communicate issue resolutions
- Close attention to detail
- Excellent time-management skills

The CAI Indiana project team will work closely with IDOE to develop and obtain approval on all resource materials—such as forms, scripts, and user manuals—that will be used by the CAI Help Desk. Upon approval, the CAI IDOE project team will work in concert with the CAI Help Desk management team to determine the optimal dates for training Help Desk staff on IDOE assessment specifics and to post all resource materials to Superhelp, our online knowledge-base tool. Prior to each test administration, the IDOE project team conducts an on-site training with Help Desk staff to review

specific information that may be unique to the upcoming test administration. We welcome IDOE participation in developing the Help Desk training materials. Appendix C references a sample of Help Desk training materials.

Superhelp

All CAI Help Desk personnel have access to Superhelp, an online, CAI-developed repository that uses a Google search appliance and allows Help Desk agents to quickly locate applicable, approved responses and materials. This tool was designed to ensure that all agent responses to the same issues are answered consistently every time. It also provides a mechanism for updating the technical information and other documentation available to Help Desk agents as a result of real-time issue identification and feedback from users.

CAI developed Superhelp during Spring 2015, and it is used to support all CAI assessment projects. This electronic repository includes all FAQ documents, guides, manuals, and information found on the Indiana assessment portal.

Our agents will provide consistent responses to the same queries coming in from the field. New inquiries and approved responses are uploaded into Superhelp, and the tool is a cornerstone in ensuring that agents provide up-to-date, accurate information to every user during every contact. The content in Superhelp provides a common baseline for all agents. Approved information loaded into the knowledge database can be easily located by our agents by using the search functionality.

Communication During Testing Windows

We pride ourselves on the transparency of our client support activities. Our standard reports provide summaries of response times, hold times, and other important indicators. These reports will be reviewed regularly with IDOE with the express purpose of using the information and metrics to identify vital program improvements.

During the testing window, CAI will provide Help Desk summary reports to IDOE daily. Additionally, CAI uses a real-time Help Desk reporting site, which allows users to view real-time case summaries and generate custom reports.

Escalation Process

Our case management software, 8×8, helps ensure that escalations are managed quickly and efficiently. All CAI Help Desk communications are stored within 8×8 in their original state and may be retrieved for an extended period, including recorded telephone calls, emails sent and received, and chat sessions conducted.

The 8×8 system provides supervisors with the ability to assign and track escalated cases, listen to recorded calls, monitor real-time call-queue statistics, and retrieve case histories sorted by caller. When the Help Desk is contacted, a case is automatically generated with a unique case number, and the following information is captured:

- Caller contact information
- Help Desk agent name
- Summary of the request
- Case status
- CAI system involved (e.g., Test Delivery System [TDS], Test Information Distribution Engine [TIDE])

This ticketing system allows our Help Desk agents to escalate their cases to higher tiers as necessary. When a case cannot be resolved within its current tier, the agent informs the user that the case will be escalated to the next tier for further research and uses 8×8 to reassign the case to an agent in the next tier. All case updates are logged in 8×8 and communicated via email to the appropriate internal CAI teams, including the Help Desk management team and the client project team. Any case information and follow-up communication outside of normal business hours is systematically recorded in 8×8; data are captured in real time and available for reporting to IDOE.

During the testing window, CAI will provide Help Desk summary reports to IDOE daily. Additionally, CAI uses a real-time Help Desk reporting site, which allows users to view real-time case summaries and generate custom reports.

7. Local Setup and System Readiness Testing

Introduction

CAI is happy to closely collaborate with IDOE and Indiana schools to identify protocols and evaluate system readiness and remediate issues discovered during this period. CAI has always been committed to proactive involvement with key

stakeholders in testing solutions prior to system launches. Our system has been designed to work with schools and anticipate local issues, without compromising data security and integrity in any way. This commitment has been shown consistently over time with our proven experience in more than 26 states and jurisdictions, including Indiana.

Committed to Reducing Administrative Burden

Our system is premised on the idea that schools should not need to become technology centers simply to administer a test—that is, we work with schools so that they need not build large technology hubs to conduct assessments. In fact, we require only two things to administer a test:

1. A connection to the Internet
2. Installation of our CAI Secure Browser on the testing device

With these two requirements met, we can deploy tests at scale with the most instructionally sensitive item types in the industry. Many vendors over-engineer their systems and offload some of the technical burden of test delivery onto the schools and corporations they serve. This leads to increases in help desk requests and servers that fail at critical testing times and force corporations to host and manage local caching servers. These additional caching servers create one more possible failure point that compromises the system, increasing the likelihood of testing downtimes.

Our model's architecture is different. It is lightweight, reliable, and scalable. There is no need to use testing tickets, upload complex rosters, or build and deploy local caching servers in corporations and schools in order to support our tests. Importantly, students do not need to stagger their test start times, as some vendors suggest. All students can begin simultaneously with a test proctor administering a test intuitively. Schools can focus on students and instruction, not on recruiting masses of costly technical staff and acquiring hardware devices to support our systems. From a security standpoint, storing secure content and test data locally at the corporations and schools increases vulnerabilities. CAI does not store any content or data locally at the school or on the devices students use to take tests.

Parallel Testing Through the Practice Test Environment

CAI can build and maintain a Practice test environment, which is accessible on the same technology platform as the operational test. Beginning three months prior to first test window, this environment is always available, outside of scheduled maintenance windows; with these considerations:

- Note that system versions will be updated over time. The Practice test environment will be upgraded to a future version before the Production operational environment so that IDOE and users can test the new upgrade features before the version is deployed to Production.
- In addition, the Test Information Distribution Engine (TIDE) will be rolling over within this initial three-month period, thereby updating the user and student registration data for the new schoolyear.

The Practice test environment includes the following features:

- Same technology platform as Production operational environment, including the same hardware and network services on which the system is hosted
- Complete suite of fully integrated CAI systems, including Single Sign-On (SSO), TIDE, the Test Delivery System (TDS), and the Central Reporting System (CRS)
- End-to-end functionality, including edge cases and borderline scenarios, for all systems
- Capability for end-to-end testing of devices from school endpoints
- Programmable with the same system configurations, access, and network functionality as Indiana's Production operational environment, where all summative tests are administered

Protocols and Test Forms for Schools' Local System Readiness Test

The Practice test environment will be available to all schools, especially for new schools and schools that have experienced technical difficulties.

Test Forms Indicated in the RFP

CAI will build and deploy three System Readiness Test (SRT) forms, as indicated in the RFP. In addition to these forms, CAI can provide accommodated test forms for ILEARN as well as forms in Spanish.

Other Protocols That CAI Can Offer

CAI can offer other protocols and services that exceed the RFP requirements. CAI is committed to a proactive approach that will identify potential issues in advance; we are thus constantly improving our systems to better empower schools to successfully administer tests while we are reducing their administrative burden.

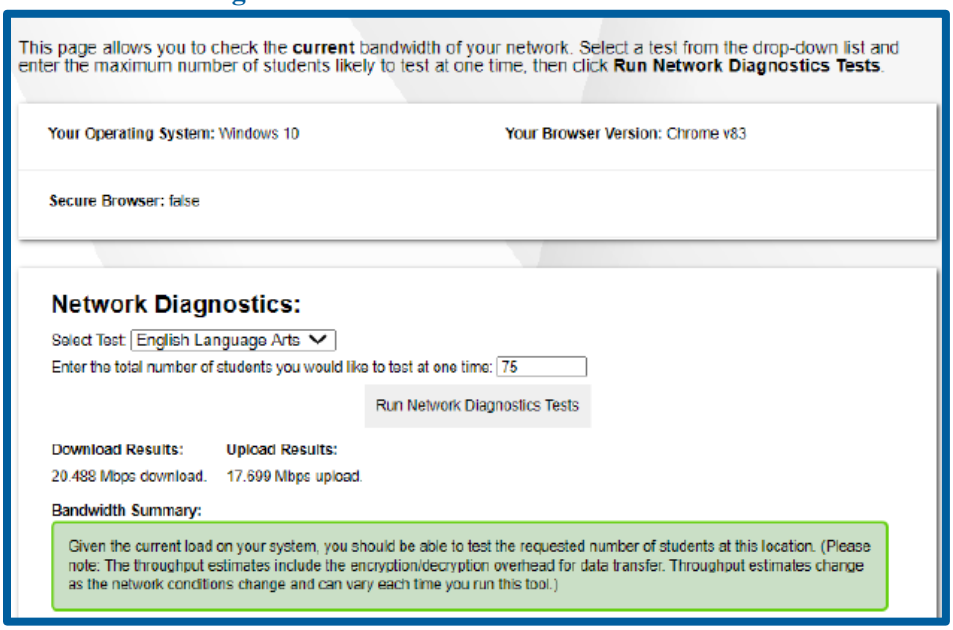
Diagnostic Readiness Tool

Our system has a web-based diagnostic tool that assesses the readiness of specific computers for testing. One of the tool's features is a download-and-upload speed check that estimates the number of test takers who can test simultaneously at the same location.

The diagnostic readiness tool can be run on all platforms supported by CAI's TDS. Typically, no network configuration is required at the school. Sometimes, schools or corporations will allow their computers to access only certain white-listed IP addresses. In these cases, the schools must add CAI's IP addresses to the allow-list. Unusual setups, such as certain proxy server arrangements, may need adjustment in order to allow traffic to pass appropriately to our servers or prevent proxy servers from caching content, which may be updated. We provide simple instructions to address these rare cases.

The diagnostic readiness tool uses a sophisticated statistical model of the testing process that models variation in instantaneous demand (e.g., the number of students who simultaneously press the Next button) and evaluates the likelihood that peaks will exceed network free capacity (not used by other processes) with a frequency likely to cause noticeable delays in testing. Exhibit 1.4.7-1 presents the user interface (UI) for our integrated diagnostic tool. If a school's intended number of users exceeds its current capacity, the tool will indicate the number of concurrent users that can be supported with existing resources.

Exhibit 1.4.7-1: Diagnostic Readiness Tool



Bandwidth Check

We recognize that the field may include a very wide range of devices from old to new as well as network connections that are slow or unstable; therefore, our system architecture is designed to be nimble. Aside from the Secure Browser, our testing systems' only additional requirement is an Internet connection in corporation schools. As long as staff in the field have access to a device with a viable Internet connection, they will be able to deliver online assessments.

As a proof of concept, we recently conducted a test and found that we were able to successfully deliver 13 tests simultaneously on 13 different devices all connected to a 4G cell phone hotspot with no noticeable latency while administering the test. This means that anyone carrying a modern smartphone is capable of creating an Internet connection that can be used for testing. At IDOE's request, we would be happy to work with any corporation that may anticipate difficulties in administering assessments online and talk to them about employing solutions such as mobile hotspots, better scheduling practices for labs, or configuration of mobile carts.

We propose a two-part process for evaluating corporation readiness and verifying the capacity of the technical infrastructure:

- Upon installation of the CAI Secure Browser, schools and corporations should use our diagnostic tool to ensure that the network can support the intended number of users.
- CAI will coordinate with each corporation to conduct a corporation-wide practice test day.

The first step will help schools and corporations to measure their maximum testing capacity. The second step will provide a realistic cross-school check of the corporation's network readiness. Additionally, the practice test day will evaluate the human processes, provide a training opportunity, and allow schools to work out kinks in their planning in a lower-stress environment than the actual test days.

Practice Test Day

In the first year of using our system, corporations are encouraged to schedule a day on which groups of students access the practice test under conditions and at times similar to those that would exist on an actual testing day. Coordinating this practice day across the corporation helps test any infrastructure that is shared across schools.

This practice day also provides the benefits of a dry run, allowing teachers and administrators to figure out any logistics that they may have missed in their planning. CAI is happy to coordinate this practice day with corporations and to ensure that the CAI Help Desk is prepared to answer questions and provide support. At IDOE's request, our Program Management Team can identify any trouble spots where bandwidth may have been restricted. Our network engineers are available through CAI's Tier 2 Help Desk to assist schools in troubleshooting any technical issues.

As part of the practice test day, corporations complete a pre-testing preparedness checklist (refer to Exhibit 1.4.7-2) and administer a practice test. This ensures that corporations have followed setup steps (e.g., installing the Secure Browser, updating OS systems, checking networks). The infrastructure trial is an opportunity for corporations and schools to prepare for operational computer-based test (CBT) administrations by simulating test-day network utilization, identifying any school or corporation issues, and confirming that all computers and devices that will be used for testing can run the appropriate software. During the trial, schools and corporations are advised to do the following:

- Schools will prepare by having testing staff read the applicable guides and manuals.
- Corporations may create an environment that matches expected school bandwidth utilization during testing.
- Schools may create the same testing environment (e.g., testing rooms, number of computers or devices, appropriate switches and hubs, and power supplies) that will be used on the actual test days.
- Schools will use the web-based diagnostic readiness tool provided by CAI to determine network user capacity and bandwidth requirements.
- Prior to the largest CBT administration of the year, or as directed by the corporation, schools will run a trial that simulates the appropriate number of student logins based on the total number of computers that they intend to use concurrently for testing.
- The trial should take approximately 15 minutes. During this time, users will log in, supply random answers, and submit the trial.
- Schools are encouraged to run the trial in their testing rooms on their testing computers or devices and to troubleshoot any local issues prior to a corporation-wide infrastructure trial.

Training and Technology Readiness Checklists

CAI prepares extensive user-friendly training materials and technology readiness checklists to help familiarize schools with our systems. These materials also include troubleshooting guides in case schools experience technical difficulties during the testing window. As mentioned in reference to the practice test day, schools can review these guides and manuals and provide feedback on how to make them more user-friendly and relevant to users with varying skillsets.

Multiple Secure Browser Setups

As part of the practice test day or a period before the first testing window, schools can also test the setup of the Secure Browser. CAI's only requirement for schools to administer secure tests is to download the Secure Browser. Schools can test multiple setups, such as installing the Secure Browser via the command line, or sharing it over a network, or installing it for use with an NComputing Terminal. Likewise, they can also test the setup that is applicable to them and read the pertinent installation guide so they can anticipate any installation issues.

Monitoring, Analyzing, and Reporting System Readiness Test Results

CAI will track, monitor, elicit feedback, report to IDOE and follow up with schools that experienced issues with the Practice test environment. CAI will follow up with the SRT to identify and resolve such issues and will partner with IDOE to identify and follow up with schools who did not complete the SRT by an agreed-upon deadline and were required to do so. As part of this process, CAI will design and make available a feedback form for schools to fill out and provide detailed feedback. Lastly, CAI will deliver a report to IDOE that provides a summary of and detailed findings on the test cycle, including recommendations for next steps.

Time Requirements and Steps for Successful System Setup and Preparation

CAI only requires schools to provide an Internet connection and to install the Secure Browser on students' testing devices. Exhibit 1.4.7-2 provides a list of requirements to help schools prepare for successful test administrations while reducing their administrative burden.

Exhibit 1.4.7-2: Requirements to Help Schools Prepare for Test Administration

Requirement	Anticipated Time Needed	Responsible Party	Additional Notes and Sample Links
Install Secure Browser	~1 month before first test window	Schools	https://ilearn.portal.cambiumast.com/secure-browsers.html
Use diagnostic readiness tool, and perform bandwidth check	~1 month before first test window	Schools	Refer to *Other Protocols That CAI Can Offer* for additional CAI protocols and procedures beyond the RFP.
Read technology setup guide	~1 month before first test window	Schools	https://ilearn.portal.cambiumast.com/-/media/project/client-portals/indiana-ilearn/pdf/technology-guides/quick-guide-for-setting-up-your-online-testing-technology-20212022v01.pdf https://fsassessments.org/-/media/project/client-portals/florida/pdf/manuals-and-user-guides/technology-guides/technology-setup-for-online-testing.pdf
Read test administrator checklist	~1 month before first test window	Schools	https://fsassessments.org/-/media/project/client-portals/florida/pdf/test-administration/test-administrator-checklist_fall-winter-2021.pdf
Register users and students in TIDE	~1 month before first test window	Schools	https://ilearn.portal.cambiumast.com/-/media/project/client-portals/indiana-ilearn/pdf/in_sy-2020-2021_tide_user_guide.pdf
Read TDS user guide	Prior to or on test day	Schools	https://ilearn.portal.cambiumast.com/-/media/project/client-portals/indiana-ilearn/pdf/2020-21_tds-user-guide.pdf
Read troubleshooting guide for Secure Browsers	Prior to or on test day, if issues arise	Schools	https://ilearn.portal.cambiumast.com/secure-browsers.html
Fix issues, if any, with Secure Browser installation	Prior to opening of first test window	CAI	CAI will get detailed feedback on technical issues regarding installation of Secure Browsers and will work with these schools to resolve them.
Work with schools that experience bandwidth issues	Prior to opening of first test window	CAI	CAI will get detailed feedback on technical issues regarding Internet bandwidth issues and will work with these schools to resolve them.

Lastly, the following links provide two sample implementation checklists:

- https://ilearn.portal.cambiumast.com/resources/test-coordinators/2021-2022-indiana-systems-readiness-guide-for-cambium-assessments
- https://fsassessments.org/resources/manuals-,-a-,-user-guides/technology-guides/technology-setup-for-online-testing

8. Supported Hardware/Software

We designed our Test Delivery System (TDS) to work within the constraints of actual schools. The system is compatible with the equipment, bandwidth, and expertise that schools currently have and requires little to no on-site technical support.

From the beginning, CAI's online testing systems have adhered to three tenets:

1. No expectation of technological expertise in the schools; setup, installation, and testing must be simple and nontechnical.
2. Be parsimonious with bandwidth; even schools with well-provisioned Internet lines often introduce internal bandwidth bottlenecks.
3. Support the hardware that schools currently have; never mandate upgrades.

Our fidelity to these tenets enables our clients to transition 100% of their schools online when they choose. This includes large states like California and Ohio (where we test all but a few hundred accommodated students online), as well as rural

states (such as New Hampshire, Vermont, West Virginia, and Wyoming), and remote island jurisdictions (including Hawaii and the U.S. Virgin Islands).

Our system works on the newest tablets and the oldest desktops. Although there is tremendous variation in the technology available in schools across each state, schools must work within the existing technological framework. CAI believes that school technology should support teaching and learning, and assessments should work within that infrastructure.

Our assessments require very little bandwidth, despite rich item interactions and stimuli. They are engineered this way because we know that even schools with good Internet connections can sometimes have internal bottlenecks that throttle bandwidth.

More importantly, our assessments are designed to require virtually no technological expertise in schools. We know that schools and corporations often lack access to skilled technicians. Our system requires only a single piece of software—the CAI Secure Browser—with no special hardware. The Secure Browser can be installed quickly and simply, either on a single machine or across a large network. Once installed, it takes care of itself. Our caching is accomplished in the browser memory of each student's device—no proctor caching servers or other proxies are necessary, which eliminates the burden of installing them and the need for in-house technological expertise. No data are stored on local machines or networks. All student responses are immediately transmitted to our networks, and if there is a disruption, students can pick up where they left off using any device.

Secure Browser

CAI's systems support wired and wireless connections, and all data transmitted over these networks are encrypted. Our systems also support all designated devices. The CAI Secure Browser is the only software necessary within schools or corporations, and we generally update it every one-to-two years. The system is purely Internet-based and requires no caching servers or other complicated systems in the schools or corporations. It can be installed with a few clicks on an individual machine, "pushed out" using any typical network management tool, or even installed without administrative rights. Once installed, the student machines communicate directly with our servers.

The Secure Browser for Windows, OS X, and Linux is simply a CAI-customized secure build of the popular Firefox browser. For Chromebooks, iPads, and Android tablets, CAI has built platform-specific browsers that are available in the respective app stores. These browsers are simple to install and are the only software needed in the schools.

Supported Devices, Platforms, and Operating Systems

CAI systems support the richest set of devices, platforms, and operating systems. In several cases, CAI has even supported versions that have been discontinued by their manufacturers; this is because we understand that some schools may not have upgraded their systems. CAI also subscribes to beta releases for various platforms, including Mac, PC, Chromebooks, Android, and iOS. The goal is to support any upcoming releases to browsers and operating systems on, or within a few days of, their go-live dates.

We support all the technology configurations listed in the RFP, and our system is currently delivering Indiana's ILEARN, IREAD-3, and I AM assessments.

CAI's platform review process tests every item on the various devices and operating systems in the field. The goal is to ensure that the item renders and functions the same way on each system. This way, CAI can ensure a consistent testing experience for students using different devices, including tablets, and on different versions of the browsers and operating systems.

Exhibit 1.4.8-1 includes device specifications for desktops, laptops, and netbooks.

Exhibit 1.4.8-1: Device Specifications for Desktops, Laptops, and Netbooks

Supported Operating Systems	Minimum Requirements for Current Computers
Windows 8 (Professional and Enterprise) 8.1 (Professional and Enterprise) 10, 10 in S mode (Educational, Professional, and Enterprise) (Versions 1809-2004[a]) 11[a] Server 2012 R2, 2016 R2	1 GHZ processor 1 GB RAM (32-bit) 2 GB RAM (64-bit) 16 GB hard drive (32-bit) 20 GB hard drive (64-bit)
Mac OS X/macOS 10.11–10.15[a] 11.4 12[a]	1 GHZ processor 1 GB RAM (32-bit) 2 GB RAM (64-bit) 16 GB hard drive (32-bit) 20 GB hard drive (64-bit)
Linux (64-bit or 32-bit) Fedora 30–33[a] LTS (Gnome) Ubuntu 16.04 LTS (Gnome)	1 GHZ processor 1 GB RAM (32-bit) 2 GB RAM (64-bit) 16 GB hard drive (32-bit) 20 GB hard drive (64-bit) Required libraries/packages: GTK+ 2.18 or higher GLib 2.22 or higher Pango 1.14 or higher X.Org 1.0 or higher (1.7+ recommended) libstdc++ 4.3 or higher libreadline6:i386 (Ubuntu only) GNOME 2.16 or higher
Linux (64-bit only) Ubuntu 18.04, 20.04 LTS (Gnome)	1 GHZ processor 2 GB RAM 20 GB hard drive In addition to all libraries and packages listed above, Ubuntu 18.04 LTS (Gnome) and 20.04 LTS (Gnome) also require the following libraries: Sox Net tools

[a]Support for this version is anticipated upon completion of testing following its release.

Exhibit 1.4.8-2 includes device specifications for tablets and Chromebooks.

Exhibit 1.4.8-2: Device Specifications for Tablets and Chromebooks

Supported Operating Systems	Supported Tablets	Related Requirements
iOS/iPadOS 13.7 14.5 15[a]	All 9.7" or larger iPads running a supported version of iOS/iPadOS	Automatic Assessment Configuration disables many features automatically and requires no further setup. Additional features can be disabled through Mobile Device Management.
Android 7.1 8.1 9 (Minimum version recommended)	All modern Android tablets running a supported version of Android and capable of running a restricted profile	The CAI Secure Browser keyboard must be enabled after installation of the mobile Secure Browser.
Windows 8 (Professional and Enterprise) 8.1 (Professional and Enterprise) 10 (Educational, Professional, and Enterprise)	CAI supports any tablet running these versions of Windows (educational and professional) but has done extensive testing only on Surface Pro, Surface Pro 3, Asus Transformer, and Dell Venue.	N/A
Chrome OS 74+	All Chromebooks	Kiosk mode must be enabled.

[a]Support for this version is anticipated upon completion of testing following its release.

With regards to ancillary devices and minimum screen size or resolution, Exhibit 1.4.8-3 provides minimum requirements for all supported computers, laptops, tablets, and approved testing devices.

Exhibit 1.4.8-3: Ancillary Device Minimum Requirements

Testing Device	Requirement
Screen Dimensions	Screen dimensions must be 10" or larger. (iPads with a 9.7" display are included.)
Monitors and Displays	All devices must meet the minimum resolution of 1024 × 768. Larger resolutions can be applied as appropriate for the monitor or screen being used. For the best experience, the device's display scale should be set to 100% to keep the amount of usable screen area within the 1024 × 768 minimum resolution for TDS. A secure testing environment can be guaranteed only when using a single display. A multi-monitor configuration is not supported.
Keyboards	The use of external keyboards is highly recommended for tablets that will be used for testing.
Mice	Wired two- or three-button mice can be used on desktops or laptops. Mice with "browser back" buttons should not be used.
Headphones and Headsets	Wired headphones or headsets with a 3.5 mm connector or USB headphones

Operating Systems

New Versions of Supported Operating Systems (except Chromebooks). CAI will support new versions of any currently supported operating system within 90 days of official release. This is done by actively subscribing to beta and development channels supported by the manufacturer to complete testing ahead of any future releases. Unfortunately, CAI cannot guarantee support until an official version is released and testing and issue resolution are complete.

In some cases, we have been able to support new versions much more quickly. For example, we were able to support OS X Mavericks within two weeks of its official release. In other cases, support has taken longer than 90 days due to stubborn security issues (e.g., Windows 8.1 on tablets).

New Versions of Chrome OS. CAI works collaboratively with Google on new versions of Chrome OS, which are released about once every six weeks. CAI provides presumptive support, including:

- Not blocking new versions from accessing the site.
- Resolving any issues that arise depending on the change from the manufacturer; while minor versions often work out of the box without software modifications on CAI's side, occasionally some do not.
- Recommending that IDOE notifies corporations that it may prohibit testing on some (forthcoming) Chrome OS versions if they introduce significant security holes, bugs, or other problems under conditions where we cannot guarantee that new versions will work.

As testing season approaches, we also recommend that corporations avoid implementing Chrome OS updates.

New Versions of Supported Browsers (for Test Administration and Training Tests). Similar to the Chrome OS policy, CAI provides presumptive support for manufacturers that release a new browser every six weeks or so (e.g., Mozilla, Google). We do not block new versions of these browsers from accessing the site.

Manufacturers that release their browsers annually (e.g., Apple, Microsoft) typically make a significant number of changes and may therefore require up to 90 days to support, although such support is often facilitated in much less time. We block new versions of these browsers from accessing the site until they have been tested and all issues resolved.

New Mobile Devices. CAI intends to support new versions of currently supported devices 90 days after they are released (e.g., iPad 4 to iPad Air). Similar but distinctly different products are tested and certified on their own merits and may not be supported (e.g., iPad mini). CAI does not block users from using new versions of supported devices unless dictated by state policy.

During internal software testing, if we detect a security threat, we immediately communicate with the client to explain the threat in detail, provide mitigation methods, and offer solutions. To the extent possible, we build safeguards into the code and deploy these within one-to-two months. For example, OS 10.14 (Mojave) had an issue because Apple changed the way that screen captures and screen recordings are saved. Subsequently, CAI had to modify the code so that students could not save screen captures on that operating system. We deployed the fix within two months. Apple almost always introduces new test security threats with each macOS release, and we have successfully deployed new browsers to disable them in response.

During the period between release of a new operating system and our officially initiating support, IDOE has the choice to disallow the operating system, manage the threat through policy and training, or permit only lower stakes tests (i.e., non-summative tests) on that platform until all threats are effectively addressed.

Load Capacity

We maintain substantially more capacity than we will use in any given year. Each year, we undertake sophisticated capacity planning, accounting for the number of tests to be delivered, individual testing windows, historic patterns of testing, and historic rates of change in order to predict peak loads and ensure adequate capacity. We take our most conservative prediction models (predicting the highest concurrency) and add at least 25% capacity. Typically, this results in CAI maintaining nearly twice the capacity that we actually use at peak. We refer readers to Section 1.4 (3c) under *Test Delivery Platform*, where we discuss in more detail our platform capacity.

1.5 (3d) Program Manager and Project Management Team

Cambium Assessment, Inc. Leadership and Structure

CAI operates under the direction of Steve Kromer, President of CAI. Heather Hayes, Vice President of CAI Programs and Client Services, directs all online testing projects. Mr. Kromer and Ms. Hayes have the authority to make corporate decisions related to this project and, along with other CAI senior managers, are closely involved in project operations and attend key planning, progress, and technical meetings.

Policy decisions can and should be informed by technical guidance where appropriate, and the IDOE will always have final authority on policy matters. CAI will promptly inform the Department of any technical or technological issues that could potentially impact policy. It is the role and responsibility of CAI and its subcontractors to provide IDOE with our technical expertise and support while producing contract deliverables.

CAI's workforce is organized by function, and each functional area is led by a member of CAI's senior management team. For each project, the team leader in each area takes first-line responsibility for the project team's products and services, while the corporate director is ultimately responsible for the relevant functional area. CAI's approach to managing personnel and staff ensures that there is a team to support each contract requirement and that critical information never resides with a single person.

Project Team Staffing

In this section, we identify key staff for each functional area of the Indiana assessment program. We provide an organizational chart for CAI in Exhibit 1.5-1 and another for our partner Data Recognition Corporation (DRC) in Exhibit 1.5-2. A staff allocation chart is included in Exhibit 1.5-3 at the end of this section. Résumés for proposed key personnel are presented in Appendix A.

Exhibit 1.5-1: CAI Project Organizational Chart

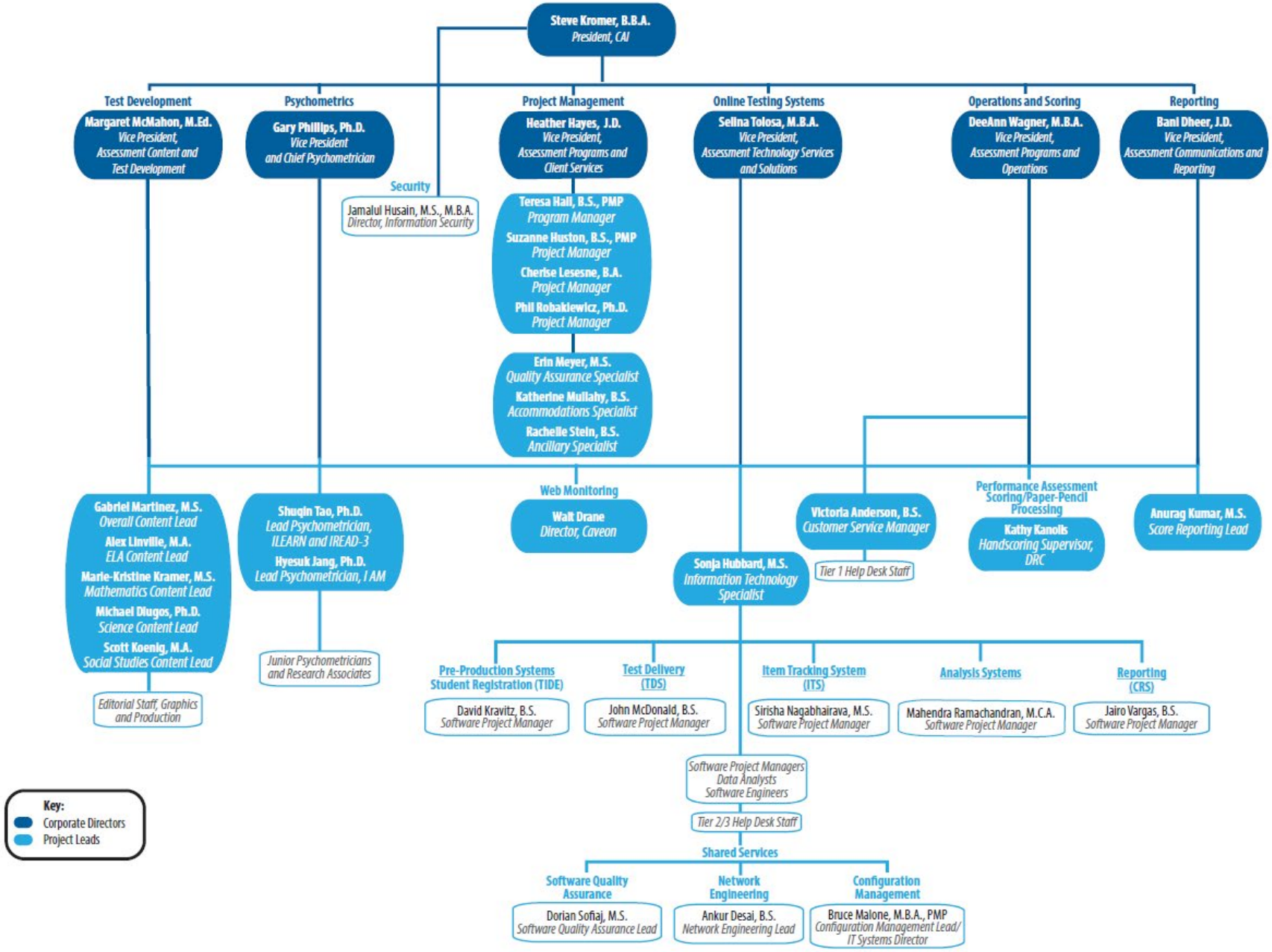
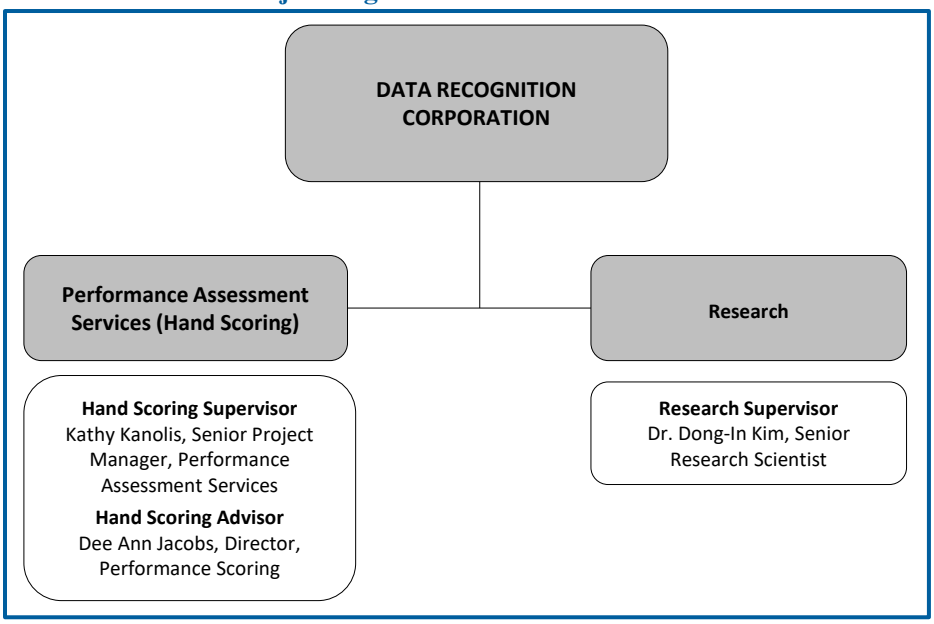


Exhibit 1.5-2: DRC Project Organizational Chart



Project Management

Heather Hayes, J.D., PMP, Vice President of CAI Programs and Client Services, leads a team of 82 project management staff members, 38 of whom hold advanced degrees. Ms. Hayes has more than 20 years of management experience in online systems, including managing Oregon's online testing program and overseeing the implementation and documentation of best practices in assessment programs in 28 states and jurisdictions. She received her Juris Doctor degree from the University of Iowa College of Law.

CAI's team of project managers for the Indiana program will be led by **Teresa Hall, B.S., PMP, Program Manager.** Ms. Hall has 21 years of assessment experience both as a program and project leader of multiple large-scale, multi-million-dollar state and national assessment programs and as a state client at the Wisconsin Department of Public Instruction. At CAI, Ms. Hall is the full-time program director of the Indiana assessment contract, which includes ILEARN, IREAD-3, ISTEP+, and I AM. Prior to joining CAI, Ms. Hall served as the senior director of test development at ACT, Inc., leading the team of program managers responsible for the end-to-end test development and online and paper publishing of ACT's large-scale products (The ACT, ACT Aspire, WorkKeys) plus more than 10 derivative products and projects. Ms. Hall also served as a senior program manager at CTB/McGraw-Hill, managing the team of content development and publishing project managers responsible for all test development projects at CTB. At the Wisconsin Department of Public Instruction, Ms. Hall oversaw development of the mathematics portion of the Wisconsin High School Graduation Test. Ms. Hall received her B.S. in secondary education, mathematics, from the University of Nevada, Reno.

Suzanne Huston, B.S., PMP, Project Manager. Ms. Huston has been building relationships and managing client expectations across various industries for the past 13 years. Since 2017, Ms. Huston has served as a senior program manager of Indiana testing programs, providing collaborative support to program leads to ensure consistency in deliverables, tasks, ancillaries, and other documents. Ms. Huston has also managed the Washington Comprehensive Assessment Program and the US Virgin Islands state testing program. She has had oversight of all contractual activities, from specifications meetings, system configuration and technical deployments to scheduling of administrative tasks, online system go-lives, and scoring and reporting deliverables. As a project manager at Keystone Assessment, Ms. Huston managed the Hawai'i State Alternate Assessment testing program as well as scoring and data analysis delivery for the US Virgin Islands' VITAL-A Alternate Assessment program. Ms. Huston holds a B.S. in business/merchandising from the University of Kentucky, Lexington, and is a certified Project Management Professional.

Cherise Lesesne, B.A., Project Manager. At CAI, Ms. Lesesne serves as the program manager for the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) retest assessments and Indiana's I AM assessments. As program manager, Ms. Lesesne ensures that contract deliverables are provided in a timely manner and collaborates with CAI's technical teams to support the configuration and testing of internal assessment systems for test registration, test delivery, and scoring and reporting. Prior to joining CAI, Ms. Lesesne co-led a charter middle school in New York City that

prepared minority students for postsecondary and career success. Additionally, she worked for the New York City Department of Education to develop and implement the city's formative assessment portfolio. Ms. Lesesne has also served on the program management team to support the New Hampshire Department of Education's student assessment office as well as the implementation of the Smarter Balanced Assessment Consortium. Ms. Lesesne received her B.A. in English Language and Literature from Spelman College in Atlanta, GA.

Phil Robakiewicz, Ph.D., Project Manager. Dr. Robakiewicz has more than 15 years of experience in large-scale assessment, test development, public policy, and client services. He has managed more than 10 state assessment programs and, through a grant from the Bureau of Indian Education, has assisted several tribes across the country in developing alternative pathways to proficiency under the No Child Left Behind Act (NCLB). At CAI, he is currently the project lead for the ILEARN and IREAD-3 components of the Indiana state contract. He oversees the day-to-day activities of these programs and communicates regularly with the client to ensure the on-time and error-free delivery of a suite of customized assessments. Dr. Robakiewicz also has extensive higher-education experience in academic and student services, curriculum development, assessment, retention, and teaching and learning. . Dr. Robakiewicz received his Ph.D. in ecology and evolutionary biology from the University of Connecticut and earned a graduate certificate in higher-education management from Kansas State University. He received his B.A. in biology and medicine from Brown University.

Erin Meyer, M.S., Quality Assurance Specialist. Ms. Meyer has worked in assessment for 13 years and currently leads CAI's Business Process Management effort, which entails documenting and maintaining over 250 standard operating processes that span the entire assessment life cycle. Ms. Meyer also contributes to process improvement projects, assisting on Six Sigma Green and Black Belt projects with root-cause analyses, identifying improvements, and rolling out process changes. Ms. Meyer was previously a member of CAI's Psychometrics Team, where she worked on client deliverables and assisted with technical quality controls. Ms. Meyer earned her B.A. in psychology and history from the University of Maryland and also holds an M.S. in information technology with a concentration in project management.

Katherine Mullahy, B.S., Accommodations Specialist. Katherine Mullahy has served as a project coordinator for Indiana's I AM assessment for almost two years. She collaborates with the I AM program manager, Indiana program team, CAI staff, and IDOE to manage and support I AM deliverables, training resources, user acceptance testing (UAT), Help Desk queries, scheduling, portal updates, and other tasks. In addition to the I AM program, she participates in cross-program tasks for the ILEARN and IREAD-3 programs. Before joining CAI, Ms. Mullahy was a first- and second-grade teacher in Milwaukee, WI. She earned her B.S. from Marquette University in elementary/middle-school education and psychology.

Rachelle Stein, B.S., Ancillary Specialist, serves in a cross-program capacity for Indiana's computer and paper-based assessment programs. She manages ancillary document development for the ILEARN and IREAD-3 testing programs and assists with ancillaries for Indiana's other assessment programs, ISTEP+ and I AM. In a cross-program capacity, she maintains the content management system, supports UAT, and reviews a variety of deliverables and communications for consistency, accuracy, and adherence to a client-specific style guide. Before coming to CAI, Ms. Stein worked as a contractor at the US Attorney's Office in Boston, doing data analysis and asset tracking for the Asset Forfeiture Unit, where she managed large databases, handled communications with federal and state agencies, and drafted legal documents.

Test Development

Producing more than 10,000 items annually, CAI's Test Development Team has been developing and aligning items to state content standards since its inception. This team, which represents more than 140 staff members, including 10 with doctoral degrees and 59 with master's degrees, is led by **Meg McMahon, M.Ed., Vice President of Assessment Content and Test Development.** Ms. McMahon is primarily responsible for item development and the assembly of test forms for CAI projects. She also manages budget tracking, staffing, product development, and the overall coordination of assessment development. Ms. McMahon has more than 15 years of experience in mathematics education, with 12 years in educational assessment at CAI. Ms. McMahon, whose B.A. is in mathematics, earned her M.Ed. in educational psychology with a focus on assessment, evaluation, and testing from George Mason University in Virginia.

Gabriel Martinez, M.S., Overall Content Lead. With more than 17 years of experience developing state assessments, Mr. Martinez has a proven record of successful collaboration with schools, districts, and state administrators in delivering tests that are valid, reliable, and appropriate for students. His work in both the private and public sectors (with New Mexico state government) has provided Mr. Martinez with a deep understanding of the constraints on implementing large-scale assessments. While working at the New Mexico Public Education Department, Mr. Martinez was responsible for

managing the transition from 0% to 99% online testing, which saved the state money and facilitated a quicker turnaround of student reports. Prior to working in assessment, Mr. Martinez was a community college educator and field biologist. Mr. Martinez earned his M.S. in wildlife and fisheries science from the University of Arizona in Tucson, Arizona.

Alex Linville, M.A., ELA Content Lead. At CAI, Mr. Linville conducts senior reviews for all content materials and works closely with CAI staff and clients to ensure that assessment content is sound, meets customer specifications, and follows industry best practices. Before joining CAI, Mr. Linville served as a social studies and ELA teacher in Chicago Public Schools and as a teacher abroad. . He also managed an international study program for Thai students. Mr. Linville holds an M.A. in social sciences with a focus on economics from the University of Chicago.

Marie-Kristine Kramer, M.S., Mathematics Content Lead. Ms. Kramer is currently a test developer at CAI and serves as the Mathematics Content Lead for our contract with the Utah State Board of Education. In this role, Ms. Kramer has helped to manage the review of mathematics items for the Readiness Improvement Success Empowerment (RISE) assessment. Previously at CAI, Ms. Kramer has served as the Florida Algebra 1 and geometry lead, developing rich items that met Florida's test specifications. Ms. Kramer has also written and reviewed mathematics items for grades 3–8 and EOC tests for projects in Florida, Arizona, and Ohio and has participated in creating performance tasks for the Smarter Balanced Assessment Consortium field test. She facilitated numerous committee meetings and prior to joining CAI worked as an instructional assistant at the Virginia Tech Math Emporium, where she tutored students in subjects ranging from college algebra to calculus with analytic geometry. Ms. Kramer received her undergraduate degree in mathematics from Virginia Polytechnic Institute and State University and her master's degree in educational psychology from George Mason University in Virginia.

Michael Dlugos, Ph.D., Science Content Lead. At CAI, Mr. Dlugos has developed dozens of NGSS items for multiple state assessments. He also facilitates content, fairness, rubric validation, and data analysis committee meetings as well as the follow-up resolution meetings with state administrators. Mr. Dlugos previously spent eight years working at several educational technology companies, where he developed thousands of NGSS and non-NGSS assessment items for practice banks, textbook item banks, and high-stakes exams. He also has experience managing content development to ensure compliance with guidelines, deadlines, and budget goals. Mr. Dlugos has also taught biology, environmental science, and anatomy and physiology at both four-year and community colleges. He received his doctorate in biology from Binghamton University.

Scott Koenig, M.A., Social Studies Content Lead. Mr. Koenig brings 19 years of teaching experience combined with curriculum and assessment development to his work at CAI, where he oversees item and test development and ensures that items and assessments accurately align to state content standards. Before working in large-scale test development, he designed curriculums and collaborated on assessment development in both his school and region at the secondary level. Mr. Koenig transitioned from the classroom to the Michigan Department of Education (MDE) while working on assessment resources supporting statewide standards development. At MDE, he oversaw the development of Michigan's social studies assessment, supported Michigan's social studies standard revisions, consulted with local regions and districts, and presented as a department consultant on social studies assessment development. He has worked with many social studies associations as an educator and, while with the MDE, was a member of the Council of Chief State School Officers (CCSSO) Social Studies Collaborative. Mr. Koenig received his M.A. in curriculum and teaching from Michigan State University.

Psychometrics and Statistics

CAI offers psychometric and statistical services that stand alone in terms of quality and innovation. The integration of psychometrics with statistics and sampling sets CAI apart from the competition. Although testing firms often bring expertise in psychometrics, the quality of those services depends on the samples upon which the data are based. Typical samples used in state testing programs can undercut the best psychometrics, leading to volatile test results from year to year and inaccurate classification of test takers. CAI combines expertise in sampling and psychometrics to optimize student samples, and our statistics accurately reflect the complexities of the sample designs.

Gary Phillips, Ph.D., Assessment Vice President, and Institute Fellow. Dr. Phillips leads CAI's Psychometrics and Statistics Team, which includes 24 lead psychometricians who hold doctoral degrees and more than 20 statistical programmers, research associates, and support staff. Before joining CAI, Dr. Phillips led the National Assessment of Educational Progress (NAEP) for the federal government and served as acting commissioner of the National Center for Education Statistics (NCES), where he had also served as the deputy commissioner. Previous responsibilities at NCES included overseeing the NAEP, the National Adult Literacy Study (NALS), and the Third International Mathematics and

Science Study (TIMSS). Dr. Phillips was the architect and executive director of President Clinton's Voluntary National Test (VNT). Nationally and internationally recognized for his expertise in large-scale assessments and complex surveys, Dr. Phillips has published or presented more than 200 papers, taught dozens of graduate-level statistics courses, and presented hundreds of workshops on advanced statistical and psychometric topics.

Shuqin Tao, Ph.D., Lead Psychometrician (ILEARN and IREAD-3). At CAI, Dr. Tao provides psychometric leadership for statewide assessments; oversees psychometric activities that include scoring, calibration, and equating; and uses various statistical programming tools to implement quality control procedures for test development and psychometric analyses. Before joining CAI in 2019, Dr. Tao worked for 10 years on several statewide assessments, end-of-course (EOC) assessments, interim assessments, and formative assessments. During her time at Curriculum Associates, Dr. Tao led the design, development, implementation, maintenance, and enhancement of i-Ready Diagnostic—a computer-adaptive assessment for measuring and monitoring student growth—and i-Ready Standards Mastery—a formative interim assessment designed to inform instruction at the classroom and school levels. She also provided psychometric leadership that helped the company to accomplish its strategic transition from an instruction company to a learning company. In addition, Dr. Tao served as a consultant at Houghton Mifflin Harcourt, where she contributed to the design and development of new interim assessment products and played a key role in developing an on-the-fly multi-stage testing algorithm as well as algorithms to score and analyze technology-enhanced items. At the National Board of Osteopathic Medical Examiners, Dr. Tao led the development of an innovative assessment—Clinical Decision-Making—and oversaw the maintenance and enhancement of COMLEX-USA Level 1. Dr. Tao holds a Ph.D. in educational measurement and statistics from the University of Iowa in Iowa City.

Hyesuk Jang, Ph.D., Lead Psychometrician (I AM). Dr. Jang provides psychometric and statistical activities for the statewide alternate assessments, and currently works on both I AM and Ohio's Alternate Assessment for Students with the Most Significant Cognitive Disabilities (AASCD). Dr. Jang's responsibilities include the operational psychometric work of calibrations, equating, scoring, and preparations for item data review and standard settings. She also performs quality control, runs simulations, conducts research studies, writes technical reports, and evaluates the test form. Prior to joining CAI, Dr. Jang worked for the Korea Institute of Curriculum and Evaluation as appointed researcher, where she analyzed data on national assessment of educational achievement. Dr. Jang received her Ph.D. in measurement and quantitative methods from Michigan State University.

Computer and Statistical Sciences Center/Online Testing

The Computer and Statistical Sciences Center (CSSC) is responsible for CAI's software infrastructure and software products, including technology and support for student registration, online testing, reporting, learning management, and related systems.

CSSC's mission is to develop innovative products and systems that will keep CAI at the forefront of the assessment field. To accomplish this, CSSC combines a structured software development unit (developers and project directors) with a team of statisticians, psychometricians, and mathematicians. It is organized into groups that support families of software systems:

- Pre-production systems are responsible for supporting assessments before they are delivered, including test development, publication, and user management.
- Test delivery and reporting systems are responsible for our high-demand, public-facing systems that deliver tests and reports as well as other curricular and educational supports.
- Data analysis systems are responsible for test data processing, analysis, and data delivery.

Each family of systems has a technical lead, and together these individuals form a committee that oversees peer review of key documents, such as requirements, design documents, test plans, and program-code peer reviews. CSSC's interdisciplinary team includes more than 160 staff members, 11 of whom have doctoral degrees in areas ranging from computer science to statistics and engineering. Eighty-nine of the software project directors and other engineers have MBAs and other advanced degrees.

CSSC also includes shared services covering network engineering, software quality assurance, security, and configuration management that support all of our systems. Close interdisciplinary collaboration enables CSSC to develop remarkable technical products that effectively turn raw data into useful information and manage complex human processes to efficiently support test development, psychometrics, and score reporting.

For more than a decade, **Selina Tolosa, M.B.A., Vice President of Assessment Technology Solutions and Services**, has served as team leader for the development and implementation of assessment software systems at CAI, including CAI's online test delivery engine for operational tests administered in more than 26 states and jurisdictions. Before joining CAI, Ms. Tolosa was the director of information services and the financial officer for New American Schools, a not-for-profit organization that funds development of schoolwide designs aimed at transforming elementary and secondary schools. Ms. Tolosa also brings experience in financial forecasting and analysis, quality assurance of government enterprise systems, and application of database skills, statistical sampling, and relational databases to data organization of assessment systems. Ms. Tolosa earned her M.B.A. degree from the Wharton School at the University of Pennsylvania.

CAI proposes implementing our proven item banking, test delivery, student registration, reporting, and related systems to support the Indiana assessment program. While the entire CSSC Team will support the Department, the following staff will be responsible for communicating with IDOE about the configuration and implementation of our systems for the Indiana program. Each team lead will be responsible for vendor communications under the direction of Ms. Tolosa, ensuring a seamless multi-vendor structure and delivery.

Sonja Hubbard, M.S., Information Technology Specialist. Ms. Hubbard has more than 12 years of experience delivering web solutions for the US Government as well as for non-profit, international development, education, news media, and other private-sector organizations. She brings skills in technical project management, requirements analysis, and usability and user experience design. Prior to joining CAI, she worked at a web technology consulting firm managing web application projects that included the Office of Naval Research's STEM education outreach program management database, the International Tax Policy Forum's digital library, and the National Transportation Alternatives Clearinghouse. Ms. Hubbard has also worked at AED, where she oversaw design and development of multi-lingual web portals that enabled educators around the world to share resources and collaborate with each other. She received her MS in information systems management from the George Washington University School of Business, and her B.A. in media studies from Pomona College in Claremont, CA.

Ms. Hubbard will lead a team of software project managers for CAI's systems, including the Test Information Distribution Engine (TIDE), Test Delivery System (TDS), Analysis Systems, Centralized Reporting System (CRS), and Item Tracking System (ITS). The team members are listed here, and their résumés can be found in Appendix A.

- David Kravitz, B.S. (TIDE)
- John McDonald, B.S. (TDS)
- Mahendra Ramachandran, M.C.A. (Analysis Systems)
- Sirisha Nagabhairava, M.S. (ITS)
- Jairo Vargas, B.S. (CRS)

Communications and Reporting

CAI goes beyond simply reporting scores to providing deep analyses of the data, expressed in a clear, appealing, and actionable way. Unlike its competitors, CAI delivers information in full color with variable text and graphics. The reports begin with the same basic data that have been traditionally reported, but they extend much further. The basic data are reported using tested data displays that facilitate correct interpretation and prevent misinterpretation. The implications, as well as limitations, of additional analyses are presented both graphically and in text that is customized for each individual report, including the increasingly popular value-added analyses. Our professional development services focus on assessment administration and data use that helps our clients to develop assessment literacy in their states.

Bani Dheer, J.D., Vice President of Communications and Reporting, brings more than 15 years of experience to her role overseeing all of CAI's online and paper-pencil reporting services across our assessment clients. Ms. Dheer manages a multi-disciplinary team of designers, developers, and project managers. She also leads our Communications and Reporting Team, managing communications planning and the design and delivery of communications and training materials for all clients. Prior to joining CAI, Ms. Dheer worked in market research and communications developing strategies for educational not-for-profits and Fortune 500 companies such as Coca-Cola, Nike, Proctor and Gamble, Learning First Alliance, the National Endowment for the Arts, and the California Teachers Association. Ms. Dheer earned her J.D. degree from the University of British Columbia in Vancouver, Canada.

Anurag Kumar, M.S., Score Reporting Lead. Mr. Kumar leads the score-reporting operations at CAI for more than 22 reporting administrations across seven states. This effort includes planning, product design, finalizing reporting specifications and schedules, quality assurance, as well as coordinating with CAI project managers, software engineers, programmers, and designers, as well as managing printing and shipping logistics. Previously, Mr. Kumar worked with

multiple social-research organizations where he was involved in the data management of education, workforce development, and juvenile justice projects. He received his M.S. in management information systems from the College of Business at the University of Cincinnati and his B.S. in production engineering from G. B. Pant University, Pantnagar, India.

Operations

CAI's Operations Team includes 29 full-time and more than 200 part-time professionals and is responsible for the production of paper-pencil-based test forms; for Help Desk operations; and for warehousing, distributing, collecting, security processing, scanning, editing, performance scoring, and preparing data files.

DeeAnn Wagner, M.B.A., serves as the **Vice President of Assessment Programs and Operations.** Ms. Wagner has more than 25 years of experience managing high-stakes assessment projects, including the past 20 years at CAI. Ms. Wagner earned her B.S.B.A. degree in operations management from the University of Delaware and her M.B.A. degree from Thomas Jefferson University in Philadelphia, PA.

To lead customer service, CAI proposes **Victoria Anderson, B.S., Customer Service Manager.** Ms. Anderson currently manages CAI's Help Desk across all assessment programs, with a focus on support for online testing. She also manages CAI's Help Desk knowledge bases, inquiry-tracking systems, and telephone and electronic communications systems, overseeing full-day support across five time zones for 10,000 monthly inquiries. Ms. Anderson's team expands to approximately 250 staff members during peak periods, providing services from 5 a.m. to 10 p.m. EST, Monday through Friday, with occasional Saturday support. She establishes and enforces processes and best practices; adheres to proper training methodologies and provides staff training; produces management reports; communicates program statuses and issues with program management; oversees our clients' service-level agreements; and uses standard metrics to track and manage the Help Desk workflow. Ms. Anderson earned her B.S. in management from Baker University in Baldwin City, Kansas.

Subcontractors

CAI will serve as the sole point of contact for all contractual matters, including those that may impact or involve our subcontractors. We acknowledge that deficiencies in work performed by any subcontractor are the responsibility of CAI. We understand all subcontractors must be approved by IDOE.

Data Recognition Corporation

Data Recognition Corporation will perform the handscoring and paper-pencil processing for Indiana's assessment program. Key personnel will include the following:

Kathy Kanolis, Handscoring Supervisor. Ms. Kanolis has more than 20 years of experience working with large-scale educational assessment programs, including 15 years overseeing the handscoring of the ISTEP+ assessments. In her current role, Ms. Kanolis is responsible for all activities associated with the applied skills scoring of DRC's Test Assessing Secondary Completion (TASC) as well as alternate assessments in Alabama, Louisiana, Nevada, and Washington. Ms. Kanolis has two years of experience teaching and holds an M.S. in educational psychology and a B.A. in psychology from Purdue University, in West Lafayette, Indiana.

Dee Ann Jacobs, Handscoring Advisor. Ms. Jacobs has more than 24 years of experience in performance scoring, including 10 years working on the ISTEP+ program. Ms. Jacobs is responsible for the planning, implementation, and management oversight of performance scoring operations for DRC's Indianapolis scoring site and several remote sites. Ms. Jacobs has successfully managed the scoring of over 17 million items per year with continued excellence in quality. In addition, Ms. Jacobs has seven years of teaching experience that includes serving as associate professor at Indiana University/Purdue University at Indianapolis, where she was a literature and composition instructor. She also taught composition classes at Eastern Kentucky University as a graduate assistant. Ms. Jacobs holds a B.A. in political science.

Dong-In Kim, Research Supervisor. Dr. Kim has more than 25 years of research experience, including 20 years in the fields of statistics and measurement. He worked on the ISTEP+ program from 2009–2015. As a senior research scientist at DRC, Dr. Kim develops and applies advanced mathematical models and modern statistical theory to analyze achievement test data from multiple-choice and performance items. Dr. Kim currently serves as the psychometric lead on the LEAP 2025 Math and English Language Arts Test Development for High School, Grades 3–8, Diagnostic, and Interim programs. Dr. Kim holds a Ph.D. in educational measurement and statistics, an M.A. in educational measurement, and a B.A. in education.

Caveon

Caveon will provide its Web Patrol service to monitor English language websites and searchable discussion forums, chat rooms, and social media sites made available on the Internet (collectively, "Websites") for the disclosure of protected test content contained within IDOE's state assessments, in accordance with the terms of the RFP, proxy testing solicitations, and unauthorized training materials ("CLIENT Content") for a period of time outlined within the RFP. Key personnel will include the following:

Walt Drane, Director of Education Services. Mr. Drane is an experienced K–12 large-scale assessment professional skilled in the area of test security. His former experience includes leading Mississippi's Test Security Unit at the Department of Education, and he has led multiple large-scale investigations throughout the state to ensure the validity and reliability of statewide assessment results. He holds a BA in political science with a focus on international relations, a certificate in criminal justice and corrections, an M.A. in education, and an education specialist degree in educational leadership.

Jennifer Sterne Jensen, Program Manager. Ms. Jensen has 30 years of program management and consulting experience, specializing in certification testing and skills assessment. An effective communicator and problem-solver with experience in all phases of the exam life cycle, Ms. Jensen incorporates her passion for technology and innovation into all aspects of her work.

Christie Zervos, Vice President of Operations. Ms. Zervos's main duties include managing and supervising the Web Patrol team. She is responsible for client satisfaction and fulfillment of web patrol contracts. Since Caveon's inception, Ms. Zervos has nurtured and grown the Web Patrol service, fulfilling contracts for more than 25 clients that include large, international, high-stakes testing programs for K–12 education, universities, admissions, certification and licensure, and other areas. Ms. Zervos earned her B.S. at the University of Utah.

Cary Straw, Executive Web Patrol Manager. Mr. Straw has worked for 37 years in online computing platforms, design, brand management, sales, and testing. That depth of experience enables him to understand the intricate challenges of online test security and how best to address them.

Exhibit 1.5-3: Staff Allocation Chart

Team	Name	Assigned Responsibilities		Total
	Steve Kromer	*President, CAI*		As needed
Project Management	Heather Hayes	*Vice President, Assessment Programs and Client Services*		As needed
	Teresa Hall	*Program Manager*	100%	1,800
	Suzanne Huston	*Project Manager*	100%	1,800
	Cherise Lesesne	*Project Manager*	100%	1,800
	Phil Robakiewicz	*Project Manager*	100%	1,800
	Erin Meyer	*Quality Assurance Specialist*	25%	450
	Katherine Mullahy	*Accommodations Specialist*	25%	450
	Rachelle Stein	*Ancillary Specialist*	25%	450
		Program Coordinators and Assistants	325%	5,850
	Victoria Anderson	*Customer Service Manager*	13%	240
		Customer Service Staff		12,000
Psychometrics	Gary Phillips	*Vice President and Chief Psychometrician*		As needed
	Shuqin Tao	*Lead Psychometrician, ILEARN and IREAD-3*	67%	1,200
	Hyesuk Jang	*Lead Psychometrician, I AM*	50%	900
		Junior Psychometricians and Research Associates		4,400
Test Development	Margaret McMahon	*Vice President, Assessment Content and Test Development*		As needed
	Gabriel Martinez	*Overall Content Lead*	33%	600
	Alex Linville	*ELA Content Lead*	13%	240
	Amanda Huston	*ELA Test Development Manager*	10%	180
	Marie-Kristine Kramer	*Mathematics Content Lead*	13%	240
	Michael Dlugos	*Science Content Lead*	7%	120

Team	Name	Assigned Responsibilities		Total
	Scott Koenig	*Social Studies Content Lead*	4%	80
		Editorial Staff, Graphics and Production		5,400
Online Testing Systems	Selina Tolosa	*Vice President, Assessment Technology Services and Solutions*		As needed
	Sonja Hubbard	*Information Technology Specialist*	13%	240
	David Kravitz	*TIDE Liaison*	4%	80
	John McDonald	*TDS Liaison*	8%	144
	Mahendra Ramachandran	*Analysis Liaison*	4%	80
	Sirisha Nagabhairava	*ITS Liaison*	4%	80
	Jairo Vargas	*CRS Liaison*	4%	80
	Jamalul Husain	*Security Liaison*	4%	80
	Bruce Malone	*Configuration Management Liaison*	4%	80
		Developers and Data Analysts, All Systems		7,000
	Dorian Sofiaj	*Lead, Software Quality Assurance*	4%	80
		QA Staff		2,100
	Ankur Desai	*Network Engineering*	4%	80
		Network Engineers		2,100
Reporting	Bani Dheer	*Vice President, Assessment Communications and Reporting*		As needed
	Anurag Kumar	*Score Reporting Lead*	20%	360
		Score Reporting Specialists		6,000
Operations and Scoring	DeeAnn Wagner	*Vice President, Assessment Programs and Operations*		As needed
	Kathy Kanolis	*Handscoring Supervisor, DRC*	70%	1,260
	Dee Ann Jacobs	*Handscoring Advisor, DRC*	25%	450
	Dong-In Kim	*Research Supervisor, DRC*		
Web Patrol	Walt Drane	*Director of Education Services, Caveon*		As needed
	Jennifer Sterne Jensen	*Program Manager, Caveon*		As needed
	Christie Zervos	*Vice President of Operations, Caveon*		As needed
	Cary Straw	*Executive Web Patrol Manager*		As needed

* CAI reserves a small portion of our senior staff work time for professional development and other opportunities for personal growth and expansion of their skill sets to serve our state assessment clients.

1.6 (3e) Project Plans and Schedules

CAI will continuously monitor the ongoing operations of the ILEARN, IREAD-3, and I AM programs using a detailed project plan and cross-program schedule. We commit to the following actions to support timely completion of deliverables and clear communication between IDOE and CAI staff:

1. CAI shall provide an annually updated project plan and schedule for joint use and real-time monitoring of all programs activities by July 1 of each year. We will deliver a draft 2022–2023 schedule to IDOE within 60 days of contract execution as required.
2. IDOE will have appropriate, frequent, direct real-time access to the cross-program schedule as required.
3. CAI will provide weekly updates showing all deliverables for a current week and the subsequent six weeks. The weekly updates will be provided to IDOE on Monday (by noon ET) of each week. Holidays will be adjusted as agreed to by both parties.
4. All schedule adjustments made to the overall schedule will be noted both in the master project schedule and in the weekly updates.
5. The master schedule will be delivered electronically to IDOE weekly in an agreed-upon format for import. The schedule will delineate agreed-upon durations, associated tasks, and the party responsible for completing each deliverable or process step.

6. A master project schedule detailing all milestones of the project and their due dates will be updated monthly and provided to IDOE.
7. Changes to key milestones in the master schedule will require a contract amendment.

A master schedule highlighting key milestones on the critical path for 2022–2023 is provided in Appendix B.

CAI has not been involved in any litigation or breaches of contract due to missed deadlines resulting in compromises of an assessment program.

1.7 (3f) Status and Planning Meetings

Weekly Status Meetings

CAI considers weekly conference calls to be an important and routine element of effective communication, especially during testing windows. CAI will host weekly status calls, weekly schedule checkpoint calls, and weekly content/test construction calls with IDOE to address all aspects of each program. One cross-program status/schedule call will be followed by individual program-specific calls. IDOE and CAI currently conduct weekly meetings via Microsoft Teams, but CAI will adopt any other mutually agreed-on platform should IDOE have a preference.

An agenda of proposed topics will be delivered to IDOE for review at least 24 hours in advance of each scheduled weekly meeting. After each weekly meeting, CAI will provide the meeting minutes; updated action items; and risk, issue, and decision logs updated as appropriate, using a format approved by IDOE. CAI will ensure that the weekly meeting minutes provided to IDOE include, but are not limited to, the status of ongoing activities, decisions made, decisions pending, activities completed, activities that are behind schedule (including planned action steps to rectify any deviation from the agreed-on timeline), and high-level timelines for critical activities. Detailed schedule activities will be incorporated into the program schedule that is updated and shared with IDOE weekly. CAI will maintain a decision log and list of action items to track important outcomes from meetings held with IDOE. The decision log will note any decisions that require a contract amendment.

CAI will provide the following deliverables to IDOE each week:

1. Updated cross-program schedule
2. Updated list of action items
3. Updated risk log
4. Updated issue log
5. Updated decision log
6. Minutes from each status meeting within 24 hours
7. Production tracker during manual, script, item tagging, and form construction cycles

Planning Meetings

CAI will participate in (and cover all associated CAI costs for) four virtual planning meetings with IDOE and CAI Program Management teams during Year 1 (2022–2023). CAI will schedule a kickoff meeting, which will be the first planning meeting of the 2022–2023 administration, with IDOE and CAI leadership teams, ideally to occur within the first month of the contract award. During the kickoff meeting, IDOE and CAI will review milestone schedules for the upcoming year and establish the baseline plan.

In every subsequent contract year, CAI will be responsible for CAI costs associated with four meetings that will include CAI management and senior management staff as well as subcontractor staff as necessary. All meetings will be held virtually. During each planning meeting, staff members from IDOE and CAI will review schedules for the upcoming year, establish the baseline plan, and work through any scope of work modifications or enhancements. Attendees will discuss any challenges encountered while performing the work covered by the contract and any changes to processes and procedures that may be needed to allow the programs to run more smoothly. CAI will submit the meeting notes to IDOE within five business days of each meeting for final review and approval.

During the initial start-up phase of this project, additional virtual meetings may become necessary; CAI costs will be covered by CAI, and meeting dates, times, and locations will be mutually agreed on by CAI Program Managers and IDOE administrators. Additional costs will be approved following a protocol established with IDOE and agreed on by CAI.

1.8 (3g) Educator Involvement

Educator Meetings

CAI understands that IDOE will plan, manage, and facilitate all Indiana educator meetings. CAI will work with IDOE to confirm that IDOE has the standard student data needed to ensure that the needs of the meeting are met from a data perspective. This includes providing IDOE field-test data in a standard format to support a data review meeting for ILEARN and I AM field-test items. IDOE and CAI will work together to coordinate what is needed for each meeting, the format and layout of the data required, and a schedule for the handoffs prior to the educator meetings.

Educator Handscoring

CAI acknowledges that Indiana legislation requires that Indiana educators participate to the extent possible in the handscoring process of ILEARN open-ended items. CAI has previous experience with this legislation, and over the last three years, has developed guidelines and processes that support this legislative requirement and recruited state educators to be part of the handscoring process for the ILEARN assessments. These guidelines include the creation of an Indiana educator scoring plan that is submitted by CAI to IDOE for approval on an annual basis. CAI and IDOE will also collaborate on a one-page Educator flyer that can be distributed to Indiana educators to solicit participation and interest. The opportunity will be communicated to the field via the ILEARN portal and other distributions as confirmed by IDOE.

Educator Scoring Plan

ILEARN Fall Biology ECA and Winter Biology ECA Administrations

Due to the small population of students testing during the Biology end-of-course assessment (ECA) administrations, CAI recommends restricting the recruitment of Indiana educators to only 1–2 educators to ensure there were enough responses for the educators to fully participate. Recent recruitment for the ILEARN Fall and Winter Biology ECAs involved the following:

- *December 2019*: Two Indiana educators participated in onsite handscoring activities at the handscoring facility.
- *February 2020*: One Indiana educator participated in handscoring activities remotely.
- *December 2020*: One Indiana educator participated in handscoring activities remotely.
- *February 2021*: One Indiana educator participated in handscoring activities remotely.

The Indiana educators for these administrations will be confirmed by IDOE and hired as temporary handscorers by the handscoring vendor. They will be trained exactly as other professional handscorers are trained for all handscoring administrations and will be held to the same criteria and qualification as other handscorers.

ILEARN Grades 3–8 and Spring Biology ECA Administrations

CAI will work closely with IDOE to actively recruit and train Indiana educators for annual ILEARN Spring handscoring activities. All handscoring will be conducted remotely. CAI will provide a scoring plan to IDOE for review and approval prior to recruitment. Indiana educators will be trained exactly as other handscorers are trained and will need to meet all qualifications and criteria through the process. Indiana educators' scoring quality and productivity will be evaluated using the same system and standards used for other handscorers, and they will receive the same automated feedback provided to other handscorers.

Recent recruitment efforts and results for the ILEARN Spring administrations are as follows:

- *Spring 2019*: 334 Indiana teachers and instructional coaches were hired and successfully handscored open-ended items on ILEARN assessments.
- *Spring 2020*: 577 Indiana educators were in various stages of the application and hiring process at the time of the Spring 2020 ILEARN assessment test cancellation (which resulted from the COVID-19 pandemic).
- *Spring 2021*: 226 Indiana educators and instructional coaches were hired and successfully scored the open-ended ILEARN assessments.

1.9 (3h) Test Design

ILEARN Test Design

Overview of ILEARN Test Design

As we describe in the following sections, the ILEARN test design process followed a rigorous blueprint creation procedure in which Indiana educators developed ILEARN blueprints specifying how achievement of the Indiana Academic Standards will be assessed across grades for English/Language Arts (ELA), Mathematics, Science, and Social Studies. Blueprint elements include the total number of test items, the range of items administered for each assessed standard, the organization of standards into reporting categories, and the range of items administered for each reporting category.

Indiana educators were further able to prioritize some of the Indiana Academic Standards in their specification of item ranges for each standard. The ILEARN assessments in ELA, Mathematics, and Science are administered adaptively, while the Social Studies assessments are fixed form due to limited numbers of bank items. IDOE also offers fixed-form paper administrations as an accommodation. All fixed-form tests are constructed using the same ILEARN blueprint used to administer tests adaptively. The advantage of item-adaptive assessments is that by targeting test information to student ability, they achieve more precise test scores for low- and high-ability students than would be possible with fixed forms.

The ILEARN assessments in ELA and Mathematics were deployed primarily using the Smarter Balanced item pools, but the ELA and Mathematics item pools were also augmented by Indiana-developed items and CAI's Independent College and Career Readiness (ICCR) item pools. The elementary and middle school Science and Social Studies assessments were deployed using Indiana-developed items, with the science assessments augmented with ICCR items. The high school Biology assessment is deployed by Indiana.

To ensure the fidelity of the ILEARN test design, we confirm that the public-facing ILEARN blueprints must be met during each test administration. In the sections that follow, we describe how we meet the various elements of test design.

Historical Review of Test Blueprint Process (Including Educator Involvement)

Educator Recruitment. In February 2018, IDOE and CAI worked closely with Indiana educators to create blueprints that guided the item development process for all subjects and grades. IDOE recruited stakeholder participants in the blueprint and Performance-Level Descriptor (PLD) process. From this pool, a sample of participants were invited to represent regions including north, central, and south; urban, rural, and suburban; and other distinct state student subpopulations to ensure content accessibility. Each subject-area panel was comprised of grade-band subpanels.

Meeting Structure. Participants worked in subject-area, grade-band, and grade-level panels, circulating back and forth to ensure that assessment-level panels were continuously receiving feedback from subject-area educators across grades, and that final recommendations were aligned across the full system of ILEARN assessments.

Post-Meeting Activities. Following the blueprint meeting, CAI psychometricians and content experts incorporated the results of the educator meeting to create high-level, public-facing blueprints for all grades and subjects.

Subject-area panels reconvened via a webinar the week following the workshop and were provided with drafts for each of the grade-level test blueprints. A guided review of the initial blueprints illustrated how each of the blueprint elements was generated from the panelist feedback during the meeting and how the blueprints were based on constraints of the assessment system, reporting framework, and standard importance ratings. Panels evaluated whether the recommended blueprints satisfied all constraints for the ILEARN assessments, including overall testing time. IDOE considered the draft blueprints and educator recommendations in order to finalize the blueprints.

Summary. ILEARN blueprints were designed to meet the following objectives:

- Provide full coverage of the breadth and depth of the Indiana Academic Standards.
- Provide weight to the standards and reporting categories as identified by educators.
- Minimize testing time.
- Include a performance task in all subjects except Social Studies.

All final blueprints are posted on the ILEARN Portal. In each administration, all elements of these blueprints are required to be met, without exception, to ensure comparability among test administrations.

Example. Exhibit 1.9-1 showcases part of a public-facing blueprint for grade 3 Mathematics. From left to right, the pertinent information includes the reporting category and percentage of the test blueprint covered by that reporting category; the standards within each reporting category, along with the range of items seen in each adaptive assessment; and the number of items per reporting category overall.

Exhibit 1.9-1: Portion of ILEARN Blueprint

ILEARN Blueprints
Grade 3 Mathematics
(Beginning 2018–19 School Year)

Reporting Category	Standard	Standard Item Range		Standard % of Test		Reporting Category Item Range
		Min	Max	Min	Max	
Algebraic Thinking and Data Analysis (19–24%)	3.AT.1	1	3	2	7	9–11
	3.AT.2	0	2	0	4	
	3.AT.3	0	2	0	4	
	3.AT.4	0	2	0	4	
	3.AT.5	0	2	0	4	
	3.AT.6	0	2	0	4	
	3.DA.1	0	2	0	4	
	3.DA.2	0	2	0	4	

CAI's Experience Implementing the ILEARN Test Design

CAI has successfully implemented these test blueprints since the original ILEARN assessment administration in 2019. These test blueprints are complex, in the sense that there are subject-specific requirements of the blueprint beyond the standard-level minimum and maximum ranges. For example, segments are required in both Mathematics and ELA. For Mathematics, segments ensure standards, for which calculators are or are not appropriate, can be measured in the corresponding segments of the testing environment (with or without calculators.) Similarly, in ELA, some reporting categories (Writing and Listening) are appropriate for all students to have access to Text-to-Speech (TTS), whereas other reporting categories (Reading Nonfiction and Reading Literature) are not appropriate for TTS for the general education population.

Similarly, the Mathematics, ELA, and Science assessments include performance tasks as a separate test. By including the performance tasks to be administered as a separate test, this allows proctors to deliver computer-adaptive tests (CATs) and performance tasks (PTs) on separate days. The blueprint ranges used by CAI's testing algorithm ensure that items delivered during the CAT and items delivered in the PT test overall meet the test blueprints without exceeding those values. Additionally, CAI's score reporting system combines the results from both tests to provide an overall scaled score for ILEARN.

In summary, the educator-approved blueprints ensure that ILEARN test administrations assess the intended depth and breadth of the Indiana Academic Standards. During CAI's simulations, blueprint weights are adjusted to ensure that all blueprint specifications are met for each test administration. More detail about simulations can be found in the sub-section which follows (*CAI's Experience with Computer-Adaptive Form Creation*).

Considerations for Social Studies

The grade 5 Social Studies and U.S. Government ILEARN assessments are fixed-form assessments. In grade 5 Social Studies, segments are used only for the purpose of randomly administering field-test items. Neither Social Studies assessment includes a performance task.

CAI confirms the current test design will be maintained. As with the other subject areas, all blueprint values will be respected when online and paper forms are built. Additionally, there are no plans at this time to develop additional items for field testing in U.S. Government.

ILEARN Item Banks

Existing Licensed Item Banks

CAI confirms the following licensed item banks for the ILEARN Assessments:

- Smarter Balanced item banks (Mathematics and ELA)
- ICCR item banks (Mathematics, ELA, and Science)

Additionally, the new contract ensures licensure of the Smarter Balanced items for the duration of the contract plus one additional year (to ensure sustainability of the program during any transition).

Content Updates from Licensed Banks

Items from the Smarter Balanced item banks that require content updates (as directed by Smarter Balanced) will have the content corrected in Smarter Balanced's item bank (TIMS) first. Once the content is approved in TIMS, CAI will import the updated content into CAI's Smarter Balanced Field-Test Item Bank in our Item Tracking System (ITS). For all licensed banks, once content is updated and approved in ITS, then it is ready for updates in either user acceptance testing (UAT) or production (live testing.) Prior to updating content in UAT or production, Program Management files a Production Control Request (PCR), which is reviewed by our Production Control Board (PCB). This ensures there are no negative consequences for our downstream systems. All content updates are communicated to IDOE prior to updates in UAT or production and require IDOE's formal approval.

New Items from Licensed Item Banks

Smarter Balanced. For all ELA items and Mathematics Claim 1 items, CAI will work with IDOE to apply business rules to accept new items into the ILEARN pools. For Mathematics Claims 2–4 items and Mathematics performance tasks, CAI will work with IDOE to conduct Item Acceptance Review (IAR) meetings as required (because the business rules do not apply to the items in these categories). CAI understands IDOE wishes to convene educator committees in Summer 2022, to review items that Smarter Balanced operationalized for the 2021–2022 school year that were not accepted via business rules. CAI assumes IDOE will conduct these educator review meetings independently. Pricing for these meetings can be provided via the contract amendment process if IDOE requests that CAI facilitate these educator committee reviews.

Additionally, for any Smarter Balanced ELA items/passages that measure reading comprehension, CAI staff will add Reading Comprehension metadata tags to ensure the correct TTS rules are followed based upon the student's testing accommodations.

ICCR. As with the original contract, ICCR items are available for ELA, Mathematics, and Science to help supplement when the other primary licensed item banks (e.g., Smarter Balanced) do not provide enough coverage. CAI does not anticipate the need for any new items from ICCR.

Copyright Permissions

CAI will work with IDOE to maintain copyright permissions for any permissioned stimuli (e.g., ELA passages, science performance task stims) used in Indiana-owned items, acknowledging that permissions may require additional costs to be managed through future amendment cycles.

For new stimuli developed by IDOE in another item banking system, IDOE will provide CAI a list of all stimuli attributes and permissions information prior to importing into CAI's ITS. CAI's copyright specialist will review these stimuli to ensure CAI can secure these permissions as part of the new contract. If CAI is unable to secure any permissions for new stimuli developed outside of ITS, CAI will inform IDOE so appropriate steps can be taken to mitigate any loss in passage/item development.

CAI will communicate with IDOE to ensure any permissions that require additional costs will be addressed in future amendment cycles.

CAI's Experience with Computer-Adaptive Form Creation (Including Algorithms and Simulations)

CAI has led the field in standards-based adaptive assessment. Our adaptive algorithm enables us to deliver tests meeting complex blueprints (including passage-based tests) while optimizing measurement for each individual. CAI's adaptive algorithm takes two sources of information as input: an item pool and a test blueprint. The adaptive algorithm is then configured to execute maximally adaptive-test administrations under the constraint of blueprint match. Configuration of

the adaptive algorithm is critical because the composition of the item pool, which changes from administration to administration, interacts with the blueprint to influence the performance of the adaptive algorithm. We are fully prepared to continue delivering the ILEARN assessments.

Our adaptive engine supports blueprints that meet the following conditions:

1. Every student is tested on the full range of grade-level content with no discernible differences in the content assessed.
2. Every student is tested on items measuring the same mix of cognitively complex skills with no discernible differences, regardless of student proficiency.
3. Every student is tested on items reflecting the full range of other aspects of the grade-level curriculum, as may be appropriate for the grade and subject.
4. Students are tested on items that provide the best measurement possible within these constraints.

These four principles help ensure that every student can accurately demonstrate his or her academic skills and knowledge across the entire grade-level curriculum. CAI's adaptive algorithm supports blueprints that meet these goals. Our standards-based adaptive algorithm, building on our partnership with our client states over the years, implements complex blueprints. The algorithm ensures that each student receives a test that: (1) matches the blueprint, and (2) does so with the items that best match student performance, given the blueprint constraints.

Configuration of Adaptive Tests

CAI's adaptive algorithm has a proven track record of delivering tests that ensure each student an opportunity to show what he or she knows and can do across the breadth of the curriculum. We begin our presentation by clarifying a couple of terms. The delivery of an adaptive test depends on two things: the test blueprint and the adaptive algorithm. The *test blueprint* defines the characteristics and content of the items that will be delivered. The *adaptive algorithm* refers to the sequence of procedures that select the items according to the blueprint. The blueprint specifies the range of standards to be administered to each student and the other characteristics of the items that make up each student's test, such as number of reading passages. The algorithm is the procedure that ensures that the blueprint is matched and that those items are of the appropriate difficulty.

Our algorithm seeks to optimize any or all of the three following criteria:

1. Match to a complex blueprint
2. Precision of content strand or other reporting category scores
3. Precision of overall scores

The emphasis of each of these objectives is separately configurable for each test.

The blueprint defines the characteristics of the items to appear on each test, specifying the minimum and maximum number of items to be delivered in each category. Usually, minima and maxima in the lower levels of the hierarchy are established to ensure that each student sees the full breadth of standards in each reporting category, rather than forcing an item on each standard.

The algorithm is based on a multidimensional objective function. Each time an item is selected, every item in the pool has a value, and this value derives from the item's utility in fulfilling the blueprint and its match to student proficiency. Calculating this value directly for each item is prohibitively time-consuming. Instead, the algorithm goes through a four-step process that trims the search space, limiting the number of items for which the actual value of the objective function must be calculated.

The four-step process of the algorithm is as follows:

1. Identify the *k* items or item groups (e.g., a group of items following a common passage) that provide the most value in terms of matching the blueprint.
2. Sort the *k* items in an order based on the weighted average of match-to-blueprint and contribution to performance. The weights are configurable and are generally set during the pre-deployment simulations.
3. Select randomly from the top *n* candidates. (This limited application of random selection helps control item exposure.)

4. If the selection is an item group and the group contains more items than it is set to administer with the stimulus, then sort the items according to a configurable mix of blueprint match and performance match and select the top *m* items, where *m* is the number of items designed to be administered with the stimulus.

The variables *k*, *n*, and *m* are all configurable, as are the weights associated with each element in the blueprint and the relative weights of the components of the objective function. A summary of the item selection process is also provided in Exhibit 1.9-2. This configurability provides a powerful mechanism for tuning the algorithm for the item bank for each test.

Constructing forms for adaptive tests consists of two steps: establishing the item pool and optimizing the item selection parameters for the selected pool. Our adaptive engine is robust to imbalances in the item pool as long as there are enough items in the various blueprint categories. Therefore, the selection of items for inclusion in adaptive pools is less critical. When items are clustered into groups, as with reading tests, we must also pay attention to the composition of the item sets and the degrees of freedom available to the algorithm to select from among those sets. To configure and evaluate the performance of the adaptive algorithm, CAI psychometricians use our simulation tool.

Item Pool

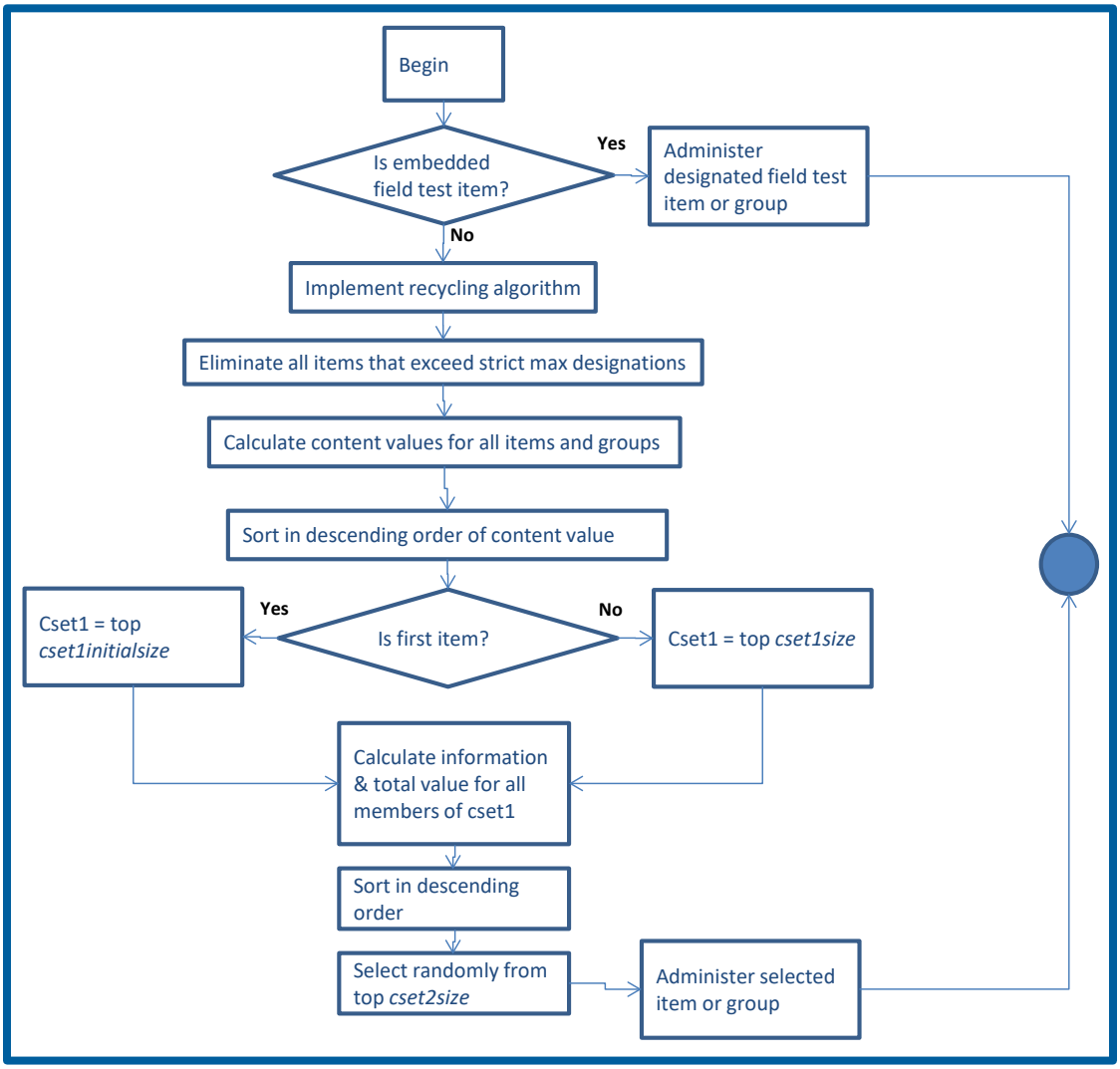
As long as there are sufficient items to meet each of the blueprint specifications, the adaptive algorithm is robust with respect to item pool composition. It is therefore not necessary that the distribution of content standards within the item pool be proportional to the test blueprint. Nevertheless, CAI test development and psychometric staff inventory the item pools before each test administration to identify any gaps in the pool that should be especially targeted for item development.

Item development in a fixed-form environment typically aims to concentrate test information near the critical proficient cut score. When all students are administered the same form, the goal is to minimize measurement error near the location of important cut scores. In adaptive environments, in contrast, the goal is to minimize error near each student's ability level. This places a greater premium on developing items that more effectively measure students near the ends of the ability distribution, increasing the proportion of very easy and very difficult items. As part of our item pool inventory, we also evaluate the distribution of item difficulties within content domains to guide our item development strategy.

With respect to item pool adequacy, in an adaptive assessment, the evaluation of items and their selection into the operational pool proceed somewhat differently than they do in a fixed-form assessment. In a fixed-form environment, the criteria for promoting items to the operational bank may be somewhat relaxed, allowing the inclusion of items that may not have optimal statistical characteristics but that are intended only to be available for placement in a test form when no other suitable items are available. Thus, item statistics are generally evaluated twice, once during data review for inclusion in the operational pool and again at form construction for placement in operational test forms.

In an adaptive assessment, all items in the pool are available for test administration. For this reason, the criteria for including items in the operational bank should be more stringently applied than might be the case in a fixed-form environment. All items in the adaptive item pool must meet minimum requirements for item discrimination, be within the acceptable range of item difficulties, and demonstrate appropriate fit statistics. The adaptive algorithm does not recognize items as being for use only in emergencies.

Exhibit 1.9-2: Summary of Item Selection Process



Simulation Tool

The simulator allows psychometricians to adjust parameters within the adaptive algorithm to optimize it for use with a particular item pool. The simulator outputs a host of indicators including, but not limited to

- estimates of bias at the overall and reporting category levels;
- standard errors and distributions of standard errors;
- match to blueprint;
- number of unique benchmarks administered to each student;
- item exposure;
- number of item groups administered; and
- item reuse across opportunities.

Psychometricians adjust configuration parameters to achieve the optimal mix of outcomes. They interact with the simulator by modifying the configuration parameters in a web-based environment. When the configuration parameters are finalized, this same configuration is uploaded to the ITS to generate a new version of the configuration file. Simulations are run on the new file as a final check that nothing has changed and that all procedures were followed. Each year, CAI will deliver to IDOE a final report on all simulations containing the detailed statistical output. As a point of clarity, we note that the blueprint values do not change across administrations; instead, psychometricians may update the blueprint weights to ensure that all elements of the test design are met.

Monitoring Performance of the Adaptive Algorithm

CAI psychometricians generate quality assurance (QA) reports to provide ongoing monitoring of test administrations throughout the testing window. The QA reports provide information on item behavior, blueprint match rates, and item exposure rates that psychometricians can use to verify that the adaptive algorithm is performing consistently with the simulated test administration runs.

Student Survey

CAI's Test Delivery System (TDS) allows for survey questions to be administered to students after their online summative assessments. Typically, we configure this survey to be a separate test (which is not scored) which collects information from the student about the student's testing experience or other data requested by IDOE. The item types used for these online surveys include multiple choice, multiple select, and table match. For example, Utah administered a separate online survey (after the summative assessments) in Spring 2021 to gather student information about their learning during the COVID-19 pandemic. Additionally, we have worked with Delaware to collect information about student perceptions of learning on an annual basis. After the conclusion of the Spring administration, CAI will provide IDOE with the collected data by July 1, 2022.

Overview of I AM Test Design

I AM is currently a stage-adaptive assessment with operational items administered in two parts. In Part 1, all students take the same assessment (20 operational items) across a range of complexities. Performance on this first set of items determines the next set of items received in one of three Part 2 forms (each contains 12 operational items): Form A (low complexity); Form B (moderate complexity); or Form C (high complexity). Each Part 2 form (Form A, Form B, or Form C) contains unique items along with items from adjacent tiers. Performance on items from both parts is combined for the final summative scale scores. The overall scale scores for Indiana students align with three proficiency levels (Below Proficiency, Approaching Proficiency, and At Proficiency).

Exhibit 1.9-3 illustrates the I AM test design for forms in each grade and subject.

Exhibit 1.9-3: I AM Test Design 2020–2021

Part 1		Part 2		
item 1		Form A	Form B	Form C
item 2		item 21	item 21	item 30
item 3		item 22	item 22	item 31
item 4		item 23	item 23	item 32
item 5		item 24	item 30	item 36
item 6		item 25	item 31	item 37
item 7		item 26	item 32	item 38
item 8		item 27	item 33	item 39
item 9		item 28	item 34	item 40
item 10		item 29	item 35	item 41
item 11		item 30	item 36	item 42
item 12		item 31	item 37	item 43
item 13		item 32	item 38	item 44
item 14				
item 15				
item 16		Key		
item 17		Tier 1 item		
item 18		Tier 2 item		
item 19		Tier 3 item		
item 20				

Part 1 is administered to all students. Performance in Part 1 determines placement into one of three Part 2 forms: Form A, Form B, or Form C. As the Part 2 stage-adaptive design in Exhibit 1.9-3 shows, item complexities are indicated by color: blue for low complexity, pink for moderate complexity, and green for high complexity. Form A is relatively less difficult, and Form C is relatively more difficult.

Parts 1 and 2 have a combined total of 32 operational items on each form. As shown in Exhibit 1.9-3, 44 unique operational items are generally needed for form building. This is due to the cross-tier linking pattern in the Part 2 forms.

Each Part 2 form contains unique items and items from adjacent tiers. Operational items in Part 2 were assigned to forms based on *a priori* complexity and item specifications, not item difficulty.

As the I AM pools increase, IDOE may wish to consider adopting an item-adaptive test design for I AM, which provides greater measurement precision across the range of student abilities. CAI will work with IDOE and other stakeholders to adjust the test design in a manner that will still meet all blueprint specifications.

I AM Blueprint

CAI worked closely with IDOE to create blueprints that guide the development process for the I AM assessments. Blueprints are the assessment design specifications that ensure assessment scores support the Performance-Level Descriptors (PLDs). Blueprints specify the proportionality of how I AM assesses the Indiana Content Connectors, including the relative range of each Content Connector on the assessment, as represented in the minimum and maximum number of items to be administered to each student.

CAI and IDOE recruited Indiana educators to inform I AM blueprint development in June 2018. These educators represented different regions of the state, diverse student populations, and content and accessibility expertise. Panels of content and special education educators serving students with significant cognitive disabilities were convened at each grade level. Here, they recommended priorities and associated item ranges noted within the blueprints. Educators also considered the vertical articulation of content across grades 3–10.

To ensure the I AM assessments provide valid assessment of the Content Connectors and align with the ILEARN assessments and expectations, the I AM assessment blueprints were constructed to include the range of content defined in the Indiana Academic Standards represented on ILEARN and the aligned Content Connectors as appropriate for the I AM student population to achieve the result of the accurate classification of student achievement. Exhibit 1.9-4 shows a portion of a blueprint (including standard-level mins) that is available on the ILEARN Portal. Similar to ILEARN, the blueprint contains reporting category and standard information, as well as item ranges per standard and reporting categories

Exhibit 1.9-4: Portion of I AM Blueprint

I AM Blueprints
Grade 3 Mathematics
(Beginning 2018–19 School Year)

Reporting Category	Content Connector (CC)	CC Item Range		CC % of Test		Reporting Category Item Range
		Min	Max	Min	Max	
Algebraic Thinking and Data Analysis (22-25%)	MA.3.AT.1.a.1	1	3	3	9	7-8
	MA.3.AT.2.a.1	0	2	0	6	
	MA.3.AT.3.a.1	1	2	3	6	
	MA.3.AT.4.a.1	0	2	0	6	
	MA.3.AT.5.a.1	0	1	0	3	
	MA.3.AT.6.a.1	0	1	0	3	
	MA.3.DA.1.a.1	0	2	0	6	
	MA.3.DA.1.a.2	1	2	3	6	
	MA.3.DA.2.a.1	0	1	0	3	

CAI has successfully implemented the I AM test blueprints since the original I AM assessments in 2019. Strict adherence to the blueprint constraints that require Content Connectors and reporting categories be assessed within specified ranges will ensure comparability across test forms and administrations. In summary, the educator-approved blueprints ensure that I AM test administrations assess the intended depth and breadth of the Content Connectors.

I AM Item Bank

As with the ILEARN items, all I AM items are currently housed in CAI's ITS, along with the metadata and item-level statistics being captured directly in ITS. Content markups are currently in place to support the required accommodations of I AM. For example, CAI can meet the following accommodations:

- Full TTS: Students receive Text-to-Speech for all stimuli and items.
- Paper-and-pencil: Students receive a printed form that matches the online form.

More detail about how content is managed in ITS can be found in the previous section *(ILEARN Item Banks*). CAI will work with IDOE to import new items as they become available. CAI understands IDOE plans to re-field test the same items from Spring 2021 in Spring 2022. CAI assumes new item development for field testing in Spring 2023 will take place without CAI's involvement.

I AM Learning Characteristics Inventory

CAI understands Test Administrators must complete the Learner Characteristics Inventory (LCI) for each student prior to the student engaging with the operational test environment to participate in I AM testing. CAI assumes the existing LCI will continue to be required. On the existing LCI, Test Administrators describe the student's classroom setting, modes of communication, motor function, assistive technology devices used, receptive language, and hearing ability.

No Mode of Communication Items and Policy

CAI agrees that the heart of the request from IDOE for no mode of communication (NMC) to be reported for all content areas after a student completes one subject area test with a score of NMC is noble, and we support resolving it. It is ideal if the NMC screener questions are not re-administered to these students multiple times. We have experience with other partners on this specific request as well and we would like to take an approach which does not endanger the peer review process as it relates to proving that an attempt was made on each test. CAI proposes that the beginning of each I AM assessment be altered such that participation is met and necessary information is provided to the Reporting System to appropriately report students as NMC or not, but students are not re-administered the screener questions multiple times. CAI looks forward to providing IDOE with the details of this proposed solution upon contract award.

IREAD-3 Test Design

Overview of IREAD-3 Test Design

IREAD-3 was first administered to students during the Spring of 2012 in accordance with House Enrolled Act 1367. The IREAD-3 assessment was constructed to measure foundational reading standards through grade 3. In 2014, the new Indiana Academic Standards in ELA were adopted for IREAD-3. IREAD-3 assessments do not measure all the Indiana Academic Standards in ELA, but rather, the standards most relevant to foundational reading proficiency.

IREAD-3 is a standards-referenced assessment that applies principles of evidence-centered design to yield overall and reporting-category-level test scores at the student level and at other levels of aggregation that reflect student performance of the Indiana Academic Standards. IREAD-3 supports instruction and student learning by providing immediate feedback to educators and parents that can be used to inform instructional strategies that remediate or enrich instruction. An array of reporting metrics allows achievement to be monitored at both the student and aggregate levels.

Previously developed fixed forms built by Indiana's prior vendor were used for all test administrations. Tests were pre-equated using previously established item parameters.

IREAD-3 Test Blueprints

As with ILEARN and I AM, IREAD-3 is driven by detailed blueprints (including standard-level minimums) that are available on the IREAD-3 Portal and must be followed during each administration with no exceptions. Exhibit 1.9-5 shows part of the IREAD-3 blueprint, as found on the Indiana Portal. Similar to ILEARN, the blueprint contains reporting category and standard information, as well as ranges per standard and reporting category. However, unlike ILEARN, which is item-based, the IREAD-3 blueprint is point-based.

Exhibit 1.9-5: Portion of IREAD-3 Blueprint

Blueprint for the Indiana IREAD-3 Assessment Grade 3 Reading (Beginning 2015 – 2016 School Year)

Reporting Category[1]	Standard	Standard Allocations[2]		Reporting Category Allocation
		Point Range	% Range[1]	Total Point Range
Reading: Foundations[3]	**3.RF.3.4** (*1.RF.3.4*) Distinguish beginning, middle, and ending sounds	1 – 2	3 – 5%	10 – 14
	3.RF.4.3 (*2.RF.4.3*) Short and long vowels	1 – 2	3 – 5%	
Reading: Vocabulary	**3.RV.2.1** Context clues for unknown words	2 – 4	5 – 10%	
Total: (25 – 35%)	**3.RV.2.2** Relationships among words	4 – 5	10 – 13%	
	3.RV.3.1 Known words to determine meaning for unknown words	0 – 1	0 – 3%	

IREAD-3 Test Forms

Currently, there are four IREAD-3 test forms that are cycled through administrations. These forms were initially built prior to CAI's awarding of the current contract, but CAI has successfully delivered these forms according to the IREAD-3 blueprints since 2019.

Exhibit 1.9-6 shows the history of the various IREAD-3 forms and demonstrates CAI's ability to continue to deliver these forms.

Exhibit 1.9-6: IREAD-3 Forms

IREAD-3 Administration	Form				Notes
	A	B	C	D	
Spring 2019				X	
Summer 2019		X			
Spring 2020	X				administration canceled
Summer 2020			X		administration canceled
Fall 2020		X			
Spring 2021	X				
Summer 2021			X		
Spring 2022				X	
Summer 2022		X			
Spring 2023			X		
Summer 2023	X				

The IREAD-3 test forms include versions for various populations. For example, the General Education test design (for online and paper-and-pencil modes) includes three segments:

- Segment 1: Practice, Phonics, and Vocabulary items
- Segment 2: Reading Comprehension and Vocabulary items
- Segment 3: Reading Comprehension and Vocabulary items

Additionally, the Hard of Hearing online accommodated form includes the same three segments but with fewer items, as described in the section which follows.

- Segment 1: Practice and Vocabulary items
- Segment 2: Reading Comprehension and Vocabulary items
- Segment 3: Reading Comprehension and Vocabulary items

IREAD-3 Item Bank

All four IREAD-3 forms are currently housed in CAI's ITS, along with the metadata and item-level statistics captured directly in ITS. This ensures not only comparability across administrations but also ensures the correct forms are delivered.

Content markups are currently in place to support the required accommodations of IREAD-3. For example, CAI can meet the following different accommodations:

- Full TTS: Students receive Text-to-Speech for all stimuli and items.
- Restricted TTS: Students receive Text-to-Speech only on directions found in stimuli and items.
- Paper-and-Pencil: Students receive a printed form that matches the online form.
- Hard of Hearing (HOH): The general education forms have four phonics items (and **one** phonics sample **item**): assessing mid, final, ending sounds, and knowledge of short/long vowels. These **five** phonics items are removed from the HOH forms; otherwise, the rotated forms match the general education forms.

IREAD-3 Scoring and Reporting

Comparability of Scoring General Education and HOH Forms

As noted earlier, Segment 1 on the IREAD-3 assessment contains four items and a sample item that are read aloud to students. For students with a HOH designation, any accommodation will invalidate the construct measured by these items. Thus, these four items are not administered to students with the HOH accommodation. That means that students with this accommodation will have four fewer operational items and four fewer score points than all other students.

Tracking and Registration of Students Who Require HOH Form in TIDE

Only state-level users can set this accommodation by hand in the Test Information Distribution Engine (TIDE). Otherwise, it comes through with all the other accommodations through the TIDE nightly files. All incorrect or missing student demographic data must be updated in IDOE systems via Indiana Individualized Education Program (IEP) and data reporting submissions. Changes will be reflected in TIDE the day following submission to IDOE.

Students must have a hearing impairment that prevents them from receiving phonics instruction in order to have this form assigned. HOH forms must be approved and assigned by IDOE.

Reporting of IREAD-3 Test Results

Reporting category scores are reported as raw score percentage correct, based on the operational items contained in a reporting category on the given form. Scores are reported for:

- Reading Foundations and Vocabulary
- Nonfiction
- Literature

Each student receives a single scale score if there is a valid score to report. The validity of a score is determined using invalidation rules, which define a set of parameters under which a student's test may be counted. A student's score will be automatically invalidated if he or she fails to respond to at least one item in each test segment.

A student's score is based on the operational items on the assessment. A scale score describes how well a student performed on a test and is an estimate of students' knowledge and skills as measured by the assessment. The scale score is transformed from a theta score, which is estimated on the basis of item response theory (IRT) models. Lower scale scores indicate the student's knowledge and skills fall below proficiency as measured by the assessment. Conversely, higher scale scores indicate the student has proficient knowledge and skills as measured by the assessment. Interpretation of scale scores is more meaningful when the scale scores are analyzed alongside performance levels and PLDs.

Based on the scale score, a student will receive an overall performance level. Performance levels are proficiency categories on an assessment, which students fall into based on their scale scores. For IREAD-3, scale scores are mapped to two performance levels:

- Level 1: Did Not Pass
- Level 2: Pass

Performance levels can be interpreted on the basis of PLDs, which represent a descriptive analysis of a student's abilities based on his or her performance level. PLDs set out content-area knowledge and skills that students at each performance level are expected to possess and are determined by comparing a student's scale score against carefully established cut scores that are unique to each grade and subject.

In addition to an overall score, students receive reporting-category scores. Reporting categories represent distinct areas of knowledge within each grade and subject. For IREAD-3, student performance in each reporting category is reported as a raw score percentage correct.

1.10 (3i) Item Ownership

CAI acknowledges that IDOE owns all IREAD-3, I AM, and ILEARN items that have been developed by IDOE. The ILEARN ELA and Mathematics items are primarily licensed from Smarter Balanced. ILEARN ELA, Mathematics, and Science item pools are further augmented using CAI-owned Independent College and Career Readiness (ICCR) item pools. We acknowledge the ILEARN high school Biology assessment items have been purchased by IDOE. These licensed items will remain the property of their owners, but the State's license to use the items will extend for one year beyond the end of the contract.

CAI acknowledges that there will be no development for IREAD-3 under this contract.

CAI acknowledges that IDOE will continue to develop items for ILEARN and I AM, and that CAI will be responsible for field testing these items as described in Section 1.18 (3q).

Item Bank

CAI has experience using multiple items banks to assemble and deliver a seamless testing experience to students. CAI will make available CAI's ICCR item bank and Hawaii's item bank for science items (to be owned by IDOE) to augment the existing pool of Indiana-developed science items.

For all items added to the assessment pool, regardless of their original source, CAI will work with IDOE to maintain multiple-year item development roadmaps to ensure that the investment made in item development translates directly to improvement in Indiana's item bank. CAI will retain responsibility for negotiating and finalizing the terms of the licensing of the third-party item banks that Indiana currently uses and will assist in working with new third-party item banks with which the State may contract. CAI will establish a third-party license that addresses the specific License Grant to IDOE, Intellectual Property Rights, License Fees, Confidentiality, and Use and Disclosure.

As per the agreement with the third party, in certain cases, the third party may allow the State to use derivatives of third-party-owned items. For any item with agreed-upon changes, the third party will continue to own the item, manage approval of all changes, maintain final sign-off, and house the final item derivative in their own bank for use by the State, until such time as IDOE may negotiate with the third party to import items into the State-managed item bank. CAI will obtain all necessary consents from third parties to work with these items and import them into the assessment pool. CAI agrees to provide requested updates to attributes and accommodation tagging required for these items, with the costs associated with any accommodation being the responsibility of IDOE.

CAI understands that, rather than licensing Hawaii's science items, the State is purchasing the item bank so that the State will own the items going forward. Therefore, CAI will not have to plan for licensing these items.

CAI will create an Indiana item bank within our Item Tracking System (ITS) to house all IDOE-owned and licensed items regardless of the item origination. All the item metadata will be maintained in this item bank. The metadata about each item or passage, referred to as attributes, are fully configurable and can capture any data that IDOE determines should be maintained. ITS attributes usually include general passage information for passages, such as grade level, genre, and readability measures. In addition, all information about sources, including copyright information and attached permission documents, is stored with the passage in ITS. Item attributes also include key blueprint-relevant metadata, such as grade level, content alignment, and Depth of Knowledge. CAI will also include item origin (for tracking shared items), item formats, and item scoring attributes. These attributes allow for ease in tracking and maintaining information about the item bank. If the State has questions about the item pool at any time, CAI will run a summary table based on any attribute to get a sense of the number of items in a particular category quickly and accurately.

Quality Control of Imported Items

Using the ITS, CAI's test developers maintain electronic versions of every item, including its many iterations, as it moves through the development cycle. ITS is a full-featured, customizable item content management and banking system that archives each prior version of every item, requires documentation of item edits, and enforces agreed-on item review levels to track an item's movement through the development cycle. This item-development workflow offers the ability to manage items from inception through the series of content, fairness, data, and other reviews previously described, to final publication. The system captures the outcomes and rationales at each review step and maintains previous drafts of each item.

This workflow management ensures that each item undergoes each review in the designated sequence and that the review is conducted (or recorded in the case of committee review) by an authorized person. Every version of every item is archived, along with each comment received in any review, including the reviews conducted by the client. Reviewers have immediate access to all older versions, providing version control throughout development. All item attributes, including accommodations and accessibility tags, item statistics, and rubrics, are associated with the item and travel with it through each review step.

Licensed Items and Passages

CAI copyright staff will review all stimuli from the licensed item banks to ensure that permission has been acquired for their use in the State tests through the Spring 2027 administrations. CAI's copyright staff will conduct a full audit of all passages to ensure that they comply with copyright and permissions requirements. Stimuli (graphics, passages, charts, tables, etc.) from the licensed banks will not belong to the State. For any stimuli permissioned by CAI, CAI will be responsible for maintaining such permissions or licenses through the Spring 2027 administrations, but the rights ultimately belong to the license holder. CAI will provide IDOE with information regarding from whom any permissions or copyright usage were obtained. This applies only to stimuli identified for use with items developed by CAI. IDOE is responsible for all permissions associated with stimuli identified for use with items developed by the State. Any stimuli commissioned specifically for the State assessments will become the property of the State.

For permissions obtained by CAI, CAI will obtain permission for both print and online formats. For print views, CAI will obtain consent to print sufficient copies to meet the estimated student count at each grade level. For the secure electronic views, CAI will obtain permission for the remaining student count estimate. The term of the permissions obtained by CAI covers the base contract plus all subsequent renewals through Spring 2027. No permissions are assumed for Science, Mathematics, or Social Studies for the State-owned custom development. For the State-owned custom development, CAI assumes only passages permissioned through the Copyright Clearance Center (CCC), commissioned, or public domain passages would be included as part of released items. The third-party item bank has an item release plan that includes CCC passages. If IDOE follows this release plan, the State will be covered under the third-party licensing agreement for those CCC passages. Permissions and costs for stimuli included in the State's Released Items Repository but outside of these parameters are the responsibility of IDOE.

1.11 (3j) Accessibility

CAI has a long-standing commitment to administering fair and valid assessments for students with disabilities and for students who are English learners (ELs). We have been committed to accessibility for all students ever since we conceptualized and designed our Test Delivery System (TDS) and the test items administered. We continue to make accessibility a top priority as we build more innovations around student testing and learning.

CAI's testing system is Web Content Accessibility Guidelines (WCAG) 2.1 AA certified. This level of certification is quite high, indicating that the system is accessible and compatible with standards-compliant assistive technology. In addition, we know that our security mechanisms can interfere with some assistive technologies, and we have built in a permissive mode that relaxes these security restrictions for individual students who need to use such technologies.

The system currently works with a wide range of refreshable braille devices, screen readers, on-screen keyboards, and other input devices. While it is impossible for any organization to guarantee support for every type of hardware and software, CAI is committed to accessibility for all students and has demonstrated that commitment through our leadership in this area.

CAI's systems meet current standards, including Question and Test Interoperability/Accessible Portable Item Protocol (QTI/APIP). We have a structured XML extension to APIP that supports representation of the advanced accommodations that go beyond those in the APIP specification.

Our test applications also meet the Section 508 compliance guidelines for access to online systems. CAI is proud of its reputation for delivering high-quality, complete, and accurate standards-compliant materials and documents to clients.

Platform Accommodations

CAI's TDS offers the industry's most robust array of accommodations, embedded supports, and testing tools, all of which can be configured as available either universally or by designation to authorized users. Embedded supports are supplied to any student who wants them, and accommodations are offered only when deemed appropriate to remove construct-irrelevant barriers to accessing test content for the individual student.

CAI's approach to accessibility favors universal design over separate accommodations. Access to accommodations—features configured for use only by eligible students—is set remotely by the Test Administrator (TA) or other authorized adult such as a School Test Coordinator (STC), Corporation Test Coordinator (CTC), or a state-level administrator working at a separate workstation. IDOE will have the option to assign accessibility features (e.g., font size, background color, mouse pointer, streamlined mode) either in advance using our online management system, Test Information Distribution Engine (TIDE), through an upload or a user interface (UI), or in real time through the TA Interface. The system can be configured to set each accommodation for individual students through one or both mechanisms, and it supports different mechanisms for different accommodations.

In general, we recommend that most features, even those that are universally available, be set prior to testing rather than through the Student Interface. The reason for this recommendation is that the sheer number of features can create a distraction in the Student Interface. Students can change background colors, experiment with text-to-speech (TTS) voices, masking, guides, and so on. Too many student choices can reduce access and even pose a distraction from test administration.

Providing these tools through context menus, rather than through keyboard shortcuts, results in a usable and accessible Student Interface. Students who cannot use a keyboard often use assistive devices, such as switch arrays, that generate a limited number of keyboard commands. Maintaining compatibility with these devices precludes creating keyboard shortcuts for each of the many features offered; many devices cannot generate that many different codes. Usability for all students also favors a context-menu approach. Many tools are available, but most are relevant only in a limited number of contexts. For example, the response-choice eliminator (strikethrough) is relevant only for selected items and only for their response options. This option is therefore offered only when a student brings up the menu on a response option. If all tools were always available, the screen would be cluttered with many icons and buttons. Context menus offer users the capabilities that are both available and relevant to their current task.

Exhibit 1.11-1 provides a summary of available tools.

Exhibit 1.11-1: Summary of Available Tools

Tools	Description	Supported by CAI Platform
Highlighter	Students can select any text to highlight. This capability persists throughout the test.	Yes
Bookmark	Bookmark capability allows students to flag an item so that they can review it later.	Yes
Magnification Interface	Students can zoom in and zoom out on the entire page. This capability persists throughout the test.	Yes
Option Eliminator	Students can eliminate any multiple-choice option, whether it is in text or a graphic. This capability persists throughout the test.	Yes
Global Notes	Students can access a notepad throughout the test. This notepad allows students to enter notes for themselves and is not item specific.	Yes
Notes	Item notes allow students to jot down ideas about items or passages. Notes are saved for later access throughout the test.	Yes
Line Reader	Students can track the line they are reading.	Yes
Ruler	Students can access a pop-up ruler.	Yes
Reference Sheet	Students can access a formula sheet and periodic table for mathematics or science tests.	Yes
Calculator	Available calculators include basic, scientific, graphing, regression, and matrices.	Yes
Straight Edge	Students can access a pop-up straight edge.	Yes

Tools	Description	Supported by CAI Platform
Footnote Pop-Up	Our word list feature supports footnote pop-ups.	Yes
Review Test	Students can review the test before it ends.	Yes
System Setting	Students can adjust audio (volume) during the test.	Yes
Area Boundaries	An agility accessibility feature, area boundaries for mouse-clicking multiple-choice options allow students to click the selected-response text or button.	Yes
Expand/Collapse Passage	Students have the option to expand the passage while still having immediate access to the associated test items.	Yes
Student Tutorials/ Practice Sessions	A reference feature, practice tests and tutorials familiarize students with the online testing system. Our tutorials can vary by item, so items of each type share a tutorial.	Yes
Masking	Students can mask extraneous information on the screen.	Yes
Test Pause and Restart	An attention accessibility feature, test pauses and restarts allow the test to be paused and resumed at any time, enabling students to take a test across multiple days. To ensure that security is not compromised, past items cannot be viewed when the test has been paused for longer than a specified period of time.	Yes
TTS: Directions, Passages, Items	Computer reads text and graphics aloud, including directions, passages, and items. What is read and how it is read is configurable. IDOE can offer a variety of options.	Yes (requires item tagging)
TTS: Graphic Description	Computer reads aloud descriptions of graphics and content of tables.	Yes (requires item tagging)
Writing Tools	Editing tools such as cut, copy, and paste and basic text formatting tools such as bold, underline, and italics for extended-response items are available.	Yes
Variable Font Size	The number of levels (generally, five) and rate of increase (generally, 1.25 × the previous level) are configurable.	Yes
Response Field Tools	The response field tools allow students to apply styling to text (e.g., bold, italics, underline) and use standard word processing features such as undo and redo, move, indent, cut, and paste text.	Yes
Embedded Dictionary and Thesaurus	Students can open the Merriam-Webster dictionary and thesaurus within the test. This tool is available during the second segment of English/Language Arts (ELA) performance tasks.	Yes

Exhibit 1.11-2 presents the specific accessibility features available on our platform.

Exhibit 1.11-2: Accommodations and Accessibility Supports

Tools	Description	Supported by CAI Platform
Highlighter	Students can select any text to highlight. This capability persists throughout the test.	Yes
Masking	Students can mask extraneous information on the screen.	Yes
Reverse Contrast	Display colors can be altered so that the background is black and the text is white.	Yes
TTS: Directions, Passages, Items	Computer reads text and graphics aloud, including directions, passages, and items. What is read and how it is read can be configured. IDOE can offer a variety of options.	Yes (requires item tagging)
TTS: Graphic Description	Computer reads aloud descriptions of graphics and content of tables.	Yes (requires item tagging)
Administrator- Selectable Variable Font and Background Colors	Any foreground and background colors can be supported.	Yes
Magnification Interface	Students can zoom in and zoom out on the entire page. This capability persists throughout the test.	Yes
Adult Transcription/ Scribe	Our Data Entry Interface (DEI) allows TAs to enter student responses online for automated scoring and reporting. For example, DEI allows TAs to enter student responses online for students taking accommodated paper-and-pencil tests (i.e., large print or braille).	Yes
Color Overlay	Any color can be overlaid on the screen. This capability persists throughout the test.	Yes
Administrator- Selectable Assistive Devices Integration	Our system has a standard interface and a streamlined interface. Most assistive devices are compatible with the former, and an even larger group works with the latter. If the use of a device requires relaxation of certain security features (e.g., if suppression of pop-up windows interferes with on-screen keyboards), the TA can select our more permissive mode, should IDOE choose to offer this feature.	Yes
Administrator- Selectable Large Print Font	TAs can set the default font size in advance via a file upload or the UI at the time of testing. Students can zoom in or zoom out at any time.	Yes

Tools	Description	Supported by CAI Platform
Refreshable Braille/Tactile with External Embosser Printer	Items can be rendered to desktop embossers that can integrate braille and tactile graphics. The items will render simultaneously on a reader-accessible screen, and the student can navigate to response spaces to input answers.	Yes (requires item tagging)
American Sign Language (ASL): Directions, Passages, Items	Students can view recorded videos of test directions and content using ASL. Avatars are not recommended by experts on hearing impairment because they do not translate well to ASL.	Yes (requires item tagging)
Variable Font Size	The number of levels (generally, five) and rate of increase (generally, 1.25 × the previous level) are configurable.	Yes
Increased White Space	Streamlined interface can be used to display more white space on the screen.	Yes
Closed Captioning	Displays captions for audio content. Captions are synchronized to audio playback.	Yes (requires item tagging)
Translation	Translations of test material in alternate languages can be provided.	Yes (requires item tagging)
Glossaries	Content developers can associate additional content with words or phrases. The content can be of multiple types, and the item information shown to a student can be controlled by his or her personal profile.	Yes (requires item tagging)
Alternate-Language Glossaries and Dictionaries	Content developers can associate alternate-language content with words or phrases. The content can be of multiple types, and the item information shown to a student can be controlled by his or her personal profile.	Yes (requires item tagging)
Administrator- Selectable Assistive Devices Integration	Our system has a standard interface and a streamlined interface. Most assistive devices are compatible with the former, and an even larger group works with the latter. If the use of a device requires relaxation of certain security features (e.g., if suppression of pop-up windows interferes with on-screen keyboards), the TA can select a more permissive mode, should IDOE choose to offer this feature.	Yes
Line Reader	Students can track the line they are reading.	Yes
Speech-to-Text (STT)	Speech can be converted to text and saved in the database.	Yes
Auditory Calming	Music or white noise can be played in the background.	Yes
Administrator- Selectable Zoom	TAs can set the default font size in advance via a file upload or the UI at the time of testing. Students can zoom in or zoom out at any time.	Yes
Screen Reader	The system is compatible with many standards-compliant screen readers and natively supports customized TTS.	Yes
Additional Time	CAI's system currently does not impose a time limit on the test. It is up to the TA to stop a student's test or stop the entire session. However, if an unforeseen event, such as a fire alarm, triggers additional testing time, CAI's system can enable a grace period extension (GPE) for a single test opportunity or multiple test opportunities.	Yes
Segment Break	Test segment breaks can be configured within a test. A test segment is made up of multiple item groups and creates a logical break within a test. For example, a segment break in a mathematics test might separate a calculator segment and a non-calculator segment.	Yes
Recorded Audio	The computer can efficiently deliver recorded audio.	Yes
Secure Print Facility	A visual accessibility tool, the secure print facility can allow the secure printing of items or passages. If a student requests that a passage or item be printed, the request is encrypted and sent securely to the TA. The TA approves the request before it is sent to the printer. This feature also supports delivery of real-time paper-and-pencil tests, including large print tests.	Yes
Test Pause and Restart	An attention accessibility tool, a test pause or restart allows the test to be paused and resumed at any time, enabling students to take a test across multiple days. To ensure that security is not compromised, past items cannot be viewed when the test has been paused for longer than a specified time interval.	Yes
Writing Checklist	The writing checklist, an attention accessibility tool generally used for essay items, enables a student to check off writing guidelines from a checklist.	Yes
Review Test	Students can review the test before it ends.	Yes
Area Boundaries	An agility accessibility tool, area boundaries for mouse-clicking multiple-choice options allow students to click the selected-response text or button.	Yes

Accessibility Use in Indiana

CAI assessments provide two categories of assessment features to students: designated features and accommodations, either embedded in the TDS or non-embedded; both are trackable through TIDE. Designated features are those supports that are available for use by any student for whom the need has been indicated by an educator (or team of educators with parent/guardian and student). Exhibit 1.11-3 provides a list of designated features and accommodations that were offered

in the 2020–2021 administration of Indiana's ILEARN, IREAD-3, and I AM assessments. The *Online Test Delivery System (TDS) User Guide* at the ILEARN portal provided instructions on how to access and use these features. This guide will be updated annually to incorporate any changes that IDOE makes in accessibility or accommodations requirements.

Exhibit 1.11-3: Designated Features and Accommodations Available in 2020–2021 for ILEARN

Designated Features	Accommodations
Embedded	
Color Contrast (on-screen) Glossaries (language) Spanish Masking Mouse Pointer Print Size Translation Stacked Spanish	ASL Audio Transcriptions Calculator Closed Captioning Permissive Mode Print-on-Demand Streamline TTS Except Reading Comprehension TTS Including Reading Comprehension Refreshable Braille
Non-Embedded	
Assistive Technology to Magnify/Enlarge Access to Sound Amplification Program Special Furniture or Equipment for Viewing Test Special Lighting Conditions Time of Day for Testing Altered Color Acetate Film for Paper-and-Pencil Assessments	Braille Transcript for Audio Items Paper Booklet Large Print Booklet Read-Aloud to Self Read-Aloud Script for Paper Booklet Scribe STT Tested Individual Interpreter for Sign Language Braille Booklet Multiplication Table Hundreds Chart Additional Breaks Bilingual Word-to-Word Dictionary Spanish Booklet Calculator Multiplication Table

Non-standard accommodation requests were recorded under a Special Requests section in TIDE. These special requests required IDOE approval. CAI is committed to working with IDOE to facilitate the assignment and correct delivery of accessibility features to students. Issues with accessibility assignments can be handled during test administration by contacting Indiana's dedicated Help Desk staff at CAI. Concerns that cannot be managed directly by CAI's Help Desk staff will be elevated to program management at CAI and, ultimately, to IDOE for final resolution. In most cases, this results in no more than a 24-hour waiting period until a student can retest with appropriate supports in place.

Accommodated Paper Forms

Data Recognition Corporation (DRC) fully understands that IDOE's assessment-vendor partners must be prepared to produce and deliver paper-and-pencil-based test materials, even as most students across the state participate via computer-based testing. DRC's extensive experience assisting other large-scale assessment clients with similar requirements makes them well qualified to serve as IDOE's partner for this element of the testing program. DRC understands the critical role that paper materials play in states that have transitioned to online testing, and they are fully prepared to support IDOE and all Indiana schools that administer both the paper-and-pencil-based and computer-based assessments.

DRC understands the requirement to produce and provide the accommodated forms at the quantities determined by IDOE, while at the same time being fully prepared to fulfill additional requests as needed. The following sections provide a full description of DRC's capabilities and processes for producing regular print (including Spanish), braille, and large print paper-and-pencil test materials.

Regular Print (Including Spanish)

DRC understands the requirements for the printing of regular print test forms as an accommodation and looks forward to the opportunity to demonstrate their capabilities as a trustworthy, knowledgeable, and precise manufacturer and manager of the highest-quality test materials. DRC will produce, print, and package all consumable (scannable) test booklets

needed for the Indiana assessments for each administration included in this contract. All printing of the test forms will be completed by DRC and its print vendor partners. As with all of DRC's large-scale assessment programs, any third-party vendors who have access to secure materials will be fully vetted and approved by DRC and will be required to sign an IDOE-approved confidentiality statement.

DRC has the unique position of offering an in-house, full-service printing facility. DRC's printing operations use the highest-quality machinery, products, and processes to offer its large-scale assessment clients the assurance that their programs' printed materials will meet DRC's exacting standards for quality, price, and schedule. In addition to DRC's industry-leading printing facility and its strong network of printing partners, they also boast a Quality Lab that is solely dedicated to ensuring that all printed materials meet their clients' specifications and DRC's demanding quality requirements.

All test booklets printed for the Indiana assessments will be thoroughly inspected by the Quality Lab at every stage of printing and finishing. The Quality Lab will inspect printer's proofs, printed signatures (fold-and-gathers), and the finished booklets (collated, stapled, barcoded, and shrink-wrapped). Quality Lab staff will engage the Indiana Project Management Team if their review reveals a quality issue that requires evaluation and resolution. No materials will be approved for a subsequent stage of printing/finishing, nor will any finished materials be released for delivery before the Quality Lab has reviewed and approved the printed output.

The Quality Lab and DRC's print procurement staff will also work directly with the Indiana Project Management Team to provide samples for other internal reviews and approvals. This will include reviews by DRC's test development team and internal resources that conduct separate checks for quality and accuracy of the printed materials. No materials will be approved for a subsequent stage of printing, finishing, or release without the reviews and approval facilitated by the Indiana Project Management Team.

DRC understands that print quantities will be provided by IDOE on an agreed-upon date that will follow a Systems Readiness Test of the schools. DRC has a vast amount of experience using such projections to manage print quantities for a number of large-scale assessment programs, and they are keenly aware of the critical need for the assessment vendor to make accurate quantity calculations to cover both the anticipated orders and to account for any unforeseen events.

DRC believes that a first-class assessment vendor must be prepared to anticipate materials requests that fluctuate from initial estimates or requests, and they have maintained a superior client service reputation by ensuring that requests for additional materials, including additional accommodated materials, are shipped promptly. Should a school's paper-and-pencil testing needs change between DRC's receipt of the statewide quantity requirements and the time of testing, DRC will be fully prepared to accept and process any additional materials requests that are approved by IDOE. DRC has a long history of collaborating with its client and vendor partners to accommodate such requests, and they are entirely confident that DRC's responsive and accurate processes will meet and exceed IDOE's expectations.

A complete list of all assessment materials to be printed for this contract will be provided in a Materials List. This document will include full print specifications for each paper-based material that will be produced for the Indiana assessment program, including specifications such as ink and paper color, number of pages, type and size of paper, etc. This document will be generated annually and IDOE will be provided the opportunity to review and approve the exact specifications prior to the production and printing of any materials.

Braille

Each year, DRC will work with staff from National Braille Press (NBP) to produce contracted and uncontracted Unified English Braille (UEB) versions for each administration of the ILEARN and I AM assessments (one braille form for each grade/subject/part) and contracted UEB versions for each administration of the IREAD-3 assessments. NBP will ensure that all tests are modified correctly and that they are accurate. NBP has a successful history of producing braille versions for many statewide assessment programs, including Indiana's, as well as educational materials for numerous publishers and testing organizations. DRC has used their services for several years with excellent results.

NBP will produce contracted and uncontracted translations of the braille output, and codes accepted by the Braille Authority of North America (BANA) will be followed. Items that can be translated into braille and that avoid the use of Tiger-embossed graphics will be intentionally selected for the accommodated form. In the unlikely event that an item cannot translated into braille, DRC will collaborate with IDOE and NBP to produce supplemental instructions for students and administrators to access the item by other means.

Notes to guide the use of the braille editions will also be produced by NBP with input and approval from DRC and IDOE. In addition, DRC will develop the *Scripted TA Directions for Braille Paper-and-Pencil Assessments* in such a way that STCs, CTCs, and TAs have detailed instructions for handling and interpreting the braille materials. Instructions for transferring student responses into the online testing system for scoring and reporting will also be included in the directions.

DRC has a long history of collaboration with NBP to ensure that all braille tests and reference guides are clearly labeled with prominent and visible descriptions. DRC will perform additional checks when the braille materials are received at their location and will work directly with their warehouse staff to prepare the braille materials for shipping. This process includes the application of security barcodes so that the secure braille booklets are subject to strict monitoring during shipping and return. The braille booklets will be packaged with all corresponding supplementary instructions, tactile graphics, or other peripheral materials in a Braille Administrative Kit so that TAs receive the full complement of materials needed for a successful braille test administration.

DRC will fulfill all orders for braille materials using its ISO-certified, OpsMMS shipping and receiving systems to ensure that all braille booklets are fully accounted for as the materials are shipped to and from the schools that require the accommodated forms. DRC's proprietary system, described in greater detail in Section 1.13 (3l) under *Missing Materials Auditing/Tracking/Follow-Up,* uses security barcodes to create a relationship between the material and the corporation to which it is shipped. This process produces an unequivocal match to the site to which secure materials were shipped, and it allows DRC to track the materials through return at DRC. DRC will also provide the recipient with pre-paid, site-specific return shipping labels to give DRC additional visibility to the materials as they are returned to them. The end result is 100% accountability of all secure materials shipped from DRC, and assurance to IDOE that DRC's processes and systems protect the security and validity of all Indiana assessment materials.

Large Print

DRC has full in-house capability to develop, produce, reformat, and print large print test materials. They have extensive experience providing large print materials for many state assessment clients, including Alaska, Georgia, Idaho, Louisiana, Pennsylvania, and South Carolina.

DRC's document/graphics design group and printing department will provide large print materials for each ILEARN, IREAD-3, and I AM administration included in this contract. The large print booklets will be exact replications of paper accommodation forms and will be formatted to meet the needs of the Indiana assessment program, including output on 11" x 17" paper that produces a minimum font size of 18-point. For the large print booklets, DRC will enlarge the standard-print output of the paper-and-pencil test form by applying precise magnification parameters to the print-approved PDF files. This method eliminates several issues that can arise from rekeying an approved test form. With this approach, students who access the test material via a large print test booklet will have the same test experience as students who require the standard-print, paper booklets. The font style and text styles (bold, italics, underline) will be identical to the standard-print booklet. In addition, all lines, paragraphs, and pages break will be the same as the standard-print booklet, and all shading in art and graphics is consistent between both outputs.

DRC will apply security barcodes to all large print booklets so that the secure materials are fully accounted for during shipping and return. DRC will ensure that sufficient quantities of large print test materials are available for each test administration, including an appropriate overage to account for fluctuations in anticipated usage or in the event of shipping or printing issues or shortages. DRC will produce and print grade-/subject-specific large print glossaries that will be packaged with the corresponding large print booklets so that TAs, STCs, and CTCs receive all the necessary large print materials in a single kit. DRC will also produce and provide clear instructions in the *Scripted TA Directions for Paper-and-Pencil Assessments* so that assessment coordinators and administrators are fully aware of how to handle and administer the large print materials. The directions will also define the process for transferring student responses to the online testing system for scoring and reporting.

All requests for large print materials (whether from the initial materials list or additional requests) will be fulfilled using DRC's ISO-certified, OpsMMS shipping and receiving systems to ensure that all large print booklets are fully accounted for as the materials are shipped to and from the schools that require the accommodated forms. The processes for packing, shipping, and returning large print materials are the same as those detailed in the preceding description for braille materials.

1.12 (3k) Manuals and Scripts to Support Test Administration

Manuals and Scripts

CAI's experience assisting state departments of education in delivering assessments has taught us that clear, detailed training materials including test administration manuals, test coordinator manuals, teacher directions, and other ancillary materials are critical for a smooth and successful test administration. CAI will partner with IDOE to create the manuals and scripts specified in the RFP to support stakeholders in administering both paper-based tests (PBTs) and computer-based tests (CBTs) and will ensure that the manuals and ancillary materials are accurate and error-free.

CAI has successfully developed and maintained manuals and test administration scripts for more than 29 states, including Indiana, and we recognize that every state has their own test administration procedures and policies. CAI has successfully worked with IDOE to develop and update manuals and test administration scripts that meet IDOE's administration requirements and reflect IDOE's established style guides. CAI's understanding of IDOE's test administration processes and familiarity with IDOE's policies will allow us to create clear and well-documented manuals and scripts for test coordinators, administrators, and session proctors to ensure that standardized procedures for test administration are understood and adhered to.

CAI will work closely with IDOE to ensure inclusion of policies and procedures familiar to corporations, schools, teachers, and especially students and will use existing manuals and ancillary materials as the foundation, along with other resources as applicable. CAI will ensure that the manuals are compliant with IDOE's test administration material workflow process and are scheduled so that to the extent possible there is minimal overlap with other test administration material under development. CAI will provide IDOE with at least five business days to review the initial draft of a document with additional review rounds built into the review process to confirm requested updates. Documents will be posted to the Indiana Assessment Portal only after receiving approval from IDOE. A comprehensive review plan for reviewing and approving documents is detailed in the following section.

Review Process and Quality Control Measures

CAI's process for developing manuals and ancillary materials is divided into two phases:

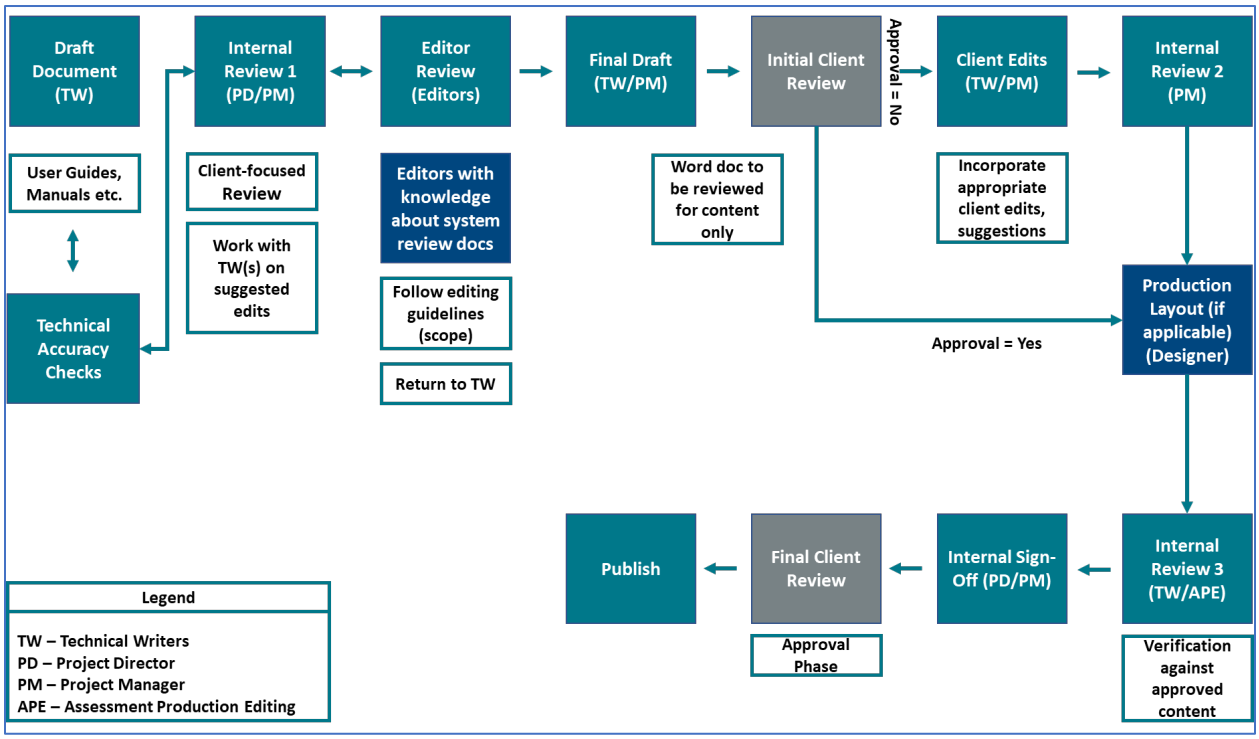
1. A drafting phase, during which we obtain agreement on the content and design of the document
2. A production phase, during which we produce the document to the specifications developed in the first phase, accommodate any final adjustments, and ensure that the camera-ready proofs are error-free

The drafting process begins with discussions with IDOE, during which we review issues of both design and content. To facilitate proposed revisions from multiple parties, CAI primarily relies on the use of PDF file markup. We have used this tool successfully across many states to identify and accept proposed edits to the manuals as recommended by multiple parties. Once drafts are approved, we proceed to production. Each document's content is fully drafted before the document enters the production system. Our production processes include multiple editorial reviews, and each document must receive senior staff sign-off. Our typical manuals production process involves the initial review stage, final review stage, and additional review rounds in between the two to ensure that the document is accurate, error-free, and meets IDOE's requirements. Camera-ready drafts are called blackline proofs. The first blackline version of the document, which results from the first iteration through our production process, is designed to reflect the final layout and formatting. Typically, only format and layout changes are made at blackline. A second blackline is produced after incorporating these changes to confirm that they were made correctly.

For some documents, CAI uses Microsoft Word documents and track changes to partner with IDOE on updates. The drafting and revision rounds of the Microsoft Word documents will generally follow the same process as the PDF files.

We outline the general drafting and revision process in Exhibit 1.12-1.

Exhibit 1.12-1: Overview of Our Editorial Review and Revision Process



Test Coordinator's Manual

CAI commits to annually developing and updating Test Coordinator's Manuals (TCMs) that provide instructions for Corporation Test Coordinators (CTCs) and School Test Coordinators (STCs) to coordinate the administrations of the paper-and-pencil and computer-based versions of the ILEARN and I AM assessments, as well as the tasks for the STC to follow before, during, and after administration. This manual also contains the protocols related to test security and test administration that all school staff must follow.

Proposed Topics for the TCM:

- Overview of the Composition and Purpose of the Assessments
- Test Security and Administration Policies
  a. Test Coordinator and Administrator Responsibilities for Maintaining Security
  b. Test Irregularities and Security Breaches
  c. Testing Environment
  d. Scheduling and Testing Time
- Checklist of Tasks to Complete Before Testing
  a. Develop a Test Administration Plan
  b. Complete Technology Setup
  c. Establish a Testing Schedule
  d. Schedule Trainings, Tutorials, and Practice Tests
  e. Organize Materials for CBT and PBT
- Checklists of Tasks to Complete During Testing
  a. For CBT
  b. For PBT
- Procedures for Test Irregularities
- Checklists of Tasks to Complete After Testing
  a. Collect and Organize Materials
  b. Tasks to Complete for PBT
  c. Tasks to Complete for CBT
- Accessibility and Accommodations Features

In developing the TCMs, CAI will follow the editorial and review process described in Exhibit 1.12-1. CAI will build in at least five days for initial review of a document followed by 1–3 days for subsequent rounds of review. IDOE will review and approve all materials before they are finalized. Once a TCM is approved, the document will be posted on the Indiana Assessment Portal. As specified in the RFP, CAI will post the TCMs at least eight weeks prior to the respective assessment's first test window each school year.

Test Administrator's Manual

CAI commits to annually developing and updating Test Administrator's Manuals (TAMs) that provide instructions necessary for the paper-and-pencil and computer-based administration of the ILEARN, I AM, and IREAD-3 assessments, as well as the tasks for the Test Administrator (TA) to follow before, during, and after test administration. These manuals also contain the protocols that TAs and proctors must follow related to test security and test administration. All administration instructions are contained within each script.

Proposed Topics for the TAM:

- Test Security and Administration Policies
  - Maintaining the Security of Test Materials
  - Testing Irregularities and Breaches
  - Testing Environment
  - Scheduling and Testing Time
- Checklist of Tasks for TAs to Complete Before Testing
  - TA Training and Preparation
  - Preparing to Administer Accessibility Features and Accommodations
  - Administer Practice Tests and Tutorials
  - Prepare the Testing Environment
- Checklist of Tasks for TAs to Complete During Testing
  - Receive Test Materials from the STC (Day of Testing)
  - Distribute Materials and Read Script (Day of Testing)
  - Keep Time (Day of Testing)
  - Maintain Test Security
  - Supervise Test Administration
  - Guidance for Troubleshooting Computer-Based Testing
  - Guidance for Clarifying Directions During Administration
  - Guidance for Redirecting Students and Dismissing Students for Misconduct
  - Item Irregularities During Testing
  - Procedures for Safety Threats and Severe Weather
  - Administer Breaks
  - Make-Up Testing
  - Test Scripts
- Checklist of Tasks for TAs to Complete After Testing
  - Return Materials to the STC
  - Accessibility Features and Accommodations
- Administration of Accessibility Features and Accommodations

In developing the TAMs, CAI will follow the editorial and review process described in Exhibit 1.12-1. CAI will build in at least five days for initial review of a document followed by 1–3 days for subsequent rounds of review. IDOE will review and approve all materials before they are finalized. Once a TAM is approved, the document will be posted on the Indiana Assessment Portal. As specified in the RFP, CAI will post the TAMs at least six weeks prior to the respective assessment's first test window each school year.

Scripts

CAI will work with IDOE to annually develop and publish secure test administration scripts for both online and paper-and-pencil accommodated tests. The scripts will provide instructions necessary for the paper-and-pencil and computer-based administration of the ILEARN, I AM, and IREAD-3 assessments for each specified grade level and content area. CAI commits to updating the scripts as and when the corresponding test forms are updated. As required by the RFP, scripts supporting paper-and-pencil tests will be printed and shipped to schools along with the actual tests, and CAI will work with IDOE on a timeline for this. Scripts supporting online accommodated fixed-form test administrations will be provided electronically to students in a secure manner.

Training

CAI's comprehensive training of Indiana teachers, TAs, School Administrators, CTCs, and Corporation Technology Coordinators (C-Techs) has been critical to successfully administering the ILEARN, I AM, and IREAD-3 assessments over the previous years. Our training program supports a standardized, efficient test administration and

- teaches stakeholders how to use each component of the online testing system to ensure a smooth test administration;
- builds understanding of critical test administration procedures for fixed-form and computer-adaptive tests;
- builds deeper understanding of the assessment system, how the tests are aligned to state standards, and the purposes of different types of assessments (e.g., fixed-form and computer-adaptive assessments, summative assessments); and
- teaches stakeholders how to use the data from each type of assessment to help refine instruction and make programmatic improvements.

CAI has delivered and maintained high-quality, effective trainings in multiple formats for each user role for 29 states including Indiana. We believe that awarding CAI the new contract will provide valuable continuity and training efficiencies for Indiana educators. Given that most educators, TAs, and CTCs are familiar with the current online testing system, learning a new online testing system and all of the associated training materials and system documentation will not be required. This will allow the majority of Indiana educators in Year 1 of the new contract to focus their resources on understanding the updates to the current system as opposed to completing the intensive training typically involved when switching to a new online testing system.

CAI proposes to use the existing training materials for Indiana teachers, schools, and corporations as the foundation of all training and update the materials as necessary, which will help in realizing cost savings. We can provide any additional proposed materials at a cost option. Our training efforts include the following:

- Supporting IDOE through pre-recorded, non-live webinar trainings to ensure that all users understand each component of the online system, and producing easy-to-understand, accurate system documentation for TAs, CTCs, C-Techs, and School Administrators
- Ensuring that system-specific training is accessible throughout the year via posted webinars and training modules
- Providing online practice and training tests delivered through the same Test Delivery System (TDS) used for operational tests, ensuring that students and TAs have the opportunity to experience the same testing environment before testing begins
- Developing and maintaining a customized information portal for Indiana educators and administrators to serve as a central repository for all training materials and system documentation

In the following section, we propose a training plan that meets Indiana's objectives of successfully administering the ILEARN, I AM, and IREAD-3 assessments.

Proposed Training Plan

We propose to use our existing series of pre-recorded webinars, presentations, and self-guided and self-paced tutorials on each of our online systems to support the annual test administrations. The web-based trainings are available on the portal to users at any time and will serve as stand-alone trainings for all years of the contract.

CAI's training materials are designed to teach both sophisticated technology users and users new to the systems their roles and responsibilities in the context of the new online systems. While sophisticated users may not need instruction on all steps of a specific function and can progress to the point in the training they find useful, new system users typically find it helpful to have instruction at a very detailed level. Users who are new to the online testing system will have access to system-specific user guides designed to navigate them through each system. User guides include step-by-step instructions

on using each system along with large, color screen captures that walk new users through each required task. New TAs can take a self-paced TA course (described in the following section) and can repeat sections of the course or the entire course as needed. Users who are familiar with the online systems may decide to use the index in our user guides to locate a specific topic, or they may decide to complete the self-paced TA course more quickly than a new user. Experienced users may also be less focused on how to use a system and more focused on how to use the data in the system, which is addressed in a separate webinar.

A detailed description of each CAI training module is listed in Exhibit 1.12-2.

Exhibit 1.12-2: Proposed Plan to Train Users on the Online Testing System

Training Phase I: Preparing for Online Testing		
Presentation Title and Primary Audience	**Proposed Training Topics**	**Proposed Training Formats**
User Roles: Principals, Teachers, TAs, Assessment Administrators, C-Techs, CTCs	User roles: Who does what and in which system?	• User role chart • Included as a component of each webinar
Technology Requirements for Online Testing	Steps for CAI Secure Browser installation and minimum hardware requirements.	• Webinar presentation • User guide/quick guide • Instructions on portal
TIDE: Registering Users and Modifying Student Settings	Learn how to register users in the Test Information Distribution Engine (TIDE), and update student test settings and restrictions.	• Webinar presentation • Online training • User guide/quick guide
Presentation Title and Primary Audience	**Proposed Training Topics**	**Proposed Training Formats**
Training Phase II: Administering Online Tests		
Online TA Certification Course: TAs, Proctors, Teachers (see the following section for further details)	Learn how to use the online testing system, set up a test session, manage and monitor testing, assist students with online tools, and understand accessibility and accommodations. Certification earned by passing quiz. If using remote testing, CAI provides a separate online TA Certification Course for Remote Testing as a cost option.	• Online test administration certification course
Online Practice Tests: TAs, Educators (see the following section for further details)	Practice setting up, pausing, resuming, and ending live test sessions, and setting accommodations using the same functionality as the operational TA site.	• Online practice tests • User guide/quick guide
Online Practice Tests: Students, Parents, Educators (see the following section for further details)	Practice signing in to a live test session using the same functionality as the operational student testing site, including using text-to-speech (TTS), zoom, highlighter, and strikethrough, and answering all item types.	• Online practice tests • User guide/quick guide
How to Start and Monitor Online Testing and Modify Test Settings: TAs, Teachers	Learn how to set up a test session, modify test settings, and monitor participation in multi-opportunity testing. Additionally, learn how to reset and invalidate tests.	• Webinar presentation • Online training
How to Resolve Test Discrepancies (TAs)	Learn how to use TIDE to immediately address test irregularities, including invalidating and resetting student tests. Topics covered include how to invalidate a test, how to reset tests, and how to request an extension of a student's test.	• Online training
Training Phase III: Post-Testing		
How to Use the Centralized Reporting System: Teachers, Principals, Corporation Administrators	Learn how to access student scores, create class rosters, and drill down from corporation and school results.	• Webinar presentation • Online training • User guide/quick guide • Videos

A detailed description of proposed training presentations and materials in the previous exhibit is also provided:

1. **User Role Chart.** This reference document indicates the access each user role is permitted in each online system. System access for each user role will be reviewed in each webinar, as appropriate. The user role chart will be posted on the portal and will be available in the manuals and form part of the online, self-guided tutorials as determined in collaboration with IDOE.

2. **Technology Requirements for Online Testing.** This training includes information for school and corporation network administrators and provides guidelines for varied technical setups and technical support available at the schools. Technical setups include multiple CAI Secure Browser installation methods such as manual installation on individual machines, installation on machines through a network, access from a shared network drive, and thin-client setup. Minimum hardware requirements will also be reviewed in detail.
3. **How to Use TIDE.** This training includes instructions on adding users at the corporation and school levels to allow them access to the appropriate online systems, as well as how to upload students for test eligibility. The training will also cover other TIDE functionality including updating student test settings and using the test management reports. This content will be delivered in a webinar and module format.
4. **Online TA Certification Course.** This self-paced course includes detailed instructions on creating and managing test sessions, monitoring student activity, setting accommodations, and implementing test security measures. The course is designed to familiarize TAs with the Student Interface, the approval process, and the tools students will use during testing. To ensure that course takers have learned the skills necessary to proctor tests in the online system, the course can be made mandatory so that each user must complete the course, including a quiz, and sign a test security agreement form before being permitted to sign in to the online testing system. The quiz can be designed to ensure that TAs "pass" the course and earn a certification; the course also includes a mechanism for corporations and IDOE to track completion.
5. **Remote Proctoring Certification Course.** If IDOE chooses to administer tests remotely, CAI offers a TA Certification Course for remote proctoring as a cost option. This self-paced course includes detailed instructions on creating and managing remote test sessions and monitoring student activity via video conferencing and other communication means, such as broadcasts and messaging. The course explains how to schedule and administer tests and assignments to students while they are at home during school closures. To ensure that course takers have learned the skills necessary to proctor tests remotely, the course can be made mandatory so that each user must complete the course, including a quiz, and sign a test security agreement form before being permitted to sign in to the online testing system. This quiz can be designed to ensure that TAs "pass" the course and earn a certification and includes a tracking mechanism.*
6. **Remote Proctoring Brochures for Parents.** This set of short brochures is designed to support parents in helping their child prepare for a remote test. The brochures include preparation checklists for their child's computer, instructions on how to take a practice test and check their Internet connection, and instructions on how to access the remote testing system. These can be provided to Indiana at a cost option.*
7. **Remote Proctoring Videos for Teachers and Parents.** This set of short 1–5-minute videos is designed to support teachers and parents in testing their Internet connection, installing the Secure Browser on different platforms, and communicating during a test. These can be provided to Indiana at a cost option.*
8. **Online Practice Tests.** Online practice tests for all assessments will be available prior to the opening of the test window. Each practice test will be composed of items that are a subset of the blueprint for the operational test, thus providing users with exposure to all item types. The online practice test site uses the same applications as the operational test site, such as the TA Interface, the Student Interface, and the test management reports. This design ensures that students, educators, and teachers become familiar with the online testing system before operational testing begins. In addition, user guides and system documentation will be made available when the online practice tests open to help educators prepare their materials prior to testing. The online practice tests will be available throughout the test window.
9. **Webinar for TAs: How to Start and Monitor Testing and Modify Test Settings.** This training includes the same content as the online TA Certification Course but will also be delivered in a webinar.
10. **Webinar on How to Use the Centralized Reporting System (CRS).** This training teaches authorized users how to access and correctly interpret score reports in the CRS. Users learn how to view corporation, school, personnel, roster, and individual student reports (ISRs) in table and graph format; access and use longitudinal reports for their diagnostic need; aggregate or disaggregate scores; filter score reports by student subgroup (e.g., gender, ethnicity, English learner [EL]); and manage online rosters (groups).

* CAI acknowledges that remote testing is currently not permitted in Indiana, but we highlight that we do have the capacity to offer remote testing and its supports.

TA Certification Course

Our test administration system is designed to be very simple to administer. We propose to use the existing TA Certification Course that includes test administration procedures for all assessments. This interactive course walks TAs through every action that they will need to perform to administer tests. In addition to providing security training, the course is also designed to familiarize TAs with the Student Interface, the approval process, and the tools students will use during testing. Topics typically covered include instructions on creating and managing test sessions, monitoring student activity, and setting accommodations.

A brief (and repeatable) quiz at the end of the training allows TAs to study this material independently and receive feedback. Users can repeat the quiz as many times as necessary to master the skills. To ensure that course takers have learned the skills necessary to administer tests, IDOE can choose to make the course mandatory. The mandatory quiz can be designed to ensure that TAs "pass" the course and earn a certification prior to administering tests. Upon completion, the user can print out a certificate indicating successful completion of the course. Certificates may be printed as needed throughout the year. The course also includes a built-in tracking mechanism for corporations and IDOE to track course completion. CAI provides separate TA Certification Courses for administering tests in person and to students who are home during school closures**.** CAI can provide the Remote Proctoring TA Certification Course as a cost option.

The online course typically includes the following information:

- Test administration roles and responsibilities
- Corporation responsibility for enforcing test administration policies
- IDOE ethics policy
- Student confidentiality
- Test security
- Item security
- Test improprieties
- Testing irregularities

User Guides, Administration Manuals, and Technology Manuals

CAI has a structured and effective process for producing high-quality documents including, but not limited to, training materials, interpretive guides, user guides, test administration manuals, and other ancillary materials to address stakeholder needs.

We produce easy-to-read, concise, effective, system-specific user guides explaining to novice and sophisticated users alike how to complete critical tasks in the different CAI assessment systems, such as the CRS. The user guides are organized to provide teachers with a consistent approach to accessing, understanding, and using the system. The goal of each user guide is to motivate teachers to make the best possible use of the system and the data it provides.

We will work closely with IDOE to provide user guides for each of its online testing systems that fully detail the functionality of the system with step-by-step instructions and clear visuals. We commit to providing

- system-specific user manuals and documentation written in clear, accessible language that include visual aids to each system in the form of screen captures describing key functions and the steps required to resolve common technical problems;
- a set of FAQs for educators and administrators that are housed in a central location such as the Indiana Assessment Portal;
- a summary of accommodations for students with disabilities; and
- technical briefs for the field, as needed, to explain how to complete a specific process using a particular online system.

CAI will work closely with IDOE to update and revise the user guides and training materials for each school year and ensure that all system documentation reflects updates to the system.

Exhibit 1.12-3 lists examples of possible user guides and describes the topics covered in each guide. CAI will work with IDOE to choose which guides to customize to meet IDOE's assessment needs. All guides are produced as PDF files and posted on the portal for easy access. Users will also be able to view each system's online guide from within the system.

Exhibit 1.12-3: Examples of User Guides

User Guide Title	Description
Assistive Technology Manual	This document provides information about how to configure accommodations and assistive devices and includes an overview of braille hardware and software requirements as well as basic test administration processes.
Configurations, Troubleshooting, and Advanced Secure Browser (by operating system [OS] and platform)	These documents contain configuration, troubleshooting, and advanced CAI Secure Browser installation instructions for each supported OS.
Quick Guide for Setting Up Your Online Testing Technology	This manual provides instructions for installing the CAI Secure Browser on supported computers and mobile devices for online test administration.
CRS User Guide	This user guide provides information about all the CRS features, including instructions for viewing score reports, downloading student results, creating and editing rosters, and searching for students.
TA User Guide	This user guide supports TAs who manage testing for students participating in online practice tests and operational tests. The guide includes the overall layout of the TA site, a description of how to create test sessions and approve students for testing, and an explanation of how students navigate the test and use test tools.
TIDE User Guide	TIDE is used to manage user and student information, order testing materials, track orders, monitor test progress, and execute administrative functions such as test resets or reopens. This guide covers a wide number of tasks in TIDE, including how to log in and navigate TIDE, manage user accounts, manage student information and accommodation settings, order paper materials, and monitor test progress.
Quick Guides: • TIDE Quick Start Guide • Test Authoring Quick Guide • TA Quick Guide • Remote Proctoring Quick Guide for Teachers • Remote Testing Quick Guide for Students and Families • Remote Proctoring Quick Guide for Technological Coordinators • CRS Quick Guide	These quick guides provide a brief overview of key tasks performed in each system.

In addition to the system guides and manuals listed in the previous table, CAI will collaborate with IDOE to create TAMs, TCMs, and test scripts, which is discussed under *Manuals and Scripts*.

Data Use Training

Our approach to providing trainings for educators and parents to understand how to use student scores and reports comprises two components:

1. Training on how to access the assessment scores
2. Training on how to use and interpret the scores

CAI proposes to use existing data for training materials, such as the Indiana Interpretive Guide for Statewide Assessments and Questions to Ask & Answer Using Your Summative Assessment Data to help teachers and other users understand how to use the data from their summative and formative assessments and identify instructional strengths and weaknesses. Additional data use training can be provided as a cost option.

Exhibits 1.12-4 and 1.12-5 list proposed training materials on how to access reports and use and interpret scores. The final list of training materials covered under this section will be confirmed by IDOE and CAI.

Exhibit 1.12-4: Examples of Training Materials on Accessing Reports

Presentation Title and Primary Audience	Proposed Training Topics	Proposed Delivery Formats
CRS User Guide (addresses all users)	Includes easy-to-read information organized for each role (teachers, principals, and administrators) on how to access summative assessment scores, view actual student responses to items, select report settings, and export data files. Also includes step-by-step instructions on how to perform specific tasks, including searching for students, downloading reports, printing student reports, exporting data, and creating lists of students (rosters).	1. User guide in PDF file format posted on portal 2. Online guide available within the system
Video Series on How to Access Your Assessment Data from the CRS*	1. How to use the exploration menu to navigate your students' data 2. How to select the student population for which you would like data 3. How to create and manage class rosters 4. How to view your reports by demographic subgroups 5. How to generate item-level reports 6. How to download PDF files of the online student report 7. How to download data files containing your students' data 8. How to print reports from the CRS in English or Spanish	1. Short 1- to 3-minute videos posted on the portal
Video Series on How to Access Your Formative Assessment Data*	1. How to access reports for corporations 2. How to access reports for schools 3. How to access reports for teachers 4. How to set filters and test reasons so that your data make sense 5. How to access longitudinal reports 6. How to create/manage/edit your rosters 7. How to export and print student data 8. How to modify scores	1. Short 1- to 3-minute videos posted on the portal
Online Training Module on the CRS	This training provides an overview of the CRS and helps users navigate the system to view summative assessment performance reports.	1. Module posted to the portal 2. Webinar on the CRS (repeated twice)

*These video series are presented as cost options for IDOE to consider.

Exhibit 1.12-5: Examples of Data Use Webinars and Training Materials

Modules/Webinars and Proposed Audience	Brochures, Guides, and FAQs
How to Use Your Summative Assessment Data (Teachers). This training module/webinar explains how teachers can use their data to understand the strengths and weaknesses of their incoming class, define learning groups at the beginning of the year, identify achievement gaps, reflect on the effectiveness of their own lesson plans, and identify growth over time.	Educator Brochure: Understand Your Summative Assessment Results This brochure explains the steps to • analyze the strengths and weaknesses of your class; • define learning groups at the beginning of the year; • identify achievement gaps; • determine the effectiveness of lesson plans at the end of the year; and • observe results over time and growth.
How to Use Your Summative Assessment Data (School and Corporation Administrators). This training module/webinar explains how administrators can identify programmatic areas of strength and weakness using their data, identify growth and achievement gaps, and track changes in the growth and achievement gaps.	
Understanding Your Own Scores on Summative Assessments (Students and Families). This module for students and families explains how to interpret summative assessment data on the student report.	A 10-page FAQ document is provided on how to use the summative assessment results to help educators understand concepts such as domains and writing scores.
	Understanding Your Own Scores on Summative Assessments (Student and Family Brochure) • What do summative assessment results tell you? • How do you interpret summative assessment results on the student report?
Understanding How to Use Instructional Resources Linked to Your Formative Assessments (Teachers). This webinar/module shows teachers how to access and use the instructional resource libraries linked to the formative assessments.	

CAI also proposes to create resources for parents and teachers on how to access the parent portal that allows parents to securely access student assessment data and review their ISRs. The parent portal includes an interactive glossary and help feature, FAQs, and links to other resources such as the following:

- **Parent Brochure.** This provides directions to parents on how to access the score reports for the different test administrations and how to understand and interpret those scores.
- **Teacher Brochure.** This provides directions to teachers on how to retrieve and send access codes to parents to log in to the parent portal and access their students' results.

1.13 (3l) Operational Administration of ILEARN, I AM, and IREAD-3

1. General

CAI will administer the ILEARN, I AM, and IREAD-3 assessments within the approximate timeframes listed in Exhibit 1.13.1-1. Specific testing windows are shown in Section 1.1 (2). CAI acknowledges that testing windows are established by IDOE's Office of Student Assessment each year and must be approved by the Indiana State Board of Education before being considered final. IDOE and CAI will mutually agree on paper testing windows (within the online testing windows) that allow for all paper-related processing activities to occur with enough time to meet reporting deadlines.

Exhibit 1.13.1-1: Approximate Administration Time Frames and Student Counts

Assessment	Approximate Administration Time Frame	Anticipated Number of Participating Students*
ILEARN Grades 3–8 (Mathematics, English/Language Arts [ELA], Science, Social Studies)	April–May	Approximately 85,000 students per grade level
ILEARN Biology End-of-Course Assessment (ECA)	November–December February April–May	Approximately 85,000 students (across all three administrations)
ILEARN U.S. Government ECA	April–May	Approximately 1,500 students
I AM Grades 3–8, 10, and Biology (Mathematics, ELA, Science, Social Studies)	April–May	Approximately 7,000 students
IREAD-3	March	Approximately 85,000 students
IREAD-3 Retest	May–July	Approximately 4,500 students

* Anticipated number of student estimates were provided by IDOE for SY 2022–2023.

CAI understands that schools are required to administer ILEARN, I AM, and IREAD-3 assessments online unless a student needs a paper-and-pencil test as an accommodation or if the school lacks sufficient technology and connectivity to successfully complete testing online. Paper-and-pencil test exceptions will be managed by IDOE. IDOE will provide the list of exceptions to CAI on an agreed-on date that will follow schools' systems readiness tests.

Exposure Control

CAI's adaptive algorithm automatically balances item exposure with other psychometric objectives, including precision of scores and blueprint match.

Exposure control is achieved through partial randomization. The algorithm first finds the items that best match the blueprint. Then, it sorts these items according to their relative contribution to test precision. Finally, it randomly selects from the best *k* items, providing a measure of exposure control. Among other parameters, CAI's psychometricians can adjust the value of *k* to ensure a perfect blueprint match, while minimizing item over- or under-exposure. CAI assumes and will plan for exposure controls and testing in each successive year's test administrations.

CAI will provide a separate report to IDOE detailing new items introduced in each ILEARN and I AM test administration. The report will include item data analysis and recommendations, if any, for item improvement. CAI understands that Indiana will not administer new IREAD-3 items.

2. Test Security

Protection Against Hacking

CAI applications are built to actively prevent attacks with malicious intent. For example, our Single Sign-on (SSO) system will lock accounts that experience too many failed login attempts within a certain period. Furthermore, multi-factor authentication is used to ensure that only legitimate users are allowed access to our systems. IDOE can configure password policy, including password length and character requirements, and expiry intervals to ensure that passwords meet its specifications. Mitigation is built into applications for common attack vectors like SQL Server injection by ensuring that all user inputs are scrubbed and calls to databases use parameterized queries. Similarly, browser cookies that are used to establish identities are encrypted or signed to prevent tampering, and precautions such as marking them as *HTTP only* and *Secure* are taken to further restrict their use. CAI actively mitigates against OWASP top 10 and SANS 25 types of errors to protect our systems from external attacks. In addition to the checks built into the system, we periodically assess their effectiveness through third-party penetration testing to ensure that these automated checks provide the expected protections.

To detect any abnormal activities, CAI uses a centralized Security Information and Event Management (SIEM) tool to monitor administrative access to server logs, and all production server logs are monitored by LogRhythm. This also allows for auditing administrative access to servers within our data centers. All anti-virus and anti-malware software are kept up to date to prevent malicious code execution within our infrastructure.

Protection Against Automated Attacks

To protect the infrastructure from attacks, such as distributed denial-of-service (DDoS) attacks, CAI uses state-of-the-art intrusion detection systems (IDS) with automatic offloading and scrubbing of malicious traffic. The IDS scan all incoming data traffic for known signatures of attacks as soon as it enters the data center where CAI systems are hosted. Any traffic matching the pattern is immediately dropped and cannot reach the CAI subnet. If there is a volumetric attack that exceeds the capacity of the IDS devices on site, traffic is automatically routed to large, dedicated scrubbing centers with the capacity to scrub significant volumes of data. Any malicious traffic is immediately dropped at these scrubbing sites and only legitimate traffic is routed back to the data center/CAI subnet. Firewalls are used to isolate the CAI subnet from the rest of the tenants within our hosting provider's data center.

Protection Against Distributed Denial-of-Service Attacks

CAI uses a DDoS solution for its systems located at Rackspace. CAI has set minimum thresholds for all of the attack vectors scanned. If the thresholds are breached, CAI receives an alert notification that a suspected attack is occurring. The alert provides the details of the attack vector and the IP address of the load balancer that is the target of the attack. DDoS mitigation begins to scrub incoming traffic. If an attack is confirmed, then that data are discarded before reaching CAI systems.

CAI agrees to report security breaches, as well as to investigate the implications for IDOE's assessments, to the State within 24 hours of receiving information about them.

Protecting Personally Identifiable Information

All personally identifiable information (PII) is strictly encrypted at rest within CAI. Any PII data in transit are also encrypted and carried over a secure transport layer. All student information is stored in our centralized Roster Tracking System (RTS). Any student attribute that is considered PII is encrypted using FIPS-140-2 compliant AES256 prior to being stored in the database. For each student in our system, an anonymized identifier is generated. All testing data are associated to this anonymized identifier within CAI's systems. Any authorized application that requires access to PII must retrieve decryption keys from a secure key management system, decrypt the data in memory, and dispose of the data once the process is finished. CAI is an ISO 27001 certified organization, and we comply with applicable state and federal laws around handling of sensitive student information, specifically PII.

All our systems protect individual privacy and confidentiality in a manner consistent with the Family Educational Rights and Privacy Act (FERPA) and other federal and state laws, including encryption at rest, in transmission, and during backup. Our privacy policy is publicly available and has been certified by external auditors to be compliant with FERPA, Children's Online Privacy Protection Act, and California Student Privacy Certification?

All personal and demographic information and student associations to school and corporation data are collected from the client using secure methods.

We collect data only for legitimate business use from data owners under contracts. Personal information collected by CAI is used strictly for our legitimate business objectives of test delivery, test administration, student assessment, and related contractual requirements.

CAI recognizes the gravity of our responsibility as stewards of student data, and we take every available precaution to protect these data from cyber intrusions into our applications or into the host systems themselves.

Protocols Aimed at Data Security and Protecting Privacy

CAI has an established incident management process with clearly defined workflow, tasks, responsibilities, and functions for responding to and managing information security incidents. The scope of this process includes all information security events that are detected, communicated, and potentially require investigation.

We have established regular desktop exercises that simulate security incidents and the team's response based on roles that each member must perform. Incident response playbooks have been developed to train the respondents.

CAI also has an established and annually refreshed security awareness training program that incorporates up-to-date general security awareness and CAI-specific policies geared to our business needs and processes. The training focuses on handling PII and the confidentiality of sensitive data. Completion of our awareness program is required for all staff and contractors as part of our onboarding process and is an annual requirement for all our personnel.

Access to Operational Systems

CAI has policies in place to ensure that access to operational systems is limited to staff members with a legitimate need. We have a formal procedure to request, approve, assign, change, create, revoke, and terminate user accounts. When temporary access to our systems, applications, or networks (e.g., for contractors, consultants, auditors, etc.) is required, we also have a formal procedure to manage this type of request.

CAI is ISO 27001 certified and has explicit policies addressing each of these systems being regularly audited for compliance.

Procedures for Secure Transfer of Student-Level Assessment Data

All transmissions of secure data take place using Secure File Transfer Protocol (SFTP) or Transport Layer Security (TLS) 1.2. When the transferred data include student PII, the transfer software encrypts the files upon upload to the site. The files remain encrypted while they are at rest, and Secure Sockets Layer (SSL) encrypts the data in transit. We recommend that our clients use similar SFTP software when the data arrive at their site to re-encrypt data when it is at rest on their servers.

Plan to Provide Reports of Test Security Analyses

CAI is audited annually by external bodies. The following reports, as well as the current status of any remediation plans associated with the reports, are available to IDOE upon request:

- ISO 27001
- Data center SOC 2 Type 1
- CIS 20 framework assessments
- Penetration test results

Maintaining Test Security and Integrity

All tests are administered and delivered through our online testing systems. Our Secure Browser, which is the user interface for setting up and taking the test, can be downloaded and made operational in several technology platforms including desktop, laptop, and mobile devices. Test reports and results can be viewed by logging into our systems. We also provide secure file transfers as well as download and upload services.

Student Results and PII

Our systems are hosted at certified third-party-managed data centers located within the United States.

Security of Test Items

All item writing, reviewing, and test creation at CAI occurs in our secure Item Tracking System (ITS). Our item bank is secure and web-accessible only over secure lines and with proper authentication. Only content leads have access to all of the item development levels in the item bank, and access levels for item writers, editors, and item reviewers are limited. Once an item leaves the level the reviewer/editor has access to, that reviewer/editor can no longer interact with or view the item.

Once non-CAI staff item writers submit an item in ITS, they no longer have access to the item and cannot follow its review development. All of the editors reviewing the items are permanent CAI staff or temporary editors hired by CAI. These temporary editors are housed in CAI offices and work directly in ITS on computers owned by CAI. Non-CAI staff item writers must sign a nondisclosure agreement prior to beginning work on any CAI state project. Because all item writing is conducted directly within ITS, which is secure, there is no need for any documents to be stored locally on item writers' devices. In addition, CAI explicitly requires that all item writers submit a signed affidavit as proof that they have not taken any screen captures of items they have created as part of their contract with CAI.

Finally, CAI staff use a SFTP site to send non-ITS materials to external clients and vendors. CAI staff control and monitor access to each folder within the SFTP site; an individual must receive a unique username and password to log in to the site, and access is restricted to only the project and materials on which an individual works.

Security of Test Content

We employ many measures to protect test content during test delivery. Regardless of specific devices, no content is stored on the testing end points. Content resides only on our testing servers, and all data transfers are over hypertext transfer protocol secure (HTTPS) transport. Test content is protected at rest, as our testing servers do not have any remote access enabled. Only specific CAI and Rackspace systems engineers, who follow strict procedures and undergo training, have access to these servers. Finally, the dedicated server role eliminates most common threat vectors (e.g., no emails, no mapped drives, extremely limited access).

Content is also served strictly through the application layer, which performs multilayer authentication, authorization, and context-sensitive checks. Our end point security model locks down the student machine, preventing access to other applications and operating system capabilities that pose threats to item security. During testing, the system continuously monitors for execution of deny-list applications or unknown applications taking focus from the CAI Secure Browser. If a threat is detected, the student is stopped from testing.

Security of Physical Plants

Physical Security at CAI Facilities

Every CAI location has card-controlled access. In our main office, card entry is required to enter the building during business hours and is required for entry to any of the floors where work is done. The entrance is monitored by a guard. In each facility, visitors must sign in upon entry and must be escorted by a CAI staff member.

When in printed form, test items are protected when a CAI staff member is not present: Locked offices and workrooms where work is conducted and secure materials are present require a card reader to enter. Similar locks and controls prevent unauthorized access to servers on our network. Most of our data and test items are stored on CAI-dedicated servers at Rackspace, which has state-of-the-art security, including biometric access control to sensitive areas.

Physical Security at Rackspace Facilities

Some of CAI's systems are located at the Rackspace Chicago data center. Rackspace data centers implement industry-leading security, as demonstrated by their ISO 27001 certification in alignment with ISO 27002 and compliance with NIST 800-53 security controls. Every Rackspace employee undergoes a background check and extensive security training. Data center access is limited to authorized Rackspace data center personnel. Even Rackspace clients cannot enter the data centers.

Data center access is tightly controlled with keycard protocols and biometric scanning in place. Security cameras monitor all data and provide round-the-clock interior and exterior surveillance.

Physical Security at Amazon Web Services Locations

CAI's TDS is hosted at Amazon Web Services (AWS). We do not store any secure data in these systems, and all AWS virtual machines are tied to regions hosted in the continental United States. AWS provides a robust array of physical, logistical, and environmental controls to secure all their facilities. Each of their locations undergoes site evaluation for environmental and geographic risk with backup power, network, and compute capacity to ensure high availability. Data center access is restricted to authorized personnel only, and through the adoption of the principle of least privilege, access is further limited to only specific areas by need. All access to data centers is logged and regularly audited with additional monitoring through the use of CCTVs and sensors to detect any unauthorized access. All device inventory is centrally managed and regularly audited. The AWS security operations center performs regular threat and vulnerability reviews, and external auditors are used to test for compliance.

3. Data Forensics Work

The validity of test score interpretation critically depends upon the integrity of the test administrations on which those scores are based. Any irregularities in the administration of assessments can therefore cast doubt on the validity of the inferences based on those test scores. Multiple steps are taken to ensure that assessments are administered properly, including providing clear test administration policies, effective Test Administrator (TA) training, and tools to identify possible irregularities in test administrations.

Quality Assurance Reports

For all online test administrations, quality assurance (QA) reports are generated during and after the test windows. As described in Section 1.19 (3r), many of these reports are geared toward ensuring the quality of test administrations, including item analysis reports, which are used to ensure that items are performing as intended; blueprint match reports, which ensure that the adaptive algorithm is performing as configured through simulations; and item exposure reports, which indicate whether item pool usage is consistent with the configuration of the adaptive algorithm during simulations as well as identify content gaps in the item pools. In addition, there are a suite of QA reports that are designed to assist in the detection of irregularities in test administrations and which may indicate possible instances of cheating. These QA reports contain both individual-level and aggregate-level results. By aggregating unusual responses, CAI flags possible group-level testing anomalies. The aggregate levels include Session, Test Administrator, School, and District.

Because testing information is accumulated automatically as testing proceeds, data analysis can occur regularly throughout the course of the test administration. However, because flagging criteria for forensic analyses are based on standard deviations of the testing population, the flagging values will continually shift throughout the test window. Thus, while the forensic analysis QA reports can be generated at intervals throughout the test window, we recommend generating these reports immediately after the test window has closed. Evidence evaluated in QA reports includes

- item score changes;
- item response times;
- changes in test scores across test administrations (after the first operational test administration); and
- item response patterns using the person-fit index.

The flagging criteria used for these analyses are configurable and can be changed by the user. Analyses are performed at the student level and summarized for each aggregate unit, including testing session, TA, and school. The RFP indicates that Indiana flags testing units that are four or more standard deviations away from the state mean, and we can implement this flagging rule. The following subsections describe the forensic analysis reports generated in the QA system.

Item Score Change

Students are allowed to revisit items as many times as they wish within a test session and may even mark items to be revisited prior to completing the test session. Nevertheless, excessively high rates of item score change, especially high rates of item score increases, may indicate irregularities in a test administration. TAs could, for example, review students' responses and either coach them to modify their responses or keep the session active and change responses themselves.

To identify irregular patterns of item score change, we examine the item score for the final response to each item and the penultimate response if one exists, and then count the number of instances in which the item score increases. Students with item score changes greater than or equal to four standard deviations above the state mean will be flagged, although the flagging value is configurable.

At the aggregate level, group means are evaluated with respect to their deviation from the state mean. As with the other analyses, the state mean and standard deviation is computed based on the aggregate level of analysis, such that the state mean and standard deviation for evaluating student records is the simple average of all student records, while the state mean and standard deviation for test sessions is the mean of all test session means, the mean and standard deviation for TAs is based on the mean of all TA means, and so on. The number of standard deviations from the state mean used for flagging is configurable and will be set to greater than or equal to four standard deviations beyond the state mean for IDOE.

Item Response Latency

The online environment also allows item response latency to be captured as the item page time (i.e., the length of time that each item page is presented) in milliseconds. Discrete items appear one item on the screen at a time. However, for stimulus-based items selected as part of an item group, all items associated with the stimulus are selected and loaded as a group. For each student, the total time taken to complete the assessment is computed by adding the page time for all items and item groups.

An example of unusual item response time would be a test session with students scoring very well on the assessment, but with test administration times on average far less than that required of students statewide. Such a pattern of short response times and high scores might be expected if, for example, students already know or have been provided the answers to the items. Conversely, if a TA helps students by "coaching" them to change their responses while taking the assessment or leaves a test session open to manipulate student responses, the testing time could be much longer than expected.

The average and the standard deviation of test-taking time are computed across all students for each test administration. The flagging rate is configurable, but following IDOE's current practice, student records will be flagged if their test-taking time is greater than or equal to |4| standard deviations from the state average. For aggregate-level reporting, group means are evaluated with respect to their deviation from the state mean testing time. This is consistent with the preference of many clients for evaluating deviations from the state mean.

Changes in Student Performance

While students grow and gain academically each year, the rank order of students' achievement is quite consistent over time. When multiple testing occasions are available, the forensic analysis report predicts the expected level of achievement on the current assessment based on students' performance on the previous test administration. Fluctuation in individual student records does occur. For example, a student may have been ill during the previous test administration, causing the student to underperform, so that their current normal performance appears as an unusually large gain. However, such fluctuations are relatively rare.

For between-year comparisons, the scores between the current year and the previous year are evaluated. The most recent opportunity score in the current year (e.g., grade 4) will be regressed on the most recent score in the previous year performance (e.g., grade 3). Note that between-year comparisons are not available for the lowest grade tested (typically grade 3).

A large score gain or loss between grades is detected by examining the residuals for outliers. The residuals are computed as the observed score minus the predicted score in the regression model. To detect unusual residuals, we compute the studentized t residuals. An unusual increase or decrease in student scores between opportunities is flagged when studentized t residuals are greater than three or less than negative three, although this value is configurable.

For each aggregate unit, aggregate unit means can be evaluated with respect to their deviation from the state mean. The state mean and standard deviation of residuals can be computed based on either the weighted average and standard deviation or the unweighted average and standard deviation. The user can select which mean and standard deviation to use, either weighted or unweighted.

The weighted state average and standard deviation of residuals are computed based on all student records. The unweighted state average and standard deviation of residuals are computed based on the aggregate unit means such that the state mean and standard deviation for test sessions is the mean of all test session means, the state mean and standard deviation for TAs is based on the mean of all TA means, and so on. Small units are excluded in computing the unweighted state mean and standard deviation of the aggregate means.

For IDOE, an aggregate unit will be flagged if the aggregate unit means of residuals is greater than or equal to |4| standard deviations of the state mean. The number of standard deviations from the state mean used for flagging is configurable.

Inconsistent Item Response Pattern (Person-Fit)

In item response theory (IRT) models, person-fit indices are used to identify students whose patterns of responses to items are improbable given an IRT model. If an assessment has psychometric integrity, little irregularity will be seen in the item responses of an individual who responds to items fairly and honestly.

In the IRT models used to score students' assessments, the expectation that a student will respond correctly to an item depends both on the student's ability level and the difficulty of the item. Thus, high- ability students will have a higher probability of responding correctly to all items, but especially so as item difficulty increases. Sometimes, however, low-ability students answer difficult items correctly, perhaps through guessing. Sometimes, high-ability students respond incorrectly to easy items, perhaps through lack of attention. Generally, however, students' responses to test items are consistent with the scoring model.

For example, if a student is coached during a test administration or copies the responses of other students, the student may provide correct responses to items at a higher probability than would be expected by his or her ability as estimated across all items. In this case, the person-fit index will be large for the student.

The person-fit index is based on all item responses. An unlikely response to a few test items may not result in a flagged person-fit index. Of course, not all unlikely patterns indicate cheating, as in the case of a student who can guess a significant number of correct answers. Therefore, the evidence of person-fit index should be evaluated along with other indicators of testing irregularities to determine whether cheating may be suspected.

Following Drasgow, Levine, and Williams (1985), the person-fit index l_z, is computed as

$$l_z(\theta) = \frac{l(\theta) - E\big(l(\theta)\big)}{Var\big(l(\theta)\big)},$$

where $l(\theta)$ is the log-likelihood of a vector of observed item scores for a given ability $l(\theta)$ with expected value $E\big(l(\theta)\big)$ and variance $Var\big(l(\theta)\big)$. The asymptotic distribution of l_z is a standard normal distribution (i.e., with an increasing number of administered items, i).

The asymptotic standard normal distribution of l_z only holds when the true person ability is known. In practice, the person ability is estimated from the same data that are used to compute l_z. The variance of l_z can be considerably smaller than one when the true ability θ is replaced by its estimate $\hat{\theta}$ (Snijders, 2001). To remedy this, Snijders (2001) derived a family of asymptotically normal person-fit statistics when $\hat{\theta}$ is used. When $\hat{\theta}$ is the maximum likelihood estimator, the fit statistic l_z^* is computed as l_z but with a corrected variance in the denominator. CAI applies a generalized derivation for l_z^* given by Lin, Jiang, & Rijmen (2021) because the generalized l_{zg}^* index applies also to IRT models that are not unidimensional (e.g., the Rasch testlet model of Wang & Wilson, 2005).

The null-hypothesis is one-sided, such that a student's responses to test items are consistent with the scoring model. Model misfit is indicated by low values of l_{zg}^*. Students with l_{zg}^* values smaller than negative four are flagged, although this value is configurable.

Group means of l_{zg}^* values can be evaluated with respect to their deviation from the state mean of l_{zg}^* values. As with the other analyses, the state mean and standard deviation is computed in either the weighted average and standard deviation or the unweighted average and standard deviation. The user can select which mean and standard deviation to use, either weighted or unweighted, in the setting. The number of standard deviations away from the state mean used for flagging is configurable and will be set to greater than or equal to four standard deviations from the state mean for IDOE.

Corporation Reports

The generation of all QA reports, including forensic reports, is automated and produced directly from the Database of Record (DOR). The QA forensic reports include statewide student-level and aggregate-level reports following the specifications described previously. To meet the requirements of the RFP for corporation-specific reports, the CAI analysis team will work with IDOE to specify an agreed-on data file layout for generating corporation-specific forensic reports. These reports can then be made available to IDOE for delivery to flagged corporations or accessed directly by corporations from a CAI-hosted Secure File Transfer Protocol (SFTP) website. The CAI analysis team will implement procedures to ensure that independent verification occurs, that all corporation report values match values in the automated QA reporting system, and that the file formats conform to agreed-on data layouts and file formats prior to delivery to IDOE and Indiana corporations.

Forensics Support

CAI will be pleased to work with IDOE to conduct further analyses of forensic report data to investigate possible testing irregularities or security breaches. CAI will make available the necessary level of support required by IDOE for these analyses. Additional analyses may be conducted by statistical analysts operating under the direction of a psychometrician or directly by psychometricians depending on the type of investigation required. Generally, psychometricians will identify approaches to data analysis to address IDOE requirements, while statistical analysts will apply those approaches to examine target corporations. We budget up to 40 hours of additional analyses to support forensic investigations.

CAI proposes to assign Suzanne Huston to oversee coordination and planning of all data forensic activities and deliverables. Ms. Huston has nine years of experience managing state assessment activities and will work closely with IDOE to ensure the accurate and timely delivery of all forensic report files.

All data files produced under this contract are the property of Indiana, and CAI will comply with IDOE requirements for secure maintenance of data files throughout the period of the contract, as well as delivery to IDOE or secure destruction of all data files at the end of the contract period. As described in Section 2.9, all transmissions of secure data take place using SFTP or Transport Layer Security 1.2. When the transferred data include student personally identifiable information, the transfer software encrypts the files upon upload to the site. The files remain encrypted while they are at rest, and Secure Sockets Layer encrypts the data in transit. We recommend that our clients use similar SFTP software when the data arrive at their site to re-encrypt data when they are at rest on their servers.

4. Web Monitoring

Introduction

CAI proposes to partner with Caveon Web Patrol for Internet monitoring. Caveon leverages the best of both automated technologies and human capacity to judge and analyze potential threats. The result of this unique combination is a service that continually and systematically finds and tracks threats to IDOE's testing program. By taking on many of the complicated, time-consuming chores involved in monitoring the Internet's darker corners, Caveon helps to protect against the worst-case scenario of an unforeseen testing breach. Because each client's goals and priorities are unique, Caveon can tailor the service, notifications, and reporting in a manner that is most useful for IDOE.

Caveon's services address the risk to IDOE's assessments and items posed by illicit discussion, distribution, and sale of test content on the Internet. Caveon leverages technology tools and human expertise to identify, prioritize, and monitor websites, discussion forums, peer-to-peer servers, etc., where sensitive test information may be disclosed or at risk of disclosure.

Patrolling efforts routinely find and evaluate *brain dumps* (i.e., websites where test items have been posted, supposedly by individuals who memorized them and/or where disclosed test content may be inexpensively resold); test preparation training and education sites that may use actual (operational) test items in their training; online auctions and classifieds like eBay and Craigslist; and other social media channels and forums in which actual test items may be revealed or proxy test takers may offer their services.

Caveon generates regular update reports that categorize identified threats by level of actual or potential risk to IDOE's testing program based on the representations made on the websites, or actual analysis of the proffered content. Websites and Internet extracts are ranked from CLEARED (lowest risk but should still be monitored) to SEVERE (highest risk). The reports contain specific URLs and other content extractions that represent and depict the categorized threat. Additionally, the reports include overall and specific threat analysis, with actionable recommendations for IDOE to follow for minimizing and removing the dangers.

Caveon uses Caveon Core, a secure web-based file sharing and reporting platform, to notify clients of recently identified high-risk threats. Caveon also keeps a continuous running log of all websites found that are likely to have IDOE's content and updates the status of each website on an ongoing basis in Caveon Core. This log, available to IDOE in Caveon Core, serves to identify and classify each reported Internet risk.

Comprehensive, Consistent Monitoring

In conducting Web Patrol operations, Caveon has built a team of specialists who spend days and evenings continually monitoring the Internet for clients' intellectual property. The team leverages numerous search technologies, some licensed

and some publicly accessible (e.g., "Open Source"), to ensure comprehensive, consistent, and continual monitoring of the Internet.

Continual, daily monitoring of the Internet is critical. The Internet is a huge entity, constantly changing and evolving. The way search tools index the Internet means that one could search this very minute and find nothing but search again moments later and discover a website that is aggressively distributing IDOE's test items.

Verifying Threats

Casting such a broad net across the Internet means the team must cull through thousands of search results (each a possible threat) for every client's test program. This is no small task, requiring hours of human effort every day to review possible threats and gauge their risks by drilling deeper to explore whether a result is benign or a legitimate worry.

This daily sifting is the most challenging aspect of Internet patrolling. The real value Caveon delivers with their service involves the "heavy lifting" their experienced Internet patrollers provide. Team members have become experts at quickly reviewing a search hit and discerning a level of risk. Most of Caveon's team has been with the organization for more than 10 years (the Web Patrol Director has been with Caveon since its inception in 2003). Despite technology innovations in other aspects of the service, this work requires human judgment and is vitally necessary in taking action against real threats to test security.

Research and Identification, and Removing Threats

Unfortunately, discovering and validating threats is only part of the challenge. Once a threat is verified, Caveon's team will consult with CAI and IDOE to recommend the steps necessary to have any infringing content removed. Dealing with unethical website operators can be challenging, but through close collaboration with clients' legal teams, Caveon has achieved success in protecting copyrighted test material.

An escalation path of legal remedies is available. That path begins with formal cease-and-desist letters. The path ends when the website operators remove copyrighted material and/or cease operations, either voluntarily or by compulsion. By continually, systematically patrolling for new threats and monitoring existing ones, Caveon Web Patrol quickly ascertains when a breach has or may occur. When discovered, Caveon immediately notifies CAI Program Management, who then notifies IDOE by the most effective method of IDOE's choice (email, phone, instant message, or a combination of these).

Having identified the threat, the Caveon team takes on the challenge of researching and identifying the contacts and contact information for website operators.

Client Collaboration

Several factors contribute to successful client engagements with Web Patrol. First, and foremost, Caveon will work with CAI Program Management and IDOE in the discussion of search terms, search term changes, search techniques, and results. Several of the most important test programs in the world (including state departments of education, college admissions programs, medical licensure programs, etc.) use Caveon Web Patrol—in these cases Caveon has forged a collaborative partnership where Caveon's team leaders and the client counterparts work in tandem to identify risks and aggressively manage them.

With Caveon Web Patrol, IDOE will receive

- ongoing Internet monitoring by a team of experts on a time frame customized to IDOE's needs;
- threat analysis for the assessment content being found online, prepared and provided by test security experts;
- threat removal consultation tools;
- ongoing expert security support and advice; and
- end of test administration key insights and trend data report.

5. Missing Materials Auditing/Tracking/Follow-Up

Packaging, Shipping, Retrieval, and Processing

Data Recognition Corporation (DRC) maintains an Operations Materials Management System (Ops MMS) that provides accurate, efficient, real-time tracking of secure materials throughout every stage of test administration, including packaging, distribution, collection, and materials receipt and check-in. Security barcodes ensure that each test booklet is unequivocally associated with the corporation and school to which it was assigned throughout all of these processes.

Packing, Shipping, and Retrieving Paper Materials

DRC has a long history of successfully managing all aspects of packaging and secure distribution and collection of tests and ancillary materials for a number of state-assessment clients. Annually, DRC packages and distributes more than 28 million materials, and it is committed to providing IDOE with accurate materials packaging, distribution, and collection under this contract.

DRC's ISO 9001:2015-certified distribution, logistics, and materials-processing methods underscore the importance that DRC places on quality; it takes all necessary precautions to ensure accurate packaging and delivery of all assessment materials.

DRC will generate unique security barcodes that will be printed on each test booklet. DRC has successfully managed the print materials for a wide array of large-scale assessment programs and is entirely confident that its use of barcoding technology will provide IDOE with the highest level of accuracy and visibility in accounting for all paper booklets. The barcodes will allow DRC to maximize the capabilities of its Ops MMS, which is a proprietary and innovative system that utilizes barcode technology to provide an precise and efficient method for packaging materials. Systematic quality controls facilitate the tracking of secure materials throughout the packaging and distribution phases. Using scanners to "scan out" order-specific materials, Ops MMS assigns secure materials at the point of packaging. These systematic controls ensure that accurate quantities and material types are pulled and packaged for the assigned sites.

Each shipping box will be pre-printed with DRC's return address and, when applicable, will have a large, brightly colored label stating that testing materials are enclosed. DRC works only with secure, bonded shipping vendors that provide online tracing and tracking services. For the Indiana assessment program, DRC will use United Parcel Service (UPS) as the primary vendor to distribute materials to all schools across Indiana. Delivery of materials will be scheduled to occur during regular weekday school hours, 9:00 a.m. to 3:00 p.m., or by appointment with school/corporation officials. All shipments from DRC will prompt email notifications to assessment coordinators that materials are in transit to them. All shipments will be designated as "inside delivery required." Signatures acknowledging receipt will provide proof of delivery. DRC and schools will be able to track shipments online via real-time updates on UPS's tracking management system.

DRC will provide pre-paid shipping labels and instructions for returning secure materials, and it will assume responsibility for all costs associated with their return. All return labels will clearly display school and corporation names and other information required by IDOE. DRC encourages schools to re-use their original shipment boxes for the return shipment, but DRC will send additional boxes to schools that request them. DRC's materials return process is simple and straightforward and offers two significant advantages over other vendors' processes: first, it requires minimal document preparation by schools; second, it provides clients with a system that ensures 100% accuracy in accounting for barcoded materials, regardless of how materials are packaged or bundled.

DRC will use UPS Return Service (UPS RS) for the collection and return of Indiana's paper-and-pencil testing materials, providing corporations and schools with the flexibility and familiarity of a nationally recognized carrier. Utilizing UPS also provides assessment coordinators with full visibility to track the status of their return shipments via the RS label-tracking functionality provided by UPS. Clear instructions for utilizing the return-shipment interface will be provided in the return instructions that appear in the program *Test Coordinator's Manual*, the *Test Administrator's Manual*, or on the assessment program portal (https://indiana.portal.cambiumast.com/) via separate Return Receipt instructions.

Upon receipt, DRC's test booklet check-in processes will allow its Operations staff to provide real-time feedback on actual receipts versus expected receipts from the corporations. In turn, the Program Management Team will be able to contact any school regarding what appears to be an anticipated materials receipt "shortfall" at the close of an assessment window. DRC recognizes that the security of the test is of the utmost importance to IDOE, and DRC's vast amount of experience dealing with the retrieval and reporting of missing materials for large-scale assessment programs will provide the Department with a responsive approach that aims to resolve oversights before they become issues. More information on reporting procedures for missing materials is included later in this section.

Processing Paper Materials

Although the expected volume of paper-and-pencil materials is relatively low for the Indiana assessments, the testing program will still receive the full benefit of DRC's industry-leading document processing capabilities for paper-and-pencil tests. DRC will employ the same ISO-certified document handling and scanning processes it uses for all of its large-scale assessment clients that offer paper-and-pencil forms. These processes leverage state-of-the-art technologies to ensure that

every test booklet is tracked through the completion of document processing and scoring. In addition, DRC's use of modern scanning equipment and ISO-certified scanning processes ensures that student responses from each document will be captured with 100% accuracy for inclusion in all required scoring and reporting records.

All processing and scanning will occur at DRC's fully secure facilities. DRC maintains stringent security and quality-control procedures during scannable test booklet processing. Processing and scanning procedures that are reviewed and approved by IDOE will provide DRC's Document Processing staff with step-by step instructions to follow during test booklet processing. DRC's software quality assurance personnel will perform extensive tests to ensure that all scanned data are captured and accurately stored in a secure database. Student responses and data will be kept confidential and secure at all times. DRC's use of barcoding technology allows it to score and accurately link student response data and images without the inclusion of student names, birthdates, or other personally identifiable information (PII). All client and student demographic and response data will be protected by stringent security features and procedures within DRC's secure computing environment.

DRC is also experienced in implementing well-defined procedures for the secure storage and destruction of materials and data for their large-scale assessment clients. DRC will store all electronic data for the life of the contract and will collaborate with IDOE and CAI to determine an appropriate schedule for the retention and destruction of used and unused paper tests returned to DRC. In most cases, the policy will include a process for the Department's annual review of materials that have come due for destruction (e.g., test booklets destroyed one year after the administration). In all cases, secure test materials will be destroyed only after explicit approval has been received from IDOE.

Missing Materials Auditing, Tracking, and Follow-Up

DRC recognizes that security of the test is of the utmost importance to IDOE. To that end, DRC proposes to implement several processes that will help to ensure the security of the test materials.

The success of DRC's missing-materials approach relies on accurate data and clear communication from its Program Management Team, which will produce a schedule and communication plan that prompts follow-up on discrepancies between anticipated returns and material receipts as soon as such data is meaningful. Missing test booklets are often uncovered by schools after receiving correspondence from CAI, and CAI will work with DRC to craft clear communications with the appropriate school and corporation personnel (as directed by IDOE) which precisely identify the materials that have not yet been returned. The Program Management Team will work directly with IDOE staff to determine the frequency of communications and the ongoing progress of missing-booklet resolution.

Because each paper-and-pencil booklet (standard print and accommodated) carries a unique test security number, DRC can provide IDOE with reports that list missing documents by security number, as well by grade and school, and other criteria required by the Department. DRC will provide a preliminary Missing Materials Report to CAI for transmission to IDOE on a schedule that aligns with the end of each paper-and-pencil testing window. The report will list the number of materials not returned and the school(s) to which they were originally sent. In addition, DRC will provide CAI with complete documentation of the steps taken by DRC and the schools to locate any missing secure materials. CAI will relay this documentation to IDOE in the different iterations of the Missing Material Reports.

DRC will produce regular Missing Materials Reports up to one month after the end of each assessment's testing window and will include each school's explanation of or response to any test booklet that was not checked-in at DRC (e.g., the booklet was securely destroyed on site, or the booklet cannot be located at the school). CAI and DRC will work with IDOE if additional communication is needed after the scheduled Missing Materials Reports are sent to the corporations. These reports will assist IDOE, CAI, and DRC in improving the instructions in the administration manuals and augmenting the information shared via administration training sessions. The Missing Materials Reports can also provide important documentation for instances of suspected test security breaches.

1.14 (3m) Released Items Repository

CAI will make a representative sample of items available in a practice system as Released Items Repository (RIR) tests. This sample will be available to the public through Guest mode on Indiana's Assessment Portal. The RIR tests will mirror the operational testing environment in TDS and will contain the same accessibility and accommodations features typically available to students taking the ILEARN, IREAD-3, and I AM assessments.

CAI will continue to support the existing pool of RIR tests, which date back to SY2018–2019. Each year, by October 1, CAI will create additional RIR tests through the release of items approved by the State. CAI expects that the annual

release of items will include 10 stand-alone items and one performance task for each ILEARN assessment, provided Smarter makes sufficient items available for release, and five items for each grade and content area in the I AM assessment if the State has sufficient items available. CAI acknowledges that there will be no additional item release for IREAD-3 under this contract. CAI further acknowledges that there may be additional content that the State will choose to release periodically through the RIR. CAI can accommodate such additional releases as a cost option.

For each item in the RIR, CAI will develop a static scoring guide that will be posted to the RIR section of Indiana's Assessment Portal. The scoring guide will include the correct answer for each selected-response item. For each handscored open response item the contract will provide an item-specific rubric that includes all achievable score points and one sample student response that has achieved full points for the item. As an option, CAI is prepared to provide one sample at each achievable score point should the state so desire.

1.15 (3n) Practice Administration

CAI recognizes that in order for educators, students, and parents to become familiar with the tests and testing environment, it is essential to provide practice tests using sample test materials in paper-and-pencil and online formats early. CAI commits to providing both online and
paper-and-pencil practice tests for ILEARN, I AM, and IREAD-3 assessments for each grade level and content area as specified in the RFP. In building these practice tests, CAI will use Indiana-owned released items, Smarter Balanced released items, and any other item sources available to Indiana. Practice tests will be available at least three months prior to the start of an operational testing window and will be available all year round. In fact, CAI's practice tests are currently available on the Indiana Assessment Portal.

CAI commits to providing the following practice tests:

- **ILEARN** – Online practice tests containing five to seven items and paper-and-pencil practice tests containing three items for each grade level and content area
- **I AM** – Online and paper-and-pencil practice tests containing two items for each grade level and content area
- **IREAD-3** – Online and paper-and-pencil practice tests containing one passage and three multiple-choice (MC) items for each grade cluster

Online Practice Tests

CAI will deliver online practice tests that

- are delivered using the same system as the operational assessments, so that the student experience is the same in every way;
- include the same embedded accessibility features as the operational assessments;
- include every item type that students will encounter on an operational assessment;
- can be accessed using an ordinary browser (rather than the CAI Secure Browser), though some functionality requires the CAI Secure Browser; and
- can be accessed anonymously for independent practice, or in proctored sessions, which enables Test Administrators (TAs) to practice their duties.

The practice site not only mimics the functionality of the operational test site, but it also runs under the same engine, although it may be configured differently. The practice test can be accessed using both nonsecure and secure browsers.

CAI's Test Delivery System (TDS) can deliver practice tests in two modes: Guest Mode and Secure Mode. In both modes, the practice test always uses the same applications as the operational test environment, such as the TA Interface and Student Interface, and it can generate the same test management reports.

- In Guest Mode, anyone can log in to the system anonymously and take any test offered in the system. Users can experience all item types as presented in the Student Interface and can use all the accommodations and test tools available in the TDS, including playing and repeating audio. Anonymity also implies that users may take as many tests as they want since the system cannot track how many tests have been taken. Many states enjoy the benefits of a freely, publicly available view of the assessment, which provides transparency to parents and other stakeholders. In Guest Mode, the user can select from among the available accommodations and supports at the beginning of the test and configure their own settings. The practice test in Guest Mode is administered in a nonsecure mode, so that it can be directly accessed via any nonsecure browser and does not require a TA to open a session and admit students.

- Secure Mode provides a full dress rehearsal for the operational assessments and ensures that students, educators, and teachers are familiar with the online testing system. The practice tests administered in Secure Mode will use the same test delivery system as the operational tests but will require the CAI Secure Browser to access these tests. In addition, the TA must create a test session for students to begin the practice test. In Secure Mode, all tools and features that are available in the practice test will mirror those available in the operational testing environment. It will provide students access to accommodations that follow state rules (and which are the same as those offered in the operational assessment) and include the same pause rules that are in effect during the operational assessments, so students or TAs can pause and resume tests.

Ease of use is critical for parents and educators to use the online practice tests. Unlike many online practice tests, CAI's online practice tests do not require any test content to be downloaded on student machines prior to taking a practice test. CAI's practice test is accessible from any machine using a standard browser or the CAI Secure Browser.

Since the online practice test is deployed using the same test delivery engine as the operational test, the ancillary materials such as the user guides, quick start guides, and administration manuals for the operational test will apply equally well to the practice test.

Paper-and-Pencil Practice Tests

As required in the RFP, paper-and-pencil practice tests will be provided for ILEARN, I AM, and IREAD-3 assessments, so all students have an opportunity to become acclimated to the assessments they will take. The paper-and-pencil practice tests will be embedded within the operational paper-and-pencil test book as specified in the RFP.

1.16 (3o) Scoring and Reporting

1. Scoring Plan

Scoring Plan Overview

CAI and Data Recognition Corporation (DRC) are partnering to perform all item scoring activities to support Indiana's ILEARN, I AM, and IREAD-3 assessment programs. All short constructed-response (CR) and writing items in the ILEARN program will be handscored by DRC, whose methods are described in Section 1.16 (3o) under *Handscoring*. The handscoring section will also discuss how Indiana educators will be involved in the scoring. Paper-and-pencil scoring for each program will also be handled by DRC, as described in Section 1.16 (3o) under *Handscoring*. All other items for each program, such as multiple-choice (MC), multiple-select (MS), equation, graphical, hot-text, matching, and grid/table scoring, will be machine-scored using what CAI calls 'explicit rubrics,' which explicitly define the features of the student responses that will receive credit.

CAI's scoring framework supports the administration and scoring for all item types. This is evident in three key design elements: supports for adaptive testing for any type of scoring, including handscoring; supports for item scoring that enable the development and scoring of a broad array of items; and supports for managing and monitoring scoring in real time. We discuss each of these in the following sections and end with a discussion of scoring plans and specifications.

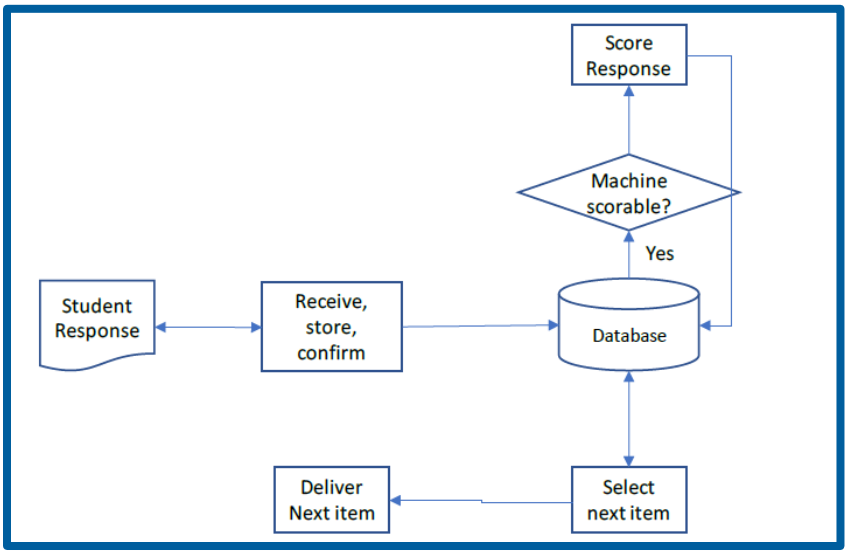
Asynchronous Scoring Framework

Some item types, such as handscored items and items with resource-intensive scoring models, take longer than other items to score. The asynchronous nature of the scoring engine means that the system never has to wait for an item to be scored in order to administer the next item. Students should never have to wait for the next item to appear, so the asynchronous engine ensures that even if an item does not have a score, the next item will be selected promptly based on the most recent ability estimate. Each time the adaptive engine selects an item, it draws all of the currently scored items to obtain the working estimate of student proficiency. Human-scored items or items for which scoring is ongoing are simply not used in the calculation. This approach provides the flexibility required to integrate a range of item types and scoring engines into an adaptive test, even if some of the scoring technologies require a time lag.

As noted in Exhibit 1.16-1, the process for selecting and delivering test items does not depend on the completion of scoring of prior items. The asynchronous scoring framework collects all of the scored responses at the time of item selection, recalculates θ, and uses this most recent estimate to select the next response. Some of the advantages of this well-proven approach include

- when students change an answer, this is automatically factored into the next selection;
- Human scored responses can be selected based on difficulty, although the scored responses are not necessary for subsequent item selection; and
- there is no risk that a slowdown in a scoring engine will interrupt testing.

Exhibit 1.16-1: Asynchronous Scoring Framework



Some reviewers may question the impact of selecting an item when the score on the prior item may not yet be available. Experiments that we conducted early in our adaptive testing experience showed that even when selections are five items behind, the impact on the precision of the final scores are not perceptible (five items behind would be an extreme case, even with our pre-fetch cache) (U.S. Patent Application Number 61/266,701).

If an item fails to score, the system may make a small number of additional attempts to score it. It is rare that items fail to score, and our system always has substantial excess scoring capacity; however, in the unlikely event that an item does not score while the student is testing, the student test data are held on another server, while an executive server (referred to as a *hub*) makes up to 10 attempts to score the response. Whether these attempts are successful, the item is passed downstream to our automated Quality Monitor (QM) System. The QM System checks for any anomaly in the test record, including unscored items. Any anomalies create an alert, and appropriate staff intervene to find and correct any problem that may have occurred.

Machine-Scored Items

The scoring framework is modular in that it can accommodate new types of responses to be scored with new engines, and to score them without disrupting the current code base. The architecture enables us to plug in new scoring engines as we develop new item types and new response mechanisms. These engines fit within the existing framework, which manages matching items to rubrics, accepting requests to score items, and returning scores to the testing engine. All of our newer items wrap scoring within a fully standards-compliant Question and Test Interoperability (QTI) scoring engine.

Scoring Engines and Item Types

CAI offers a complete implementation of the QTI response processing specification. In addition to a fully functional QTI scoring engine, custom interactions may draw on the capabilities of the following custom scoring engines using explicit rubrics:

- Graphic response scoring engine, which has an explicit test developer-created rubric that describes the properties of correct responses.
- Equation scoring engine, which evaluates the characteristics of student-entered equation responses against an explicit test developer-created rubric.
- Simulation-interaction and table scoring engine, which evaluates a sequence of trials in a simulation item against an explicit test developer-supplied rubric. This engine can score any information stored in table format.

CAI has developed a three-part, patented model to support the development and scoring of innovative item types, including multi-interaction items or performance tasks. This capability makes it possible to author sophisticated machine-scored items that include multiple interactions, and in which students are scored on relationships among the interactions, in addition to responses to individual interactions. The three parts of the model include bindings, assertions, and scoring rules.

1. **Bindings.** Bindings are variables bound to important information from the student response. In simple cases, bindings might be the value of a number entered, whether an equation is in a particular form, or the slope of the line that the student drew.
2. **Assertions.** Assertions are "true/false" variables that combine and analyze the bindings in various ways using the QTI operators. For example, an assertion might implement "the slope of the line drawn matches the slope of the line in the equation."
3. **Scoring Rules.** Where a numeric score is needed, the assertions can be counted or combined using test-developer-defined logic to assign numeric scores.

The explicit rubrics are based on the scoring assertions. These assertions are an integral part of the item, serving as a physical embodiment of evidence-centered design. By explicitly linking the evidence from the response to the inference it is intended to support, scoring assertions facilitate open and transparent discussion of the rubric and its alignment.

As noted earlier, all non-handscored ILEARN, I AM, and IREAD-3 items will be machine-scored using CAI's machine scoring engines and explicit rubrics. These items include MC and MS, as well as CR items with structured inputs such as equations, graphical responses, and table entry.

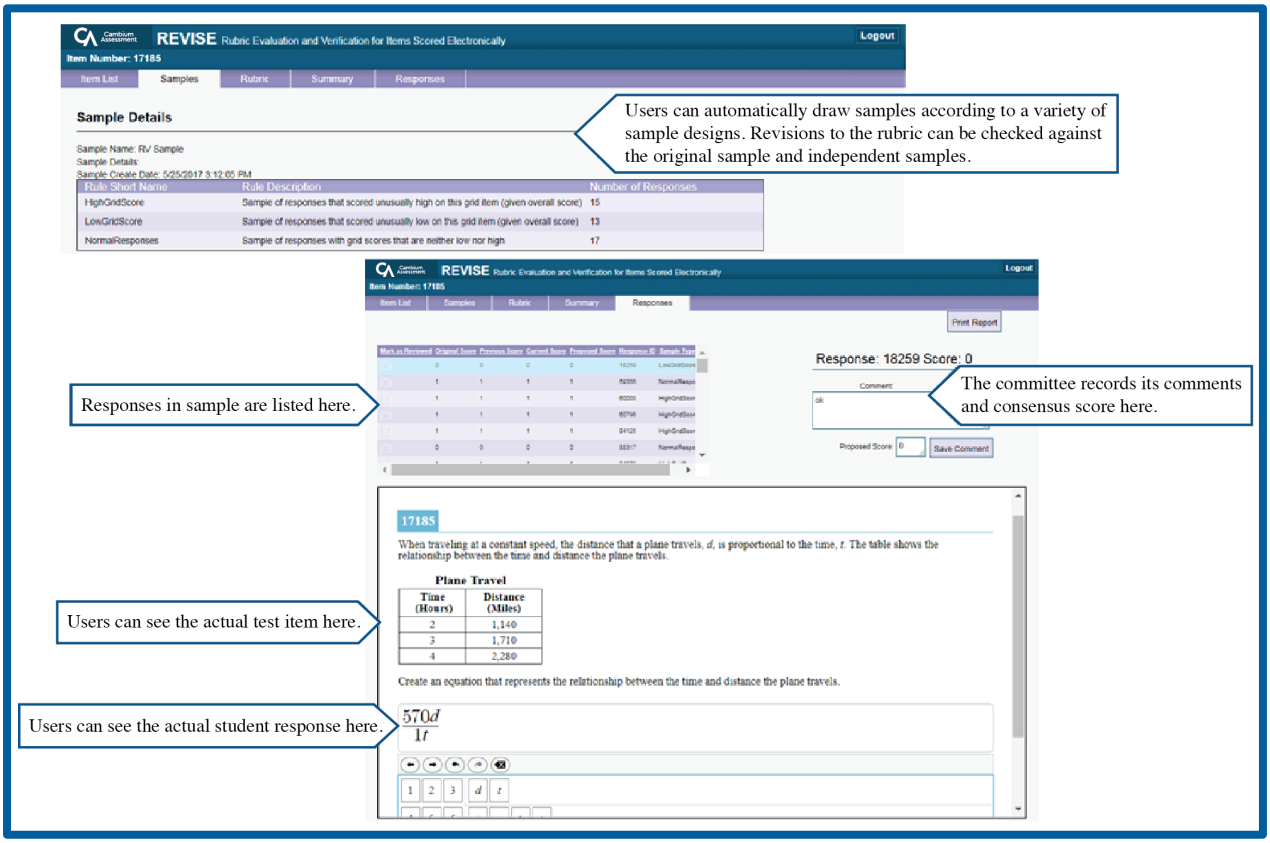
Validating Machine Scoring

The process used for scoring and validation of machine scoring of explicit rubrics involves multiple checks. If items are to undergo field-testing, then the machine-scored items go through one of two types of checks before field-test statistics are computed. Selected response items with a reasonable number of possibilities undergo a typical key-check process. Actual responses are tabulated and scored, and content experts ensure that every response pattern scores correctly. Rule-based items undergo CAI's rubric validation process, using our REVISE, or rubric validation system. This system draws independent stratified samples of responses (up to and including 5,000 responses), which are reviewed by content experts at CAI and IDOE.

If items already underwent field-testing, we recommend that the field-test data be provided to support a similar process of rubric validation, but also with the original scores as verification.

Exhibit 1.16-2 shows some features of our REVISE rubric validation system. We select the item responses to disproportionately represent anomalous responses. Specifically, the sampling algorithm identifies test takers who scored well on the MC items but poorly on the CR item being studied, as well as those who did poorly on the MC items and well on the studied CR item. Within these guidelines, the selection is random, ensuring representation of all responses. The balance of the sample comprises those responses fitting neither of the other two categories. By selecting equal numbers of cases from these strata, we over-represent anomalous responses. During this initial phase, samples of responses are examined and the rubric refined if responses that were not anticipated by the rubric are found.

Exhibit 1.16-2: Features of the REVISE Software



Following the analysis of field-test data, final revisions—along with sample responses and a report of effectiveness of rubric revisions on the committee sample(s)—are provided for final determination of which changes to implement. The next phase of rubric validation may be done by state experts, a teacher committee, or a mixture of both, depending on the item bank and the policies of its owners. In this phase, a final, independent sample of responses is drawn and examined. Any necessary adjustments to the rubric are made, and the entire sample is rescored to ensure that all and only the intended responses change.

Following rubric validation, all items are subject to the statistical checks, and flagged items are presented in data review committees. For fixed-form and multi-stage adaptive tests, our technical team answers each form and compares the answers to the key. Any discrepancies are reviewed and resolved with our content team.

Managing and Monitoring Real-Time Handscoring

CAI has developed a system that enables us to handscore and report adaptively administered CR items from a large pool and report the test within 12 business days of the student finishing the test. This system relies on

- simulations of the adaptive algorithm, which tell us the relative frequency with which each item will be used; and
- historical data, which enable us to predict (in broad categories) when students will test.

We use these data to model the expected flow of responses once the test window begins. As students complete tests, those tests flow into our analysis system. As our analysis systems process responses that need handscoring, responses are passed to a system we call *Ledger*. Ledger stores responses and transmits them to the scoring system, which is configured to send updates on each response being scored to enable us to track its progress through the system.

Ledger is loaded with data on the number of scorers trained to score each item, number of scorers currently assigned to score each item, and service-level agreements. Ledger produces summary reports that indicate the number of responses approaching the maximum scoring time, summarizing (for example) the number of responses due in 10 days, the number of responses due in nine days, etc. Comparing the predicted workflows with the actual workflows allows us to make real-time adjustments in staffing to ensure that we meet our commitments.

Scoring Plan and Specifications

CAI has a well-honed process for developing and maintaining scoring specifications to ensure that final scores, reports, and data files are produced accurately on time. Once the specifications are complete, our software team configures the system to compute the results. At the same time, our psychometricians develop a parallel scoring process. We run a large number of simulated tests through both systems to ensure that they give the same results. The test sets are designed to exercise every special case, as well as thousands of ordinary cases. This process ensures that our automated systems are producing accurate scores.

We will provide a scoring plan for each of the ILEARN, I AM, and IREAD-3 programs for IDOE review and approval. This plan includes specifications based upon each assessment's test design and blueprints. This approach will ensure that student results provide valid and reliable data on each assessment scoring claim and are computed consistently within a program for all Indiana students. CAI will produce a set of analysis, scoring, and reporting specifications that outline every detail in the process and these will be approved by IDOE.

As outlined in the RFP, the ILEARN and I AM assessment results will be available no later than July 1 following each Spring test administration. IREAD-3 results will be available within four weeks of the last test date for the Spring window and on a rolling basis during the Summer retest beginning within two weeks of the window start date.

2. Handscoring

Data Recognition Corporation (DRC) has more than 30 years of experience providing accurate scores for millions of online and paper-pencil student responses, utilizing numerous scoring models to score responses from multiple content areas, grades, and end-of-course assessments for numerous state department of education clients, including Alabama, Alaska, Arkansas, Delaware, Florida, Kentucky, Louisiana, Minnesota, Nebraska, Nevada, New Jersey, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Utah, Washington, and Wisconsin.

DRC has extensive experience scoring Smarter Balanced assessment responses including handscoring the Smarter Balanced field-test responses in 2012 and 2013, participating in discussions regarding training materials to be used in operational scoring each spring from 2015 to 2017, and handscoring operational responses from 2015 to present. DRC understands that the proposed work will require careful planning, thorough and thoughtful systems designs, and sound execution of agreed-upon procedures.

Roles and Responsibilities of Scoring Personnel

DRC offers experienced performance assessment personnel who are unsurpassed in the industry. DRC's scorers, team leaders, and scoring directors are reliable, accurate, and instrumental in meeting strict reporting deadlines. Their content staff has many years of experience with large-scale assessments, and their management staff has in-depth knowledge of monitoring scoring sessions, producing accurate results, and meeting deadlines for numerous clients. DRC is confident that their experienced staff will provide accurate and timely handscoring for Indiana. All scorers are closely supervised by the scoring leadership team, comprised of a handscoring manager and a handscoring advisor for each assessment program that DRC handscores. An overview of the roles is included in this section.

Handscoring Advisor

DRC's handscoring advisors serve as needed in an advisory capacity to help inform and monitor the handscoring process, services, and results for the programs that DRC handscores. DRC's proposed handscoring advisor, DeeAnn Jacobs, director of Performance Assessment Services, will ensure that scoring services for Indiana's ILEARN assessments are of the highest quality by providing guidance and direction for DRC's handscoring services, as needed.

Ms. Jacobs, who is based out of Indianapolis, Indiana, has more than 24 years of large-scale testing experience and 10 years of experience working on Indiana programs. She has been involved with virtually all facets of handscoring before becoming a leader within DRC. She currently manages all activities for multiple assessment programs with a wide array of clients.

Handscoring Supervisor

DRC's proposed handscoring supervisor, Kathy Kanolis, senior project manager, Performance Assessment Services, has 20 years of performance assessment experience, including 15 years overseeing all handscoring activities for the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+). She was responsible for all applied skills scoring for grades 3–8 and the Graduation Qualifying Exam (GQE) under a previous contract.

Ms. Kanolis has experience working on every type of assessment, including custom statewide assessments, high school equivalency (HSE) assessments, shelf assessments, and English language proficiency assessments. Ms. Kanolis, based out of Indianapolis, is currently responsible for DRC's HSE and alternate assessment programs that require handscoring, overseeing all day-to-day operations, rangefinding, and training materials creation.

The scoring directors on the programs Ms. Kanolis oversees report directly to her within the DRC organization. She has served in this capacity for numerous assessment programs, including those in Alabama, Indiana, Nevada, New York, Washington, and Wisconsin. In addition to her work in educational assessment, Ms. Kanolis has two years of experience teaching undergraduate education at Purdue University. She has extensive experience working with Indiana teachers, providing professional development on rubric use and handscoring activities.

Scoring Directors

DRC's scoring directors oversee the handscoring activities for one or more specific items, typically focused on one grade and one content area. The scoring directors are responsible for rangefinding preparation and facilitation; building training materials, including selection of responses and annotations; training team leaders and scorers; and monitoring timely and accurate handscoring sessions. Typically, a handscoring session will last from one to several weeks, with multiple teams of scorers all reporting to the scoring director.

DRC's scoring directors are promoted from within DRC's pool of team leaders (who, likewise, are promoted from their pool of scorers) based on their demonstrated ability to train scorers, to communicate well, to internalize scoring criteria, and to apply scores with consistency and accuracy. Their scoring directors have years of experience with DRC's handscoring application, ScoreBoard, and applying DRC handscoring quality control processes to ensure that handscoring sessions yield timely and accurate scores.

Team Leaders

DRC's team leaders oversee small teams of approximately 8–12 scorers during handscoring sessions. Typically, the scoring director provides initial training to all scorers. Subsequently, each team leader is responsible for monitoring the performance of the scorers on their team and providing feedback and retraining as needed on an ongoing basis until scoring is complete.

DRC's team leaders are promoted from within their pool of scorers based on their demonstrated ability to communicate well, to internalize scoring criteria, and to apply scores with consistency and accuracy. Their team leaders often have years of experience working with ScoreBoard and applying DRC handscoring quality control processes. Team leaders report directly to the scoring director who is leading their current handscoring assignment.

Scorers

For ILEARN, current Indiana educators will be given preference for all scoring opportunities. While it is DRC's goal to staff the ILEARN scoring project with as many current Indiana educators as possible, DRC has numerous experienced handscoring professionals available to work on the program in the event that DRC scorers are needed to ensure that scoring can be completed within the established timeframes. Utilizing a multi-dimensional approach will allow DRC to score more efficiently, which will assist in expediting the return of results to schools. DRC adds to the scorer pool through a comprehensive hiring process each spring. DRC selects scorers who are articulate, conscientious, and flexible. These individuals have strong content-specific backgrounds; they are educators, writers, editors, and other professionals. They are valued for their professional and academic experience but are required to set aside any biases concerning student performance and accept the scoring standards of the client's program.

With excellent and well-educated labor pools available in a wide range of regions throughout the country, DRC is able to tailor the scoring staff to each client's program. All DRC scorers undergo rigorous content screening, including the demonstration of writing ability, as part of the interviewing process. The majority of DRC scorers have years of experience with scoring large-scale assessments. DRC's proposed scoring advisor and handscoring supervisor are based out of Indiana and thus will be readily available for all phases of the scoring process.

As part of DRC's hiring process, scorer candidates (with the exception of the Indiana educators) are selected for specific assessments based upon various criteria, including previous handscoring experience (when applicable), previous educational and work experience, as well as writing and mathematical ability demonstrated during the recruiting process.

In September of each school year, CAI and DRC will submit to IDOE a detailed plan outlining how it can utilize, recruit, and train Indiana educators for all ILEARN administrations. Due to the small scope of students participating in the Fall

and Winter Biology end-of-course assessment (ECA) administration windows, recruitment will be targeted. Recruitment for the Spring ILEARN test administrations, including the Spring ILEARN grades 3–8 and the Spring ILEARN Biology ECA, will be available to all Indiana educators who are interested and able to participate in handscoring activities. Included in this plan will be any monetary allocation for educator scorer participants (i.e., $16 per hour pay rate), as well as considerations for recruitment and completion of handscoring if the number of required educators needed for handscoring is not achieved.

Handscoring System

DRC's handscoring system, ScoreBoard, has proven to be a highly efficient and accurate platform for scoring large-scale assessments for nearly 15 years. This dynamic system can be used to score image-scanned paper-pencil responses intermixed with responses created in an online testing platform, including other vendors' testing engines. The same stringent measures of quality control, including numerous handscoring reports, are readily available regardless of the mode of response. Therefore, DRC's process for scoring computer-generated responses is identical to their process for scoring handwritten responses; this ensures that clients are provided with the fairest scoring environment possible. DRC also conducts a bias training to ensure that their scorers do not view handwritten responses differently than typed responses.

ScoreBoard is DRC's online scoring platform which allows student responses to be electronically routed to geographically dispersed DRC scoring centers or to any scorers working remotely. Responses are allocated to scorers through a custom dealer program, ensuring that each scorer is assigned a random workload that allows the project to be processed in the most efficient manner possible.

With ScoreBoard, each open-ended item's position within the assessment is defined through the use of the programmatic Item Definition Application. For each item, the system also requires the definition of possible score values, nonscore values, and applicable scoring rules (i.e., all responses receive one independent read with a randomly-selected 10% receiving a blind second read). ScoreBoard provides scorers with the ability to view full-page images from multiple perspectives—such as zooming in/out and image flipping or rotation—in order to correctly interpret written responses. Images remain intact with various viewing capabilities and cannot be modified by the scorers. Additionally, system functionality applies a set of process rules and client-defined "read-behind" criteria.

CAI and DRC recognize that there are some items on the ILEARN Science assessments that are 'hybrid' items containing both machine-scored and handscored components within one item. CAI and DRC will be able to transmit and successfully score these item types in alignment with traditional handscored items.

Security

Security is essential to DRC's handscoring process, regardless of the mode of scoring. When users log in to ScoreBoard, either remotely or in a scoring site, they are required to read and accept DRC's security policy before accessing any student responses. For each project, scorers are also required to read and sign a non-disclosure agreement; during training, emphasis is always given to what security means, the importance of maintaining security, and how best to adhere to DRC's stringent security measures.

Scorers have access to only student responses they are qualified to score. Each scorer is assigned a unique username and password to access DRC's imaging system and must qualify before viewing any live student responses. DRC maintains full control of who may access the system and which item each scorer may score. No demographic data are available to scorers at any time. If any type of security breach were to occur, clients would be notified, and immediate actions would be taken to secure materials. The employee would be terminated.

Each DRC scoring center is a secure facility. Access to scoring centers is limited to badge-wearing staff and to visitors accompanied by authorized staff. All scorers are made aware that no scoring materials may leave the scoring center and must sign legally-binding confidentiality agreements before work begins. DRC retains these agreements for the duration of the contract. To prevent the unauthorized duplication of secure materials, cell phone and camera use while scoring is strictly forbidden.

In the remote scoring environment, security reminders are given daily. As with the work that occurs within DRC scoring sites, education regarding confidentiality expectations is the best way to maintain the security of project materials. DRC requires scorers working remotely to work in a private environment away from other people (including family members). Scorers are able to log in to the system only during the hours of their shift. As in DRC's scoring centers, the use of cell phones, cameras, or other recording devices in the remote scoring environment is strictly prohibited.

Scoring Procedures

DRC's training, qualifying, scoring, and monitoring processes are the best in the industry. All these processes have been used for years to score large-scale assessments. Furthermore, these processes have been ISO certified since 2007. DRC's general scoring procedures are highlighted in Exhibit 1.16.2-1; more detailed descriptions of these processes are also provided.

Exhibit 1.16.2-1: General Scoring Procedures

Scorer Training and Qualifying

- Scorers are seated at imaging stations and are assigned unique user IDs and passwords.
- The scoring director provides detailed directions for use of DRC's computerized handscoring system.
- The scoring director trains the scorers using item-specific anchor sets and training sets.
- Scorers must demonstrate scoring proficiency on item-specific qualifying sets before scoring live responses.

Routing Responses to Ensure "Blind" Second Reads

- The Image Handscoring System ensures that responses are routed to qualified scorers until the prescribed number of reads is performed for all responses.
- Scorers cannot tell if they are the first or second scorer.

Monitoring Scoring (Handscoring Quality Control)

- Ongoing quality control checks and procedures monitor and maintain the quality of the scoring sessions. If unusual data are observed, DRC will investigate and resolve any issues.
- Responses can be retrieved on demand (e.g., specific batch files, specific grades, specific students) should the need arise during or subsequent to the handscoring process.
- If needed (or requested), responses can be rescored based on item- or response-level information, including item number, date, score value assigned, or scorer ID.

Handling Unusual Responses

- Scorers can forward responses to team leaders for assistance.
- Responses requiring special attention, including non-scorables and alerts, are routed to scoring directors for review and resolution.

Creating Training Materials

After field testing newly developed items, committees of DRC scoring staff and IDOE will conduct a thorough rangefinding process. This collaborative process will provide a compilation of student responses that form the foundation of comprehensive training materials for scorers. DRC's scoring directors prepare for the rangefinding sessions by using the approved scoring rubrics to select a representative sample of responses for each score point. Then, the rangefinding committee reviews the student responses with the scoring rubrics and establishes consensus scores for each of the responses. DRC's scoring directors take extensive notes that detail the rationale behind each of the consensus scores given during the rangefinding process.

Once rangefinding is complete, DRC utilizes the rangefinding responses to develop operational training materials for scoring. Only responses with a high level of agreement are used to train the scorers. All anchor sets (annotated responses representing each score point), as well as all training and qualifying sets, are created by DRC. All notes generated during the rangefinding process remain with each response selected, either in the annotation (for anchor responses) or in the scoring director's notes (for training and qualifying responses). The anchor sets and training materials for handscoring open-ended items will be maintained by DRC for all online and paper-and-pencil administrations of ILEARN. DRC understands that the anchor sets and training materials must include the following:

- One anchor set per item, which includes sample scores for the array or possible score points
- One annotation set per item, which includes rationale for the scores represented in the anchor set
- Two practice sets per item with 10 practice papers across a variety of score points
- Two qualifications sets per item with 10 qualification papers across a variety of score points
- Score point designations clearly delineated for materials used in the training and handscoring process

DRC will submit copies of training materials to IDOE staff for review prior to their use in operational scoring. DRC looks forward to this collaborative process with IDOE.

As part of the work that goes into training and creating sets, DRC's handscoring supervisors and scoring directors will work together to select and develop annotations for specific student responses that are representative of specific score points. The annotations will be developed through the collaborative conversations that take place during rangefinding

meetings. These responses and annotations will then be released for public view. DRC will work closely with IDOE to determine the specific requirements (format to be used, etc.) for this task. All response selections and annotations will be approved by IDOE prior to release. DRC's Performance Assessment Services Team has produced released item documents for other clients and will produce quality documents for IDOE demonstrating their quality handscoring processes.

For all operational items, DRC will work with IDOE to retrieve all scoring anchor sets and practice (training) sets for use in handscoring operational items.

Training Team Leaders

Before scorer training begins, DRC provides team leaders with comprehensive training. Team leader training lasts approximately two days and follows the same process used in the scorer training (detailed in the next section), although it is more comprehensive due to the training and oversight responsibilities required of the team leaders.

During their training, team leaders are required to become familiar with the official Indiana-approved annotations that accompany training responses. To promote scoring consistency, it is imperative that each team leader imparts the same rationale for the score assigned to each training response. This consistency ensures that scorers assign the correct scores for the correct reasons. Once the team leaders have qualified for operational scoring, they will prepare for the arrival of their teams of scorers.

Training and Qualifying Scorers

Scorer content- and item-specific training begins with a presentation and discussion of the rubric which defines each score point. After reviewing the rubric, the scoring director will review the anchor set. The anchor sets contain multiple examples of each score point, each with an annotation that explains the response's score using language from the rubric. Each scorer will be supplied with a paper copy of the rubric and electronic version of the annotated anchor set so that they can easily reference these materials while scoring training responses. The rubrics and anchors are secure materials that scorers are not permitted to duplicate or share outside of the scoring environment.

After reviewing the rubric and anchor responses, the scoring director trains the scorers on how to use ScoreBoard more thoroughly. During training within a physical facility, scorers are seated at imaging stations and grouped by team. Each scorer, regardless of scoring environment, is assigned a unique user ID and password for logging in to ScoreBoard. The scorers log into the system to access training and qualifying sets in order to continue their item-specific training. Scorers using the distributed scoring method use the same process, but in a virtual setting. The scoring platform for each model is the same.

Once scorers are logged in, they will access training sets, which serve as an opportunity to "practice" scoring. Each team of scorers will work on one training set at a time. After the scorers complete each training set, the scoring director will review reports that detail how each scorer performed and how each response within the set was scored. Next, the scoring director and/or team leaders will use this information to lead a thorough discussion of each set, answering questions to help ensure that the scorers understand the proper way to apply the rubric to each of the training responses.

After the scoring guide and all training sets have been discussed, scorers (including Indiana educators), like team leaders, must demonstrate their ability to apply the scoring criteria by qualifying (i.e., scoring with an acceptable agreement rate agreed upon by the Department) on at least one of the qualifying sets.

Scorers will access the qualifying sets via ScoreBoard so that their scores can be captured and reported. Any scorer who does not qualify by the end of the qualifying process will not be allowed to score actual student work.

Indiana educators will be trained using the same process, but the training will be recorded so these educators can join scoring after the initial training. This will ensure the educators receive the same comprehensive training as the scorers. The training materials and video will be provided within DRC's secure, remote handscoring system. DRC has full control over who can access the training materials and videos, ensuring that this secure content will only be accessed by educators who have been hired to participate in the scoring process. Educators will also be expected to go through the qualifying process to ensure adherence to the rubrics and scoring criteria as well as consistency in scoring. Scoring supervisors will be available to answer questions, and technical support will also be available to Indiana educators/instructional coaches, the same as with DRC scorers.

DRC looks forward to working with the IDOE to ensure that their training processes reflect the wishes of the Department. DRC also offers their clients the opportunity to schedule/set up scoring visits (virtual or in-person) so that the Department

can observe scorer training and/or live scoring of the Indiana student responses associated with this RFP. Additionally, if IDOE is interested, DRC can provide IDOE visibility to Indiana-specific handscoring quality monitoring reports.

Routing Responses to Ensure "Blind" Second Reads

DRC's ScoreBoard system separates responses by grade, subject, and item and routes to qualified scorers who read each response and enter the score. DRC's system has the flexibility to handle the dynamic needs of their state department of education clients. The process of routing and scoring responses continues until all responses have received the prescribed level of readings. Scorers cannot tell if they are conducting first or second readings; all readings and associated scores are, in effect, "blind."

DRC will apply reliability reads (second-scoring) to 10% of all handscored items (both online and on paper).

Quality Management Process

DRC is proud of their suite of Quality Management Tools and are confident in their ability to tailor their use to fit the IDOE's needs. DRC follows best practices, has standardized the training process, and has, since 2007, had their processes, people, and facilities ISO certified.

ISO Certification

DRC's Performance Assessment Scoring ability has been ISO 9001 certified since 2007. Some of the fundamental criteria of the ISO 9001 standard are:

- Adhering to a set of procedures that covers key processes within the handscoring process
- Keeping proper records
- Regularly reviewing individual processes and the quality system itself for effectiveness
- Facilitating the continual improvement customers expect

Certification means that an independent ISO auditor conducts an annual audit to interview handscoring staff, including program managers, scoring directors, team leaders, and scorers, in order to ensure that they maintain consistent processes for record keeping, training/qualifying, and scorer monitoring.

DRC views handscoring quality management as a collaborative effort between departments of education and performance assessment staff. DRC looks forward to developing procedures specifically tailored to the ILEARN program in conjunction with IDOE.

A variety of quality monitoring tools and techniques will be used daily throughout each scoring window, as described.

Handscoring Quality Control

DRC is able to run handscoring reports on demand in order to monitor progress and maintain handscoring quality control. The scoring reliability system continuously monitors score quality and reports statistics for census scores of student responses throughout the handscoring window. During the handscoring process, scoring directors meet regularly with their team leaders to review statistics generated from the scorers on each of their teams. If scoring patterns are apparent among individual scorers, team leaders address these issues on an individual basis. DRC's scoring system allows a team leader to determine read-behind rates (frequency of monitoring) for each scorer. If a scorer appears to need clarification of the scoring rules, or is scoring tentatively, DRC typically monitors one out of five readings, making adjustments to that ratio as needed. The scoring system automatically selects which responses the team leader monitors.

DRC will also monitor Inter-Rater Reliability (IRR) at both the individual scorer and item levels. If a scorer falls below an acceptable rate of agreement, the team leader will re-train the scorer. If a scorer fails to improve after re-training and feedback, DRC will remove the scorer from the project. In that situation, DRC removes all scores assigned by the scorer in question. The responses will then be re-dealt and rescored by qualified scorers. Monitoring IRR at the room level can give a big-picture indication that scorers are scoring consistently. DRC will work with the Department to ensure that IRR rates are established and maintained or exceeded. Finally, should any unexpected scoring trends or unexpected response types require attention during scoring, DRC will review the response(s) with the Department to ensure that all scoring issues are handled immediately.

DRC does not report on scorer performance after the fact, as some contractors do. DRC believes that scorers with less-than-acceptable scoring patterns must be identified immediately and retrained in order to correct the patterns. DRC has worked diligently to devise effective monitoring reports and procedures to accomplish both detection and correction.

Accurate and consistent results are the backbone of all handscoring activities. The following methods used by DRC guarantee scoring quality:

- Rigorous **training and qualifying** for each item ensures a pool of scorers who will apply consistent and accurate scores.
- **Validity** responses detect possible room drift and individual drift. Validity reports compare scorers' scores to pre-determined scores. Validity responses are seeded to scorers. Scorers cannot distinguish validity responses from live responses, making this a powerful measure of quality control.
- Team leaders conduct routine **read-behinds** to observe, in real time, scorers' performance. Team leaders utilize live, scored responses to provide ongoing feedback and, if necessary, retraining for scorers.
- **Inter-rater reliability and score point distribution reports** are generated daily or on demand to monitor scorer reliability and maintain an acceptable level of scoring accuracy. The reports compile individual scorer data, including scorer identification number, number of responses scored, individual score point distributions, and exact agreement rates. DRC will investigate any issues and resolve any problems identified by the reports.

Quality Control Reports

DRC currently uses a number of reports to monitor the quality and/or effectiveness of various aspects of handscoring projects. Their reports have multiple parameter selections so, oftentimes, more than one individual report is included under the same report name. The reports that DRC currently uses to monitor handscoring are included in Exhibit 1.16.2-2.

Exhibit 1.16.2-2: Quality Control Reports

Report	Report Specifics
Scoring Summary Report	DRC's Scoring Summary Report provides daily and cumulative inter-rater reliability results, score point distribution data, and production volumes for each reader and item. **Inter-Rater Reliability** Monitors how often scorers are in exact agreement with each other and ensures that an acceptable agreement rate is maintained. This report provides daily and cumulative exact and adjacent inter-scorer agreement and the percentage of responses requiring resolution (only if required). The calculations for this report are as follows: • **Percentage Exact**—total number of responses by scorer, where scores are equal divided by the number of responses that were scored twice • **Percentage Adjacent**—total number of responses by scorer where scores are one point apart divided by the number of responses that were scored twice • **Percentage Non-Adjacent**—total number of responses by scorer where scores are more than one score point apart divided by the number of responses that were scored twice **Score Point Distribution** Monitors the percentage of responses given each of the score points. For example, for items on a 0–4 point scale, this daily and cumulative report shows how many 0s, 1s, 2s, 3s, and 4s a scorer has given to all the responses he or she has scored at the time the report is produced. These percentages can be compared to room-wide percentages to detect individual scoring issues. **Production Volumes** This report also indicates the number of responses read by each scorer so that production rates can be monitored. Additionally, it includes totals for each item so that progress toward completion can be monitored.
Item Status Report (Completion Reports)	Monitors the progress of handscoring. This report tracks each response and indicates the status (e.g., "needs a second reading," "complete"). This report ensures that all discrepancies are resolved by the end of the project. Information from this report will be used to create room-specific Daily and Cumulative Completion Reports to compare on a daily and cumulative basis the amount of readings completed in comparison to projected completion targets.
Read-Behind Log	Used by team leaders/scoring directors to monitor scorer reliability. Team leaders randomly select and read scored responses from each team member daily. If the team leader disagrees with the scorer's score, remediation occurs, either with the team leader or the scoring director. This has proven to be a very effective form of feedback because it is implemented with items live-scored by individual scorers.
Training/Qualifying Reports	Training and qualifying records are kept on every reader for every set taken. These reports can be run using various parameters to meet the needs of the Department (by performance task or set, reader, team, grade/subject) and can be run daily or cumulatively.
Recalibration/ Validity Reports	These two processes are conducted throughout the entire scoring session. Both processes compare pre-determined scored responses to readers' scores for the same set of responses. Additional responses are given to individuals if the scoring director feels that it is warranted. These reports can be run at the individual, team, or room level in order to detect individual, team, or room-wide scorer drift.

DRC is proud of this suite of quality control reports developed specifically for handscoring projects. Because these reports are able to be produced in real time, clients can be assured that immediate action will be taken to resolve scoring discrepancies within minutes (if necessary) of the first and/or second reading. DRC looks forward to consulting with the

IDOE to determine the best way to make their handscoring reports available for use by the Department. DRC is confident that they will be able to supply handscoring reports that meet the Department's needs and they look forward to collaborating with the Department on this endeavor.

3. Results and Reports

Introduction

The RFP envisions a reporting system that supports the current I AM, ILEARN, and IREAD-3 assessments. We have successfully delivered online reports to Indiana educators and parents for the past three years. We have seen that it is critical for teachers to understand the results of the assessments to make instructional decisions and pinpoint strengths and weaknesses in their classes. We have also learned that teachers need an easy way to integrate their understanding of the results from multiple assessments. Providing reporting systems where relevant means actionable data arrive quickly at the school to support more effective instruction and greater student achievement. As a result, CAI is uniquely positioned to meet the reporting objectives outlined in the RFP and offers Indiana the following benefits:

- Our Centralized Reporting System (CRS) is designed to provide timely, relevant reports to educators while guiding those educators to make valid, actionable interpretations of the data and foster communication between parents, educators, and students.
- The CRS integrates with CAI's Roster Tracking System (RTS), which serves as the student enrollment system of our Test Information Distribution Engine (TIDE). Consequently, each student's scores can follow the student as he or she moves among classes, schools, and districts.
- CAI has successfully reported the performance of approximately 2,710,218 students on 88 different ELA, mathematics, science, and social sciences summative assessments to Indiana educators and administrators over the past three years.
- Our reports are grounded in cognitive and focus group research with end users to help ensure that educators and parents who receive our reports understand the information as intended.
- Our system provides real-time scores as students submit their tests, even for most students writing essay responses and assessments with extended-response options. We commit to immediate scoring of online, machine-scored tests, and to providing results of tests requiring handscoring within 12 business days after the students complete the tests.
- The CRS allows schools and districts to batch-print PDF files of family reports for delivery to families.
- The CRS provides powerful standards-level reports for the class, school, and district that can help pinpoint programmatic strengths and weaknesses, indicating areas of improvement for adaptive assessments. It also allows users to view actual test items and student responses for nonsecure assessments. The CRS has information to help administrators evaluate the large-scale programmatic efficacy of school-level academic programs or curricular decisions.
- The CRS provides a QA/cleanup process for demographic data associated with assessment scores.
- We also propose a parent portal from which parents can directly access their child's results.

We propose to use CAI's CRS, which is designed to provide immediate, relevant reports so teachers can make valid, instructional decisions based on the data.

Overview of Centralized Reporting System

CAI proposes to provide Indiana teachers and administrators with an online reporting system that is intuitive and user-friendly and provides immediate access to assessment data. Educators can use the system to find and interpret data for multiple assessments.

In this section we describe

- the reports and features provided in the CRS; and
- reporting system security and control of access.

Overview of the Reports and Features Provided in the CRS

The CRS is integrated with CAI's suite of online systems such that updates done in one system will be reflected in near real time in the CRS, based on the rules established in collaboration with IDOE. The CRS dashboard presents users with summary data about the students for whom they are responsible (e.g., a principal will see the students in the school; a teacher will see students in his or her class). The user can then search through various levels of aggregation, all the way to

individual reports. The system allows users to target and access content more precisely, moving from subject area through reporting categories, and even to standards-level reports for aggregates. Finally, the system offers a longitudinal view of individual students or aggregates. Aggregate reports are available at every level, and authorized users can print or download them (or the data on which they are based). Individual student reports (ISRs) can be produced individually or batched as PDF files.

In addition, the CRS integrates with CAI's RTS, which serves as TIDE's student enrollment system. Consequently, each student's scores can follow the student as he or she moves among classes, schools, and districts. The RTS maintains information about the relationships among schools, districts, teachers, and students. As a student graduates and moves to a new school, his or her score history is automatically available to authorized users in this new school. A teacher with a new class can already know a good deal about the educational preparation of the students that he or she is about to teach. This is an especially important feature for schools and districts serving families and students who experience high mobility.

Our CRS currently supports translated reports for the following 15 languages: Arabic, Burmese, Cambodian, Chinese, Korean, Mandarin, Marshallese, Punjabi, Russian, S'gaw Karen, Somali, Spanish, Tagalog, Ukrainian, and Vietnamese. The system was designed to support translations in any language, and we have a process to verify support for each language and potentially make adjustments, if needed, for each new language. The process involves translating a sample ISR, rendering it using the same code the CRS uses to render the ISR, and then having a translation vendor verify that the translated text is being rendered correctly. See Exhibit 1.16.3-1 for a CRS overview.

Reporting System Security Features and Control of Access

Our CRS is designed to meet the highest security standards. It belongs to CAI's suite of programs and can be accessed through the common login system (CLS). It allows educators and administrators to move seamlessly between authorized programs without needing to reenter their login information. For example, if a teacher is moving between TIDE and the CRS, he or she will not need to sign in to two different applications. When a user signs in, he or she will see only the reports and student data to which he or she has access. Besides ensuring that users do not have access to unauthorized reports, this also helps to improve the user experience by displaying only data and reports that are relevant to the user. Any reports generated by our system are always encrypted at rest.

Access is controlled by a role- and a jurisdiction-based permissions system. A user who is authorized to view reports will have access to data only for students over whom the user has jurisdiction. User access to system functionality depends on the user's role, and roles (along with the permissions they require) are entirely configurable and customizable. All personally identifiable information (PII) is encrypted in the database.

Further access to data is controlled by configuring the the CRS to allow users to see scores for students as appropriate and is granted according to IDOE's policy. Exhibit 1.16.3-2 presents one sample configuration of user roles and access to data. In this example, school test coordinators (STCs) are permitted to see all the scores for students in the school, but teachers are permitted to view the scores only for their students. We will work with IDOE to configure the user roles and access to student score data for the assessments to reflect IDOE's policy in this area. CAI will also track all logins to the CRS as specified by the RFP.

Exhibit 1.16.3-1: Centralized Reporting System Overview

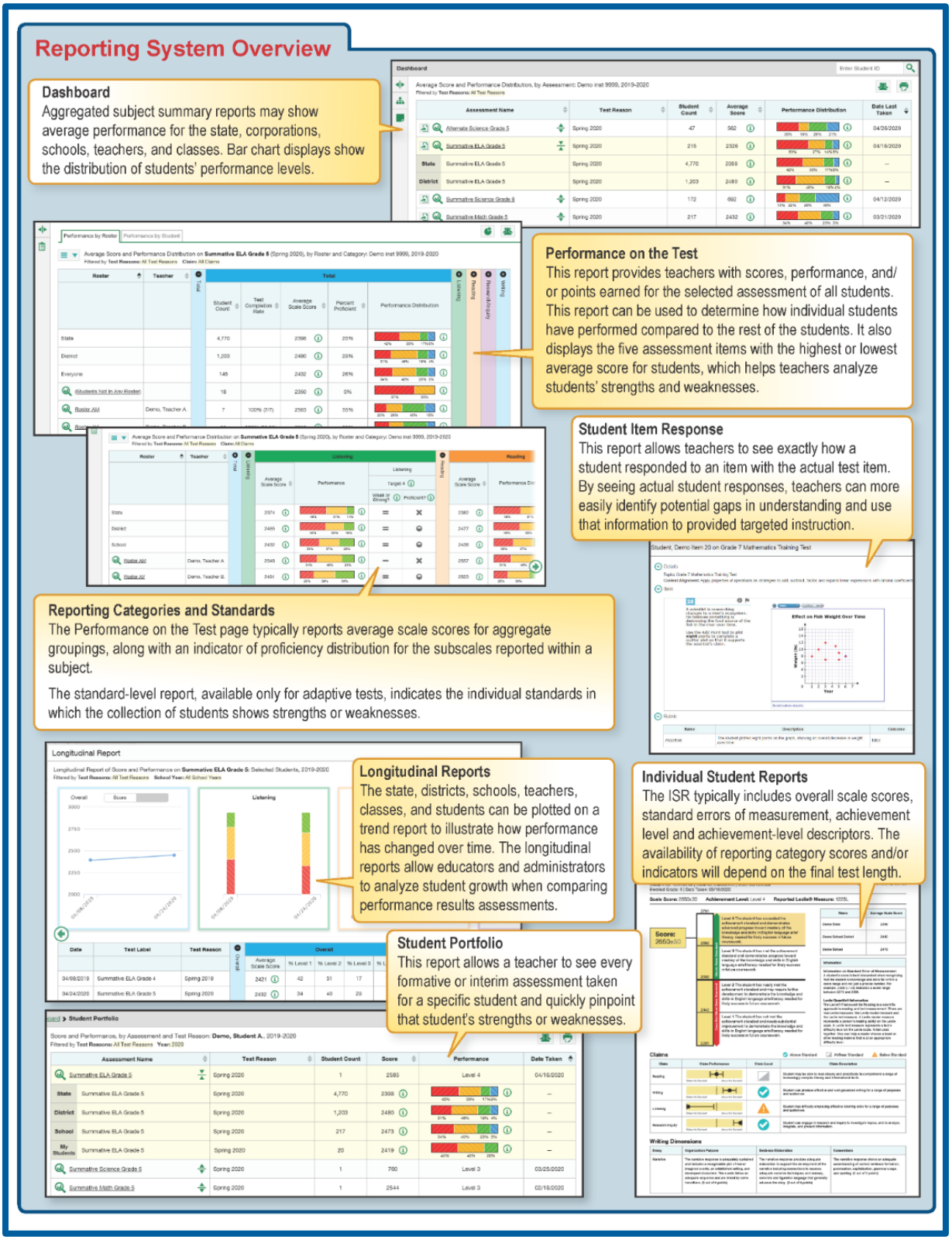


Exhibit 1.16.3-2: Sample List of Possible User Roles and Access to Data

	DISTRICT	DISTRICT	SCHOOL	SCHOOL	SCHOOL
	DA	AC	SC	TE	PR
TASK LABEL	District Administrator	Assessment Coordinator	School Coordinator	School Teacher	Proctor
What level should this user have?	all students within the district	all students within the district	all students within the school	all students within the roster	No Relationship
Does this user have access to Test Reason Manager?	Yes	Yes	Yes	No	No
Does this user have scoring access?	N/A	N/A	Yes	Yes	No

Features and Functionality of the Centralized Reporting System

In this section we describe

- data review and correction prior to, during, and following test administration; and
- CRS capabilities.

Reporting System Quality Assurance

CAI's automated data intake, processing, and extract systems are designed for high-volume efficiency and accuracy. Each time a student completes an online test, the TDS transmits data from that test event to our Quality Monitor (QM) system. Upon receipt of the student record, the QM system

- verifies scoring of student responses;
- validates scores presented to the student;
- calculates any other scores that will be used in the reporting systems along with standard errors of measurement;
- calculates derivative measures from those scores (e.g., proficiency designations); and
- performs customized validations of incoming data.

In virtually all cases, these checks are all passed. When they are not, an automated system alerts project team members who investigate and resolve the issue.

QM's quality checks are typically completed within one second of data receipt. Once the quality check is complete, the data are transmitted to the DOR and the CRS.

In addition, CAI performs rigorous QA checks to ensure the data accuracy of data files and online reports far in advance of any reports being released to the public.

Summary of Centralized Reporting System Capabilities

- **Privacy.** Access is controlled by a role- and a jurisdiction-based permissions system. A user who is authorized to view reports will have access only to data for students over whom the user has jurisdiction. For example, a district user (with an appropriate role) can see all the students in the district but not students in other districts. A school user can see students in the school, and a teacher can see students in his or her class(es). User access to system functionality depends on roles, and roles (along with the permissions they require) are entirely configurable and customizable.
- **Roles.** Access to any report in the CRS can be configured according to user role. We will work with IDOE to define the program's user roles and users' access to the various reports. The CRS also has jurisdiction features that limit users to viewing only the student scores within their own school or district. IDOE can choose to be more restrictive and limit users' access to data on a specific group of students, identified on the basis of classroom information that can be fed into TIDE. Alternatively, IDOE can have school or corporation coordinators define these groups by uploading them to TIDE.

- **Mobile Compatible Reports.** All features and reports of the CRS are tablet accessible. All tables and data displays adjust to the tablet screen, simplifying the process of viewing rosters, requesting downloadable data files, and viewing custom-created reports.
- **Translated Reports.** Translated reports can be supported in the CRS as a cost option. When we offer the translated ISRs, parents and families who do not speak English as their first language will receive a report in their native language and will have a better understanding of their child's results. The CRS has the capability for translations in Spanish, Arabic, Burmese, Mandarin, German, and Vietnamese.
- **Delivery of District Data Files.** Our CRS includes a Student Results Generator tool that allows users to export a raw data file by district, school, teacher, or roster as the data become available. The files can be exported into Microsoft Excel or any other delimited file format so that they can be loaded easily into other software platforms. Users can export any table on any report in the CRS. Printed tables carry with them a footnote indicating the date on which the report was generated.
- **Batch-Printing.** Student reports can be exported as PDF files, and users can batch-print multiple students' reports simultaneously. The PDF file format makes electronic distribution simple and ensures that the report will print properly regardless of the user's browser.
- **Customizability.** All text and measures in the reporting tool are configurable, and CAI reporting staff will work closely with IDOE to define all text and measures as part of reporting specifications development. Users can also choose to show or hide individual columns in a table or sort columns in ascending or descending order.
- **Drill-Down Capability, and/or Question-Based Navigation.** The report navigation is designed to allow users to drill down to different dimensions of their data. For example, a user can move from the school reports to the roster reports and to the ISRs. At any point, the user may also want to switch from subject-level reports and drill down to the subscore reports or standard reports by expanding or collapsing by specific reporting category. This flexibility allows the user to drill down to any desired level of granularity in the data and then modify dimensions of the report without having to go back to the beginning and drill down again.
- **Aggregate Data.** Aggregate reports are available at every level, and authorized users can print these reports or download them (or the data on which they are based). In addition to the expected aggregate reports for a district, school, teacher, and class, the reporting tool allows users to create custom rosters of students so that groups of students within a class can be tracked and reported on separately. All aggregate reports are calculated from the student level up, so as new students test, reports for the roster, teacher, school, and district are updated instantaneously. All aggregate reports in the CRS can also be disaggregated by subgroups, as defined by IDOE. The CRS can also be configured to disaggregate by multiple characteristics at once (e.g., gender by ethnicity).
- **Individual Student-Level Data.** ISRs can be produced individually or batched as PDF files. At IDOE's discretion, the system can deliver a zip file containing ISRs as PDF files and a machine-readable manifest suitable for uploading into the district Student Information System (SIS). Most districts have these systems and maintain a secure parent portal, providing an efficient means of delivering the ISRs to parents.
- **Student Search.** Sometimes, a user wants only an individual student's report and wants it quickly. The student search feature allows users to search by student ID. Users can see only students to whom they have access, though users can also search for students from previous years. This capability allows a user to see an individual student's results with a minimal number of clicks.
- **Interpretive Guidance and Assistance.** The CRS comes with an intuitive user guide that provides step-by-step instructions for every report, information about each measure included in the CRS, and screen captures to illustrate processes and outputs. The user guide is accessible from any page in the CRS. Once the user clicks the Help icon, he or she will be taken to the relevant section of the user guide specific to the page he or she is on. The CRS also has an Information icon that provides a quick reference for users who want more information about how to interpret a specific reporting element.
- **Application Programming Interfaces (APIs) for Customizability.** Our CRS provides a wide range of customizability options for users at all levels when viewing the reports, such as sorting tables, specifying number of rows displayed, using collapsible and expandable accordion sections, and filtering data that appear on the reports.
- **Accessibility.** The CRS is designed to be accessible not only on different devices but by different user types, including people with disabilities. The system is Web Content Accessibility Guidelines (WCAG) 2.0 AA certified, which means it meets federal accessibility standards.

- **Ability to Archive and Report Multi-Year Student-Level Data.** The CRS can also archive multi-year data. We will work with IDOE to determine the number of years of historical data required.

Measures and Data in the CRS

Online reports will include, at a minimum, proficiency, and sub-score information as well as aggregate reports for the following:

- State summary
- Corporation summary
- School summary
- Class summary
- Individual student results (including actionable instructional next steps and reporting category information with references to depth of knowledge to demonstrate alignment)

We will work with IDOE to identify measures for the new assessments that are the most useful for each level of user. CAI also commits to providing other administrative reports as identified by IDOE including, but not limited to, participation reports for individual students as well as the state, corporations, schools, and classes.

In this section we describe

- screen captures of sample reports and how these reports are valuable to end users and support decisions around instruction and curriculum;
- the data we typically provide for reports at each level of the system; and
- CRS documentation and specifications.

Sample Reports

We note that this is only a sample of the reports and data that we can include in the CRS; we can provide any measure or information that IDOE would like to display in its reports.

Dashboard. The Dashboard page shows overall test results for all tests that the students have taken. On the initial screen, it shows the overall summary of how the students have performed by test group (e.g., Summative ELA). The aggregation card shows the grades tested, total students tested, the count and percentage of students in each performance level, and the date of the test last taken. Educators can click the subject group to view individual test results for the selected test group. For each test, the assessments table shows the test reason (a category assigned to an assessment, e.g., Fall interim or Winter interim), number of students who took the test, average score, performance distribution, and date the test was last taken. Exhibits 1.16.3-3 and 1.16.3-4 show sample Dashboard pages for a school.

Exhibit 1.16.3-3: Dashboard for a School

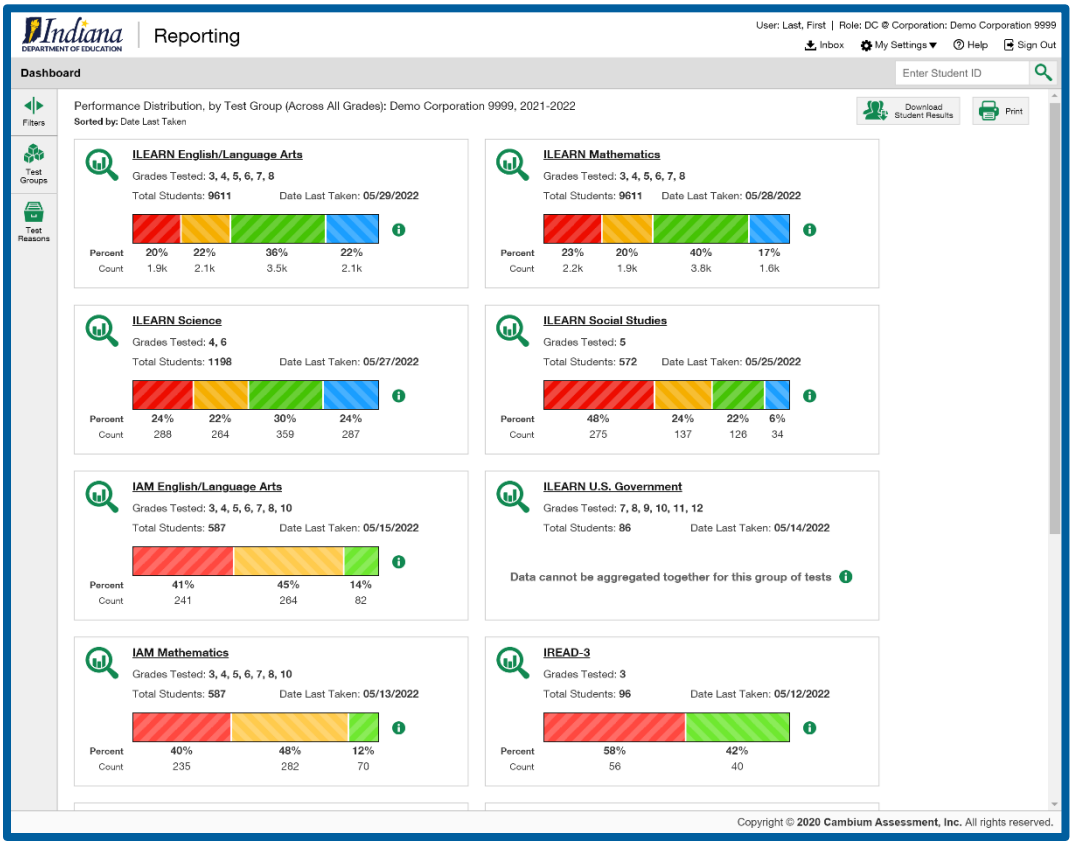
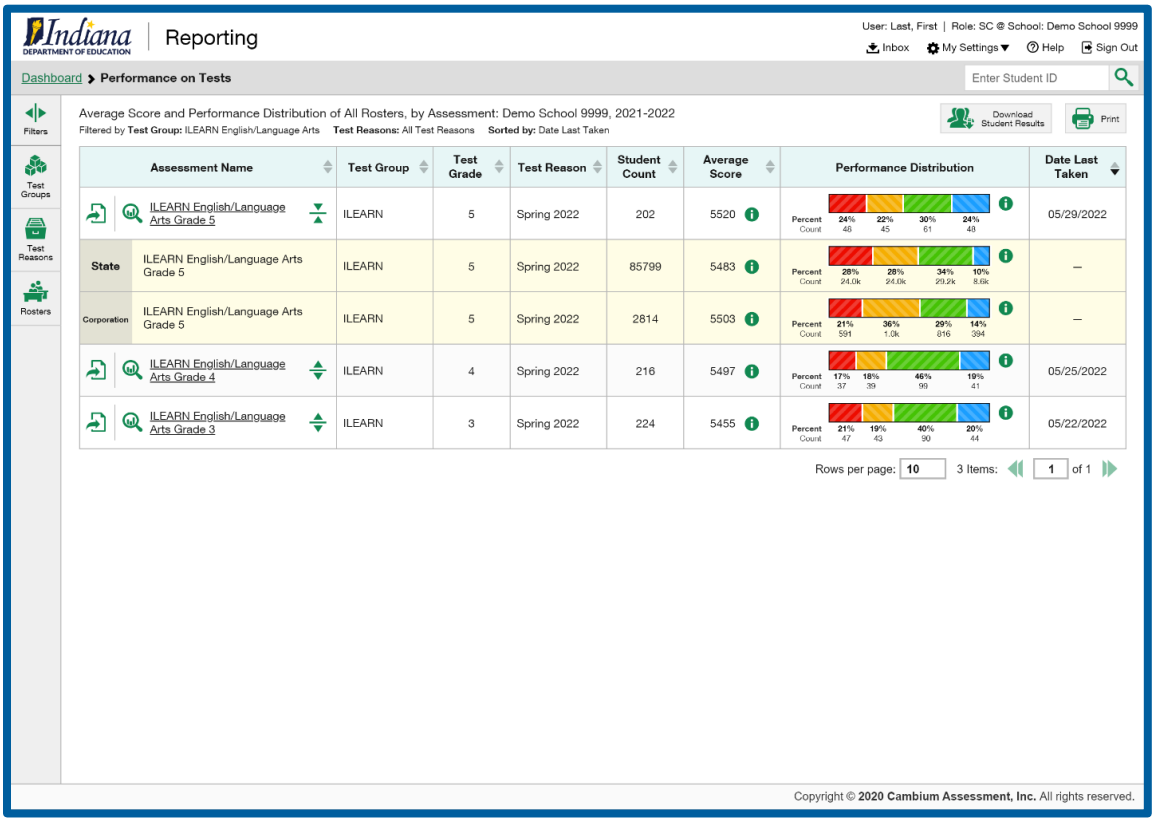


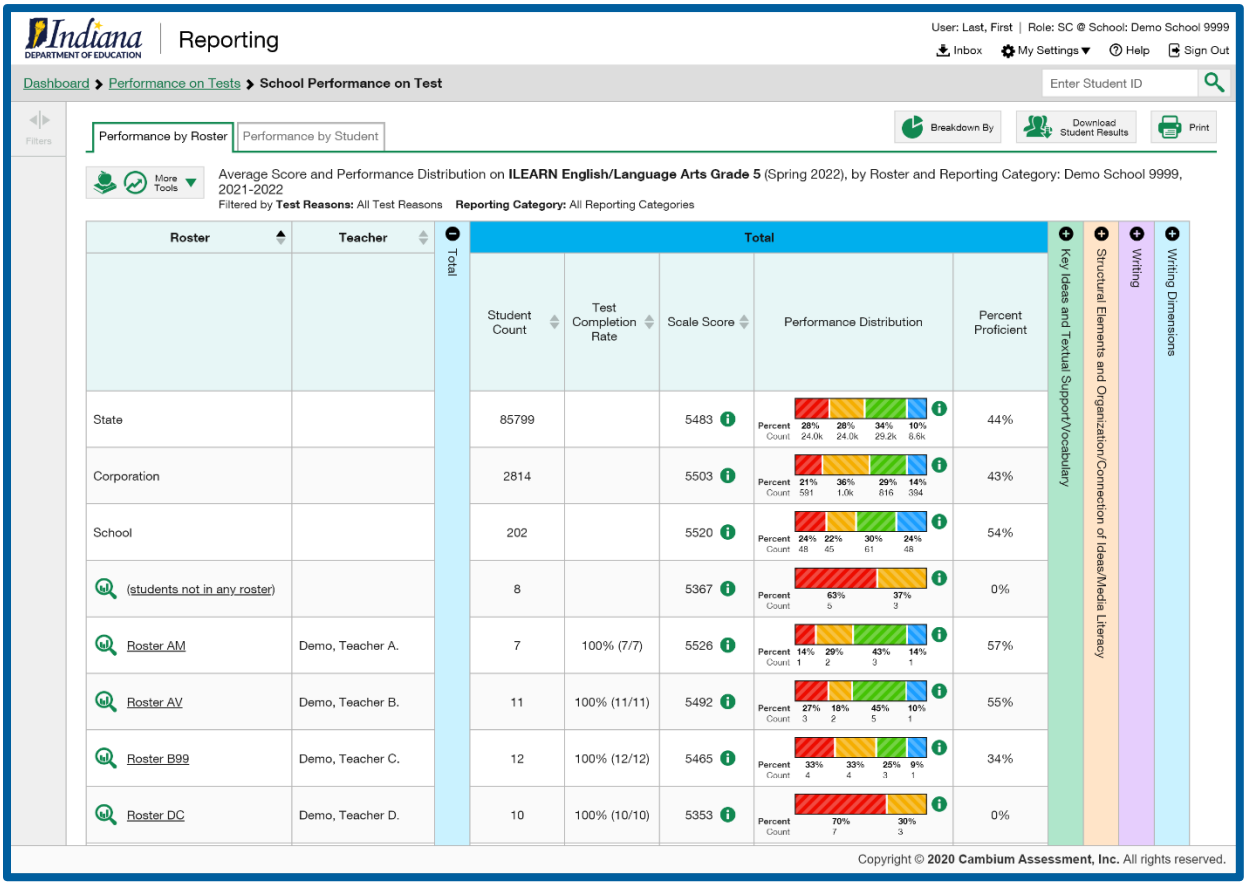
Exhibit 1.16.3-4: Detailed Dashboard for a School



Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The data on the Dashboard page gives administrators, principals, and teachers a way to quickly compare how their students have performed across different tests and test instruments that are linked. The dashboard allows teachers to view data across statistically linked tests to see progressions across interim and summative assessments. This is the first step in understanding which subject areas may need support both instructionally and from a curriculum perspective.

Subject Summary Results. Aggregated subject summary reports show average performance for the state, districts, schools, teachers, and classes. Bar chart displays show the distribution of students' performance levels. Columns can be sorted on any table in the system to allow for easy comparison, and groups can be disaggregated to report by demographic subgroup (e.g., gender). Exhibit 1.16.3-5 shows a sample subject summary report for a school.

Exhibit 1.16.3-5: Subject Summary for a School



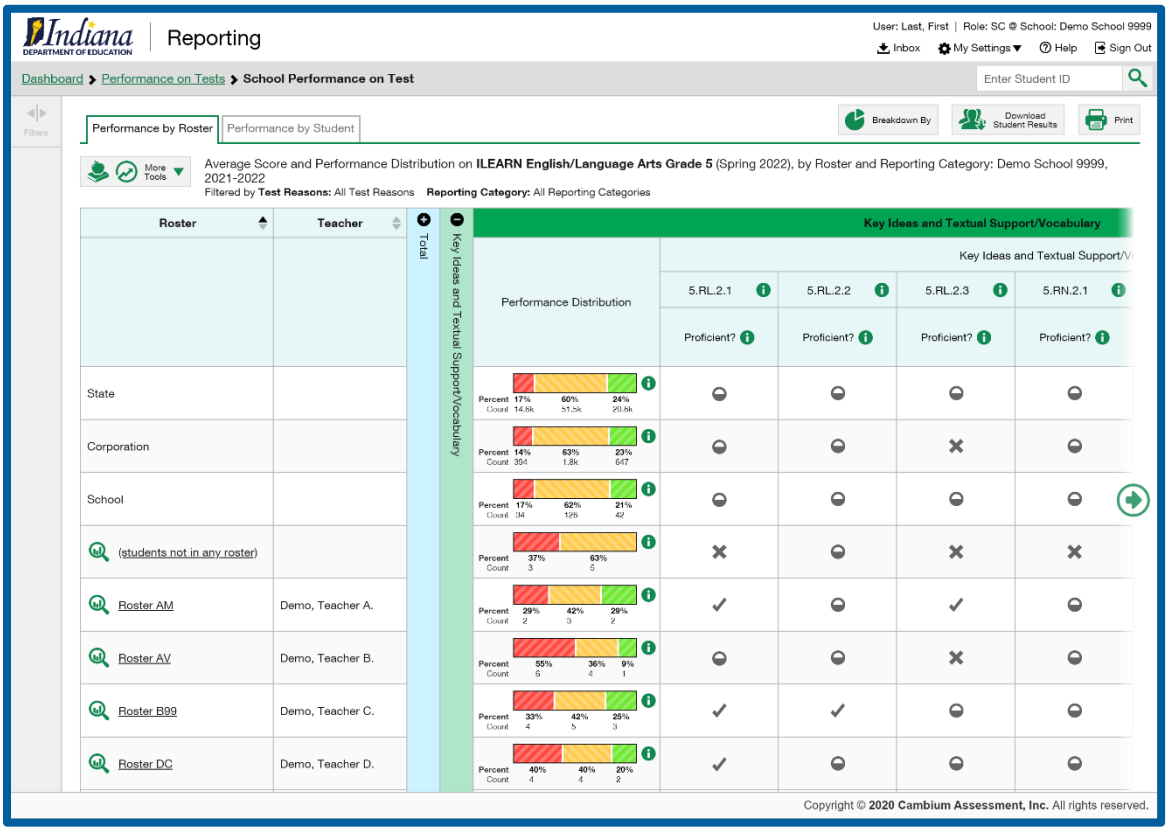
Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The subject summary report gives users detailed information on how students have performed on the selected tests. The report also provides a list of schools/rosters for educators to identify which group of students are struggling and which group of students are excelling on the test. Educators can also determine if there were any differences in the student's performance based on the demographic subgroups. For example, teachers can see student assessment results by limited English proficiency (LEP) code and observe that students in the subgroup category "Beginner" are struggling with ELA.

Reporting Category-Level Results. Aggregated reporting category results are also available on the same report, displaying performance data for the state, districts, schools, teachers, and classes. Exhibit 1.16.3-6 shows a sample school reporting category summary report for grade 5 ELA. In addition to reporting overall average scale scores for the test, we detail the reporting category average scale scores.

Additional indicators, such as the relative strength and weakness indicator for each reporting category and performance relative to proficiency, can be included in the report. The relative strength and weakness indicator will display whether students are performing better or worse on the reporting category compared to their performance on the test overall. The performance relative to proficiency indicator can show whether performance on a particular reporting category is above, below, or near the performance-level cut score.

The aggregate indicators and scores can be presented from any of the tests proposed here as options.

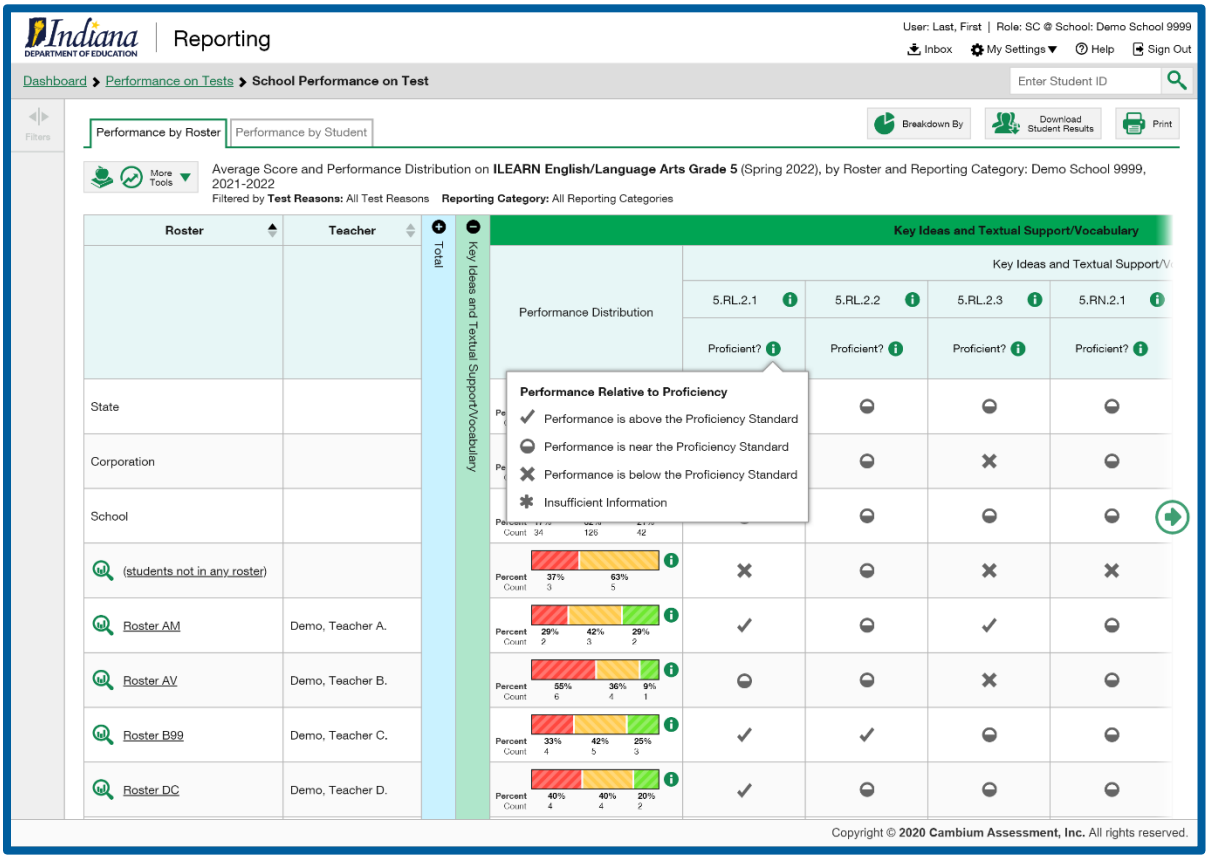
Exhibit 1.16.3-6: Reporting Category Summary for a School



Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The reporting category summary report provides educators with detailed information on how students have performed on the different areas of the selected tests. For example, a teacher might notice that his or her students are performing well overall in ELA but are struggling in the Reading for Literature area within ELA because their performance on the Reading for Literature content is weaker than would be expected of proficient students. This will help educators identify the areas where students are struggling and provide instructional support in the future.

Standard-Level Results. We have developed a standard-level report that can provide useful and reliable information at the group level (usually becoming useful for groups of 10 or more students). These reports leverage the adaptive environment to provide highly reliable, standard-level reports of strengths and weaknesses at the class, school, or district levels. Educators want precise information about the knowledge or skills students have or have not mastered. In the standard-level report, strengths and weaknesses are reported for groups of students based on whether there is a statistically significant difference between that group's performance on each standard and the group's performance on the rest of the test. A standard-level report also includes group performance relative to the expected performance of a student at the proficient cut score. See Exhibit 1.16.3-7 for a sample standard-level report.

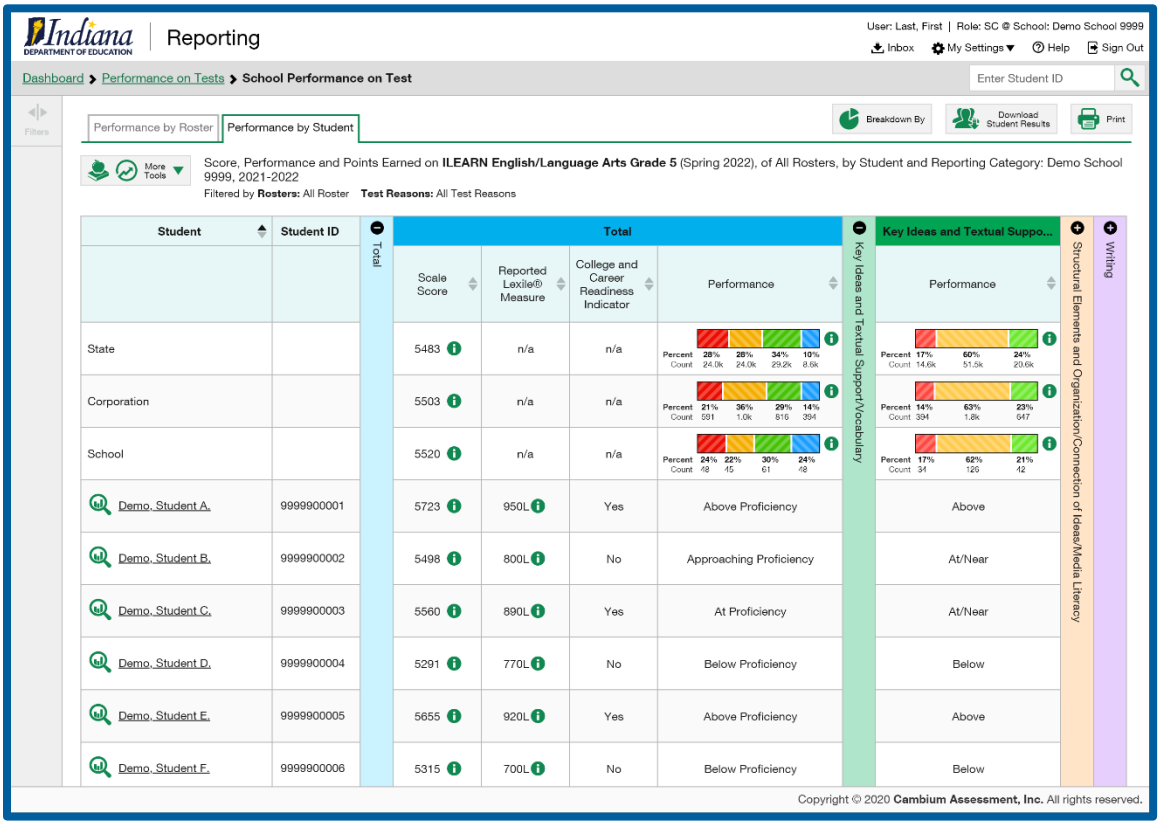
Exhibit 1.16.3-7: Standard-Level School Results



Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The fine-grained information in the standard-level report is actionable; it lets educators know where students are succeeding. Exhibit 1.16.3-7 shows a sample standard-level report for a school where relative strengths and weaknesses are shown for each standard. By narrowing down the performance result by standard, teachers and schools can determine what strategies may need to be implemented to improve teaching and student learning. We note that shorter tests will lead to more standards indicating insufficient information for very small group sizes but will not impact standards reporting for most class sizes.

Class/Teacher/School Performance Rosters. Class, teacher, and school performance rosters provide users with performance data for a group of students belonging to a system-defined or user-defined class. The report typically includes each student's unique state ID, overall subject score, and reporting category scores. The report will include only the student's overall subject scores for the summative assessment. Exhibit 1.16.3-8 shows a sample roster performance report for the summative assessment.

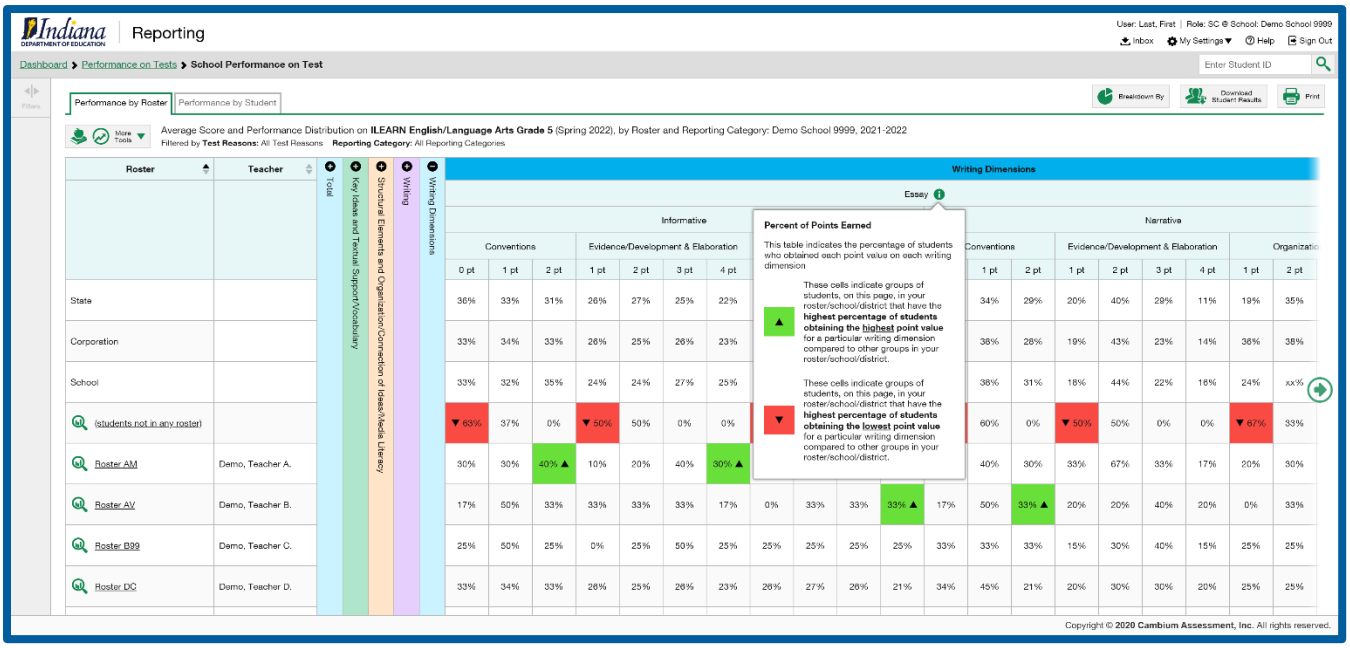
Exhibit 1.16.3-8: Sample Performance Report for a Roster



Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The performance roster report allows teachers to compare students' performance among different students. Teachers can also evaluate how their students performed compared with other students in the school, district, and state.

The **Writing Dimensions Report**, shown in Exhibit 1.16.3-9, includes shading to help teachers more quickly identify groups of students or rosters that have the highest percentage of students obtaining the highest point value for a particular writing dimension compared to other groups.

Exhibit 1.16.3-9: Writing Dimension Report



Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The writing dimension report allows teachers to quickly view how the students are performing on different writing dimensions. Teachers can evaluate how their students in the roster or school performed on the writing dimension compared with other students in the roster or school. Teachers can quickly identify which group of students have earned the highest percentage on the highest and lowest point value for each of the writing dimensions. Teachers can share their reports from all assessments and quickly learn when another teacher has been particularly effective in teaching a certain skill.

Longitudinal Reports. The state, districts, schools, teachers, classes, and students can be plotted on a trend report to illustrate how performance has changed over time. Scores can be provided across years (e.g., from Spring administration to Spring administration). Multiple trend lines can be plotted at once to see how student growth compares among students or groups of students. Reporting category trends can also be added to see whether there are differences in performance within a subject. Exhibits 1.16.3-10 and 1.16.3-11 show sample longitudinal reports of score and performance for a school across administrations in ELA assessments.

Exhibit 1.16.3-10: Longitudinal Report of Score for a School

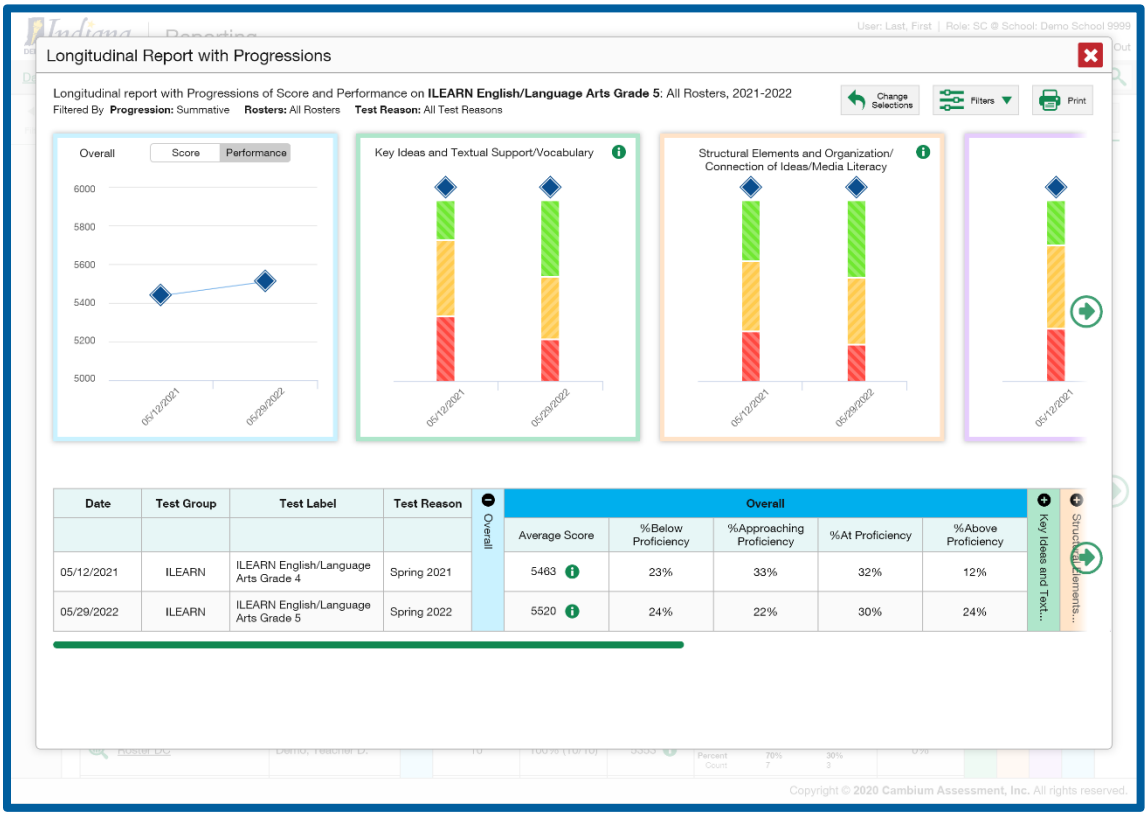
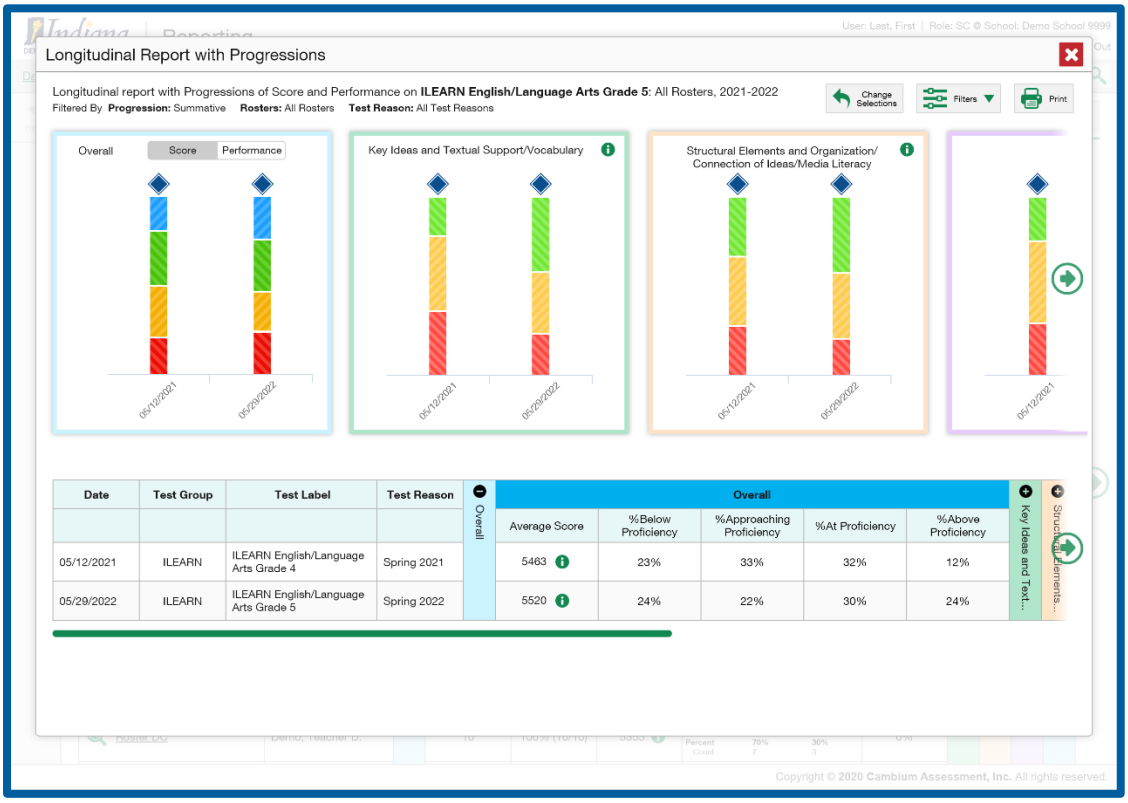


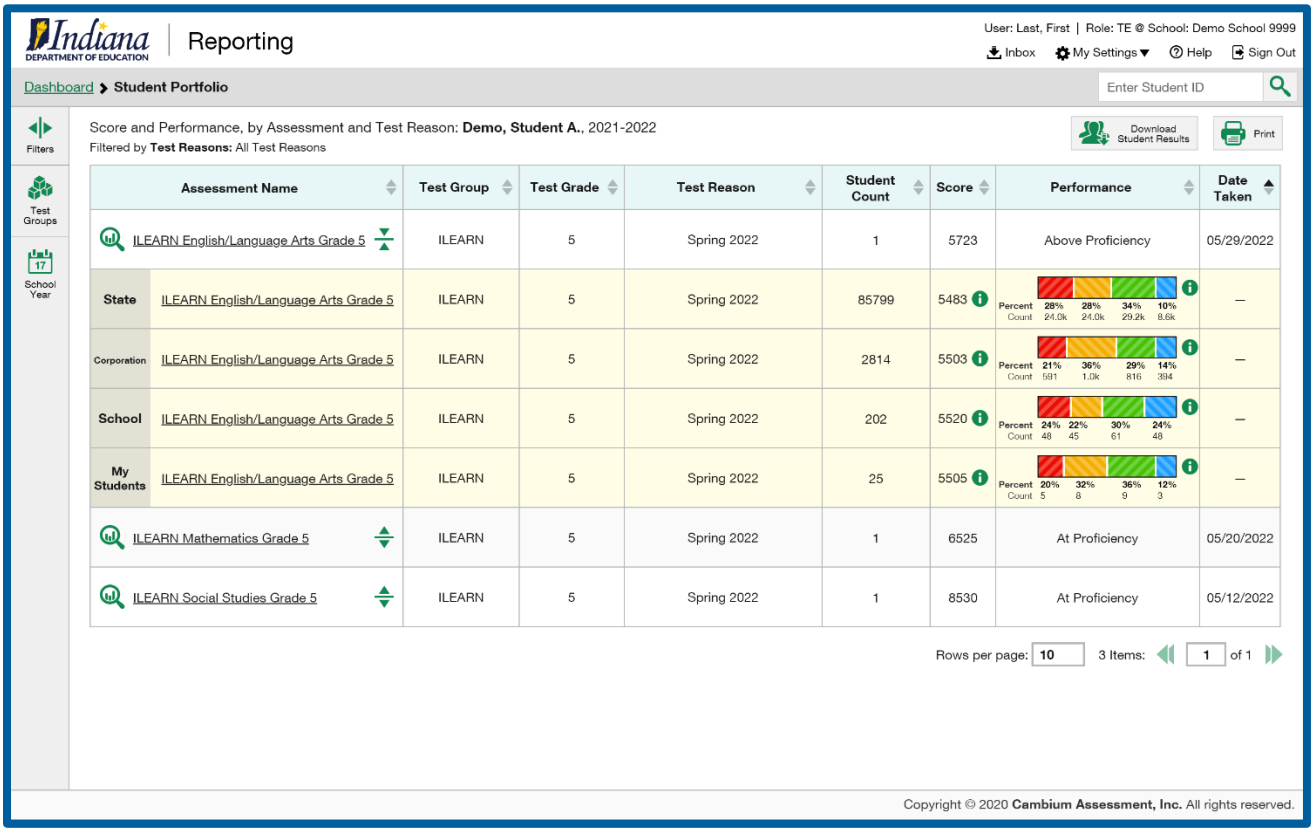
Exhibit 1.16.3-11: Longitudinal Report of Performance for a School



Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The longitudinal reports allow educators and administrators to analyze student growth when comparing performance results across assessments. Educators and administrators can also use this report to track changes in achievement gaps and show progress over time within and across statistically linked tests (e.g., progressions across interim and summative assessments). This report helps educators and administrators refine the instructional and programmatic decisions they have made so that they can see the effect of the intervention over time.

Student Portfolio Reports. Our CRS provides useful summary views of all assessment scores for a student. For example, the student portfolio report shown in Exhibit 1.16.3-12 allows a teacher to see every assessment taken by a specific student and to quickly pinpoint that student's strengths or weaknesses.

Exhibit 1.16.3-12: Student Portfolio Report



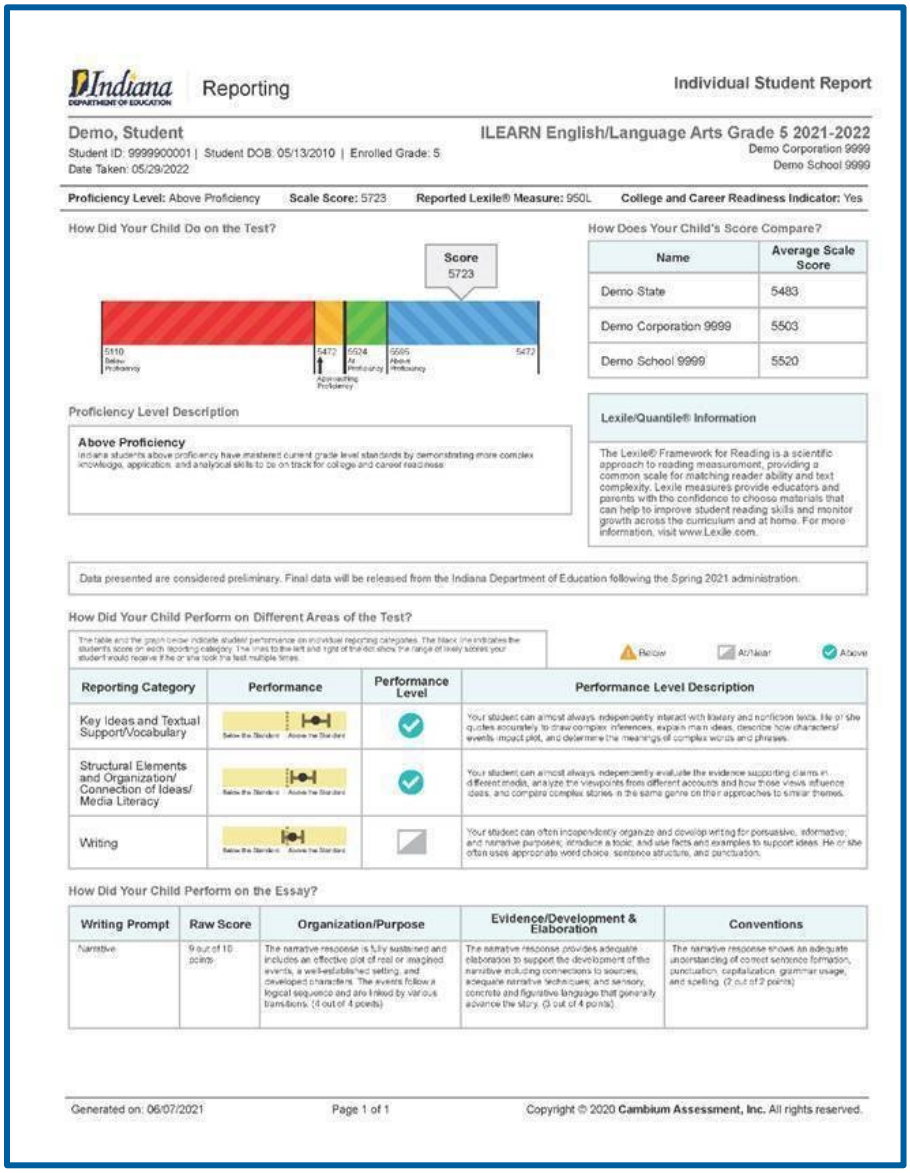
Value to End Users/Support in Making Decisions Around Instruction and Curriculum. Educators can use the student portfolio report to view all tests a particular student has taken. This can be particularly useful as teachers prepare for a parent-teacher conference where they need to quickly access how a particular student performed across tests.

Individual Student Reports. Although student reports for each grade and subject may have differing templates, formats, and content, we understand that the data for student-level reports will include, but not be limited to, the following measures:

- Scale score and probable range of scores
- School, district, and state comparisons
- Student performance on the writing rubric
- Longitudinal scores
- Item-level data that provide teachers with detailed information about which items a student answered correctly or incorrectly for a fixed-form nonsecure test

We propose to report subject area scores for individual students due to reduced-length blueprints. An example of an ISR is shown in Exhibit 1.16.3-13.

Exhibit 1.16.3-13: Individual Student Report for a Summative Test



Indiana Reporting

Individual Student Report

Demo, Student
Student ID: 9999900001 | Student DOB: 05/13/2010 | Enrolled Grade: 5
Date Taken: 05/29/2022

ILEARN English/Language Arts Grade 5 2021-2022
Demo Corporation 9999
Demo School 9999

Proficiency Level: Above Proficiency **Scale Score:** 5723 **Reported Lexile® Measure:** 950L **College and Career Readiness Indicator:** Yes

How Did Your Child Do on the Test?

Score 5723

5110 Below Proficiency | 5472 Approaching Proficiency | 5524 At Proficiency | 5585 Above Proficiency | 5472

How Does Your Child's Score Compare?

Name	Average Scale Score
Demo State	5483
Demo Corporation 9999	5503
Demo School 9999	5520

Proficiency Level Description

Above Proficiency
Indiana students above proficiency have mastered current grade level standards by demonstrating more complex knowledge, applications, and analytical skills to be on track for college and career readiness.

Lexile/Quantile® Information

The Lexile® Framework for Reading is a scientific approach to reading measurement, providing a common scale for matching reader ability and text complexity. Lexile measures provide educators and parents with the confidence to choose materials that can help to improve student reading skills and monitor growth across the curriculum and at home. For more information, visit www.Lexile.com.

Data presented are considered preliminary. Final data will be released from the Indiana Department of Education following the Spring 2021 administration.

How Did Your Child Perform on Different Areas of the Test?

The table and the graph below indicate student performance on individual reporting categories. The black line indicates the student's score on each reporting category. The lines to the left and right of the dot show the range of likely scores your student would receive if he or she took the test multiple times.

Below | At/Near | Above

Reporting Category	Performance	Performance Level	Performance Level Description
Key Ideas and Textual Support/Vocabulary	Below the Standard / Above the Standard	Above	Your student can almost always independently interact with literary and nonfiction texts. He or she quotes accurately to draw complex inferences, explain main ideas, describe how characters/events impact plot, and determine the meanings of complex words and phrases.
Structural Elements and Organization/ Connection of Ideas/ Media Literacy	Below the Standard / Above the Standard	Above	Your student can almost always independently evaluate the evidence supporting claims in different media, analyze the viewpoints from different accounts and how those views influence ideas, and compare complex stories in the same genre on their approaches to similar themes.
Writing	Below the Standard / Above the Standard	At/Near	Your student can often independently organize and develop writing for persuasive, informative, and narrative purposes; introduce a topic; and use facts and examples to support ideas. He or she often uses appropriate word choice, sentence structure, and punctuation.

How Did Your Child Perform on the Essay?

Writing Prompt	Raw Score	Organization/Purpose	Evidence/Development & Elaboration	Conventions
Narrative	9 out of 10 points	The narrative response is fully sustained and includes an effective plot of real or imagined events, a well-established setting, and developed characters. The events follow a logical sequence and are linked by various transitions. (4 out of 4 points)	The narrative response provides adequate elaboration to support the development of the narrative including connections to sources, adequate narrative techniques, and sensory, concrete and figurative language that generally advance the story. (3 out of 4 points)	The narrative response shows an adequate understanding of correct sentence formation, punctuation, capitalization, grammar usage, and spelling. (2 out of 2 points)

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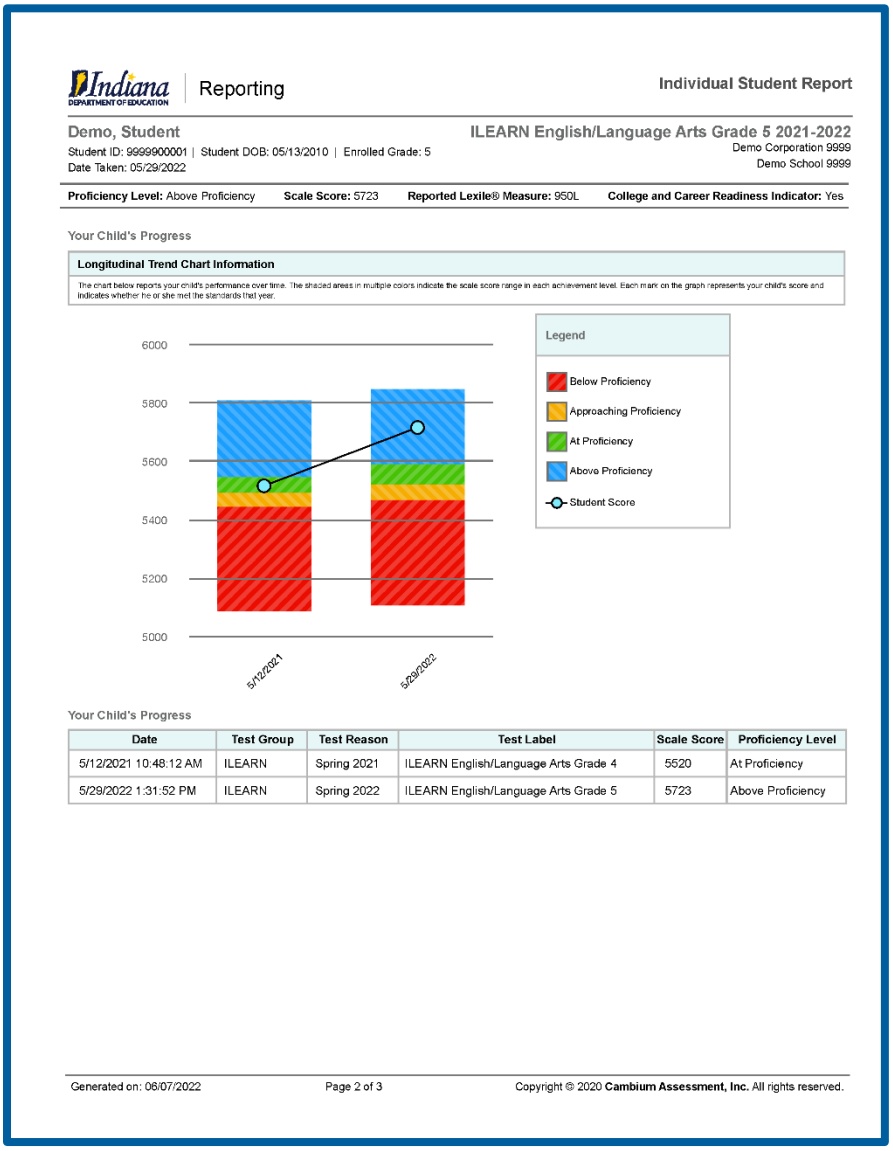
Exhibit 1.16.3-13: Individual Student Report for a Summative Test (continued)



Reporting

Individual Student Report

Demo, Student
Student ID: 9999900001 | Student DOB: 05/13/2010 | Enrolled Grade: 5
Date Taken: 05/29/2022

ILEARN English/Language Arts Grade 5 2021-2022
Demo Corporation 9999
Demo School 9999

Proficiency Level: Above Proficiency **Scale Score:** 5723 **Reported Lexile® Measure:** 950L **College and Career Readiness Indicator:** Yes

Your Child's Progress

Longitudinal Trend Chart Information

The chart below reports your child's performance over time. The shaded areas in multiple colors indicate the scale score range in each achievement level. Each mark on the graph represents your child's score and indicates whether he or she met the standards that year.

Your Child's Progress

Date	Test Group	Test Reason	Test Label	Scale Score	Proficiency Level
5/12/2021 10:48:12 AM	ILEARN	Spring 2021	ILEARN English/Language Arts Grade 4	5520	At Proficiency
5/29/2022 1:31:52 PM	ILEARN	Spring 2022	ILEARN English/Language Arts Grade 5	5723	Above Proficiency

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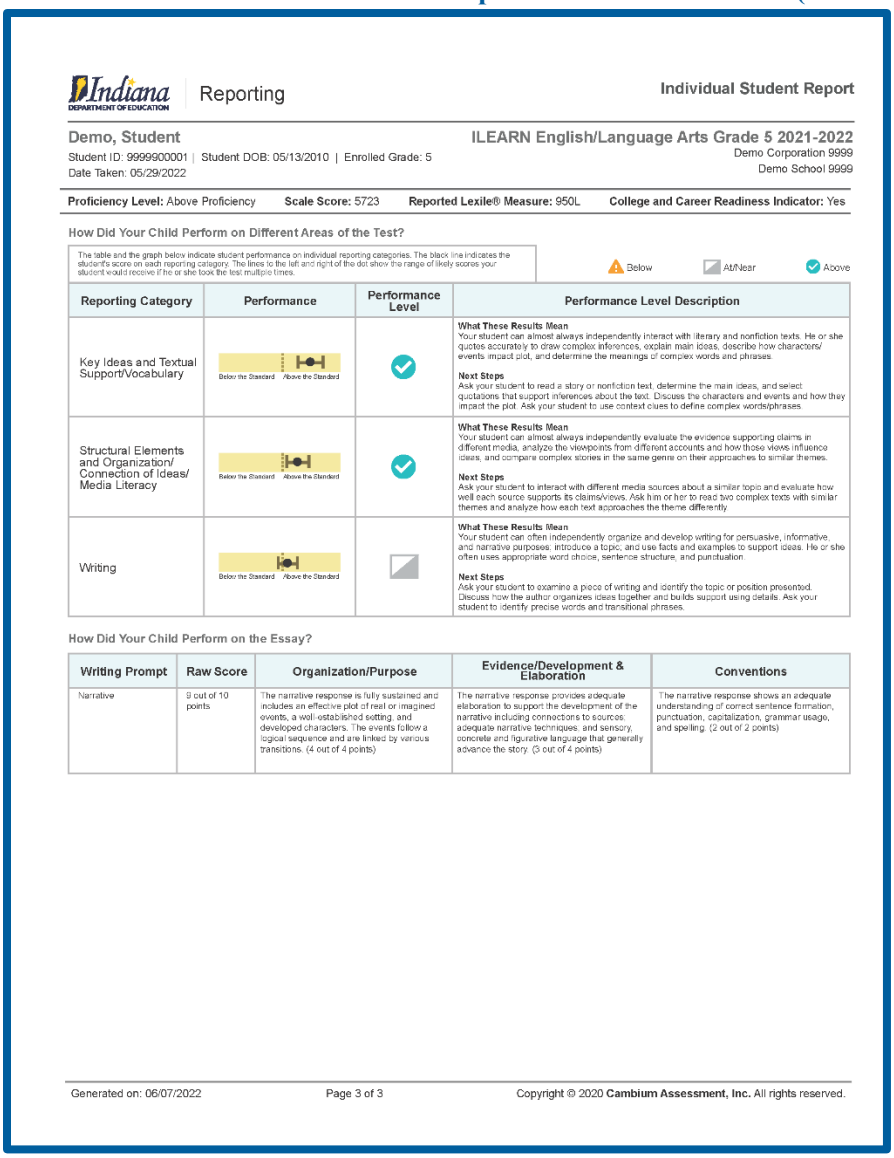
Exhibit 1.16.3-13: Individual Student Report for a Summative Test (continued)



Indiana Department of Education | Reporting

Individual Student Report

Demo, Student
Student ID: 9999900001 | Student DOB: 05/13/2010 | Enrolled Grade: 5
Date Taken: 05/29/2022

ILEARN English/Language Arts Grade 5 2021-2022
Demo Corporation 9999
Demo School 9999

Proficiency Level: Above Proficiency **Scale Score:** 5723 **Reported Lexile® Measure:** 950L **College and Career Readiness Indicator:** Yes

How Did Your Child Perform on Different Areas of the Test?

The table and the graph below indicate student performance on individual reporting categories. The black line indicates the student's score on each reporting category. The lines to the left and right of the dot show the range of likely scores your student would receive if he or she took the test multiple times.

Below | At/Near | Above

Reporting Category	Performance	Performance Level	Performance Level Description
Key Ideas and Textual Support/Vocabulary	Below the Standard – Above the Standard	✓	**What These Results Mean** Your student can almost always independently interact with literary and nonfiction texts. He or she quotes accurately to draw complex inferences, explain main ideas, describe how characters/events impact plot, and determine the meanings of complex words and phrases. **Next Steps** Ask your student to read a story or nonfiction text, determine the main ideas, and select quotations that support inferences about the text. Discuss the characters and events and how they impact the plot. Ask your student to use context clues to define complex words/phrases.
Structural Elements and Organization/ Connection of Ideas/ Media Literacy	Below the Standard – Above the Standard	✓	**What These Results Mean** Your student can almost always independently evaluate the evidence supporting claims in different media, analyze the viewpoints from different accounts and how those views influence ideas, and compare complex stories in the same genre on their approaches to similar themes. **Next Steps** Ask your student to interact with different media sources about a similar topic and evaluate how well each source supports its claims/views. Ask him or her to read two complex texts with similar themes and analyze how each text approaches the theme differently.
Writing	Below the Standard – Above the Standard		**What These Results Mean** Your student can often independently organize and develop writing for persuasive, informative, and narrative purposes; introduce a topic; and use facts and examples to support ideas. He or she often uses appropriate word choice, sentence structure, and punctuation. **Next Steps** Ask your student to examine a piece of writing and identify the topic or position presented. Discuss how the author organizes ideas together and builds support using details. Ask your student to identify precise words and transitional phrases.

How Did Your Child Perform on the Essay?

Writing Prompt	Raw Score	Organization/Purpose	Evidence/Development & Elaboration	Conventions
Narrative	8 out of 10 points	The narrative response is fully sustained and includes an effective plot of real or imagined events, a well-established setting, and developed characters. The events follow a logical sequence and are linked by various transitions. (4 out of 4 points)	The narrative response provides adequate elaboration to support the development of the narrative including connections to sources; adequate narrative techniques, and sensory, concrete and figurative language that generally advance the story. (3 out of 4 points)	The narrative response shows an adequate understanding of correct sentence formation, punctuation, capitalization, grammar usage, and spelling. (2 out of 2 points)

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Value to End Users/Support in Making Decisions Around Instruction and Curriculum. The family report includes plain language text for students and parents that explains the content standards assessed on each test and what students in each of the reporting levels have demonstrated they know and can do. In addition, we include advice about some next steps that parents and students might take at home to practice skills needed to master the standards. Students performing in different score ranges also receive suggested activities appropriate to those score ranges. Written in parent-friendly language, this data-driven text provides a substantive explanation of what parents should understand from the data and what they can do as a result of the data. Interpretations, recommendations, and other texts are drafted by content specialists or statisticians. Focus group feedback confirms that parents find the next step text the most useful part of the student report. Many parents use this text as a starting point for conversations with their child's teacher about the instructional support their child requires.

The layout and measures of the ISR have been updated over time. The student's longitudinal graph has been added, as well as performance on writing dimensions. Visual representation of student performance on each reporting category has also been added.

ISRs can be produced individually or batched as PDF files through the CRS. At IDOE's discretion, the system can deliver a zip file containing ISRs as PDF files with a machine-readable manifest suitable for uploading into the district's Student Information System (SIS). Most districts have these systems and maintain a secure parent portal, providing an efficient means of delivering the ISRs to parents.

Process for Configuring and Developing Reports

To realize efficiencies, we suggest retaining the current skin which includes use of color, logo, headers and footers throughout the systems and the CRS.

Next, to ensure that the online reports meet stakeholder needs, CAI will work closely with IDOE to document requirements and configure the online reports. Each school year, CAI will provide mock-ups of online report pages to be configured for IDOE review. IDOE will review and approve mock-ups and specifications. CAI programmers will use these documents to configure the CRS and conduct QA checks to ensure that the system is functioning as required. CAI will provide a user acceptance testing (UAT) environment that contains examples of the reports using mock data. Client sign-off is a prerequisite for deployment to production.

Online Aggregate Reports

Online Reports in the CRS will incorporate the cut scores into student-, classroom-, school-, corporation-, and state-level reports of operational test results. CAI's CRS allows users to download on-demand standard and custom PDF files, spreadsheets, and data files for each assessment. It also provides individual student results and class, teacher, school, district, and state aggregate results as appropriate based on Family Educational Rights and Privacy Act (FERPA)-appropriate access to the assessment data. ISRs can be produced individually or batched as PDF files. The system delivers a compressed file containing individual student PDF files and a machine-readable manifest suitable for upload into the educator's student information system. Most districts or schools have these systems and maintain a secure parent portal, providing an efficient means of delivering the ISRs to parents.

All online reports are delivered in common formats to schools, such that scores are compiled and shared with schools in the same manner, regardless of the testing format selected.

All authorized users can download files, including data about students for whom they are responsible, at any time. All reports in the CRS can be printed for classroom use in a printer-friendly manner (i.e., section or page breaks) or downloaded into a CSV file so schools and districts can load files into their own systems. For more information about our current student, class, teacher, school, and district reports as well as screen captures, please see the *Sample Reports* subsection.

Parent Portal

Introduction

CAI will provide a web-based portal for parents to securely access student assessment data and review their ISRs. As with the reporting system for educators, we have designed the parent portal so that it is centralized for parents. They can access all test results for their child, including summative, interim, and benchmark assessment score reports. The parent portal also includes results from teacher-authored tests administered via our TDS. The parent portal can store resources, including an interactive glossary and help feature, FAQs, and links to other resources.

In addition, our parent portal

- is designed to provide rapid, flexible reports to parents in a highly secure environment, while guiding the parents to make valid, actionable interpretations of the assessment results;
- provides a secure, encrypted, password-protected online reporting portal for parents and guardians to access their students' results;
- is grounded in cognitive and parent focus group research to help ensure that parents who receive our reports understand the information as it intended; and
- allows educators to generate access codes for the parent portal credentials to parents and guardians through TIDE. Family users can sign into the parent portal with their student's credentials and view that student's performance reports.

Accessing the Parent Portal

Parents can use CAI's web-based portal to access a student's assessment data. Once the access code information has been shared with the parents and guardians, family users can sign in to the parent portal with their student's credentials and view that student's performance reports. CAI will work with IDOE to build an authentication mechanism to permit only users with authorized access to student test data. This will involve using the student's username and password (if this is available) or using a combination of the student's attributes, such as name, student ID, date of birth, etc. The challenge here is to ensure that the process is secure and the data required are not readily available to others. Once such a mechanism is established, users can go to the parent portal, enter the necessary credentials, and access the appropriate student's data.

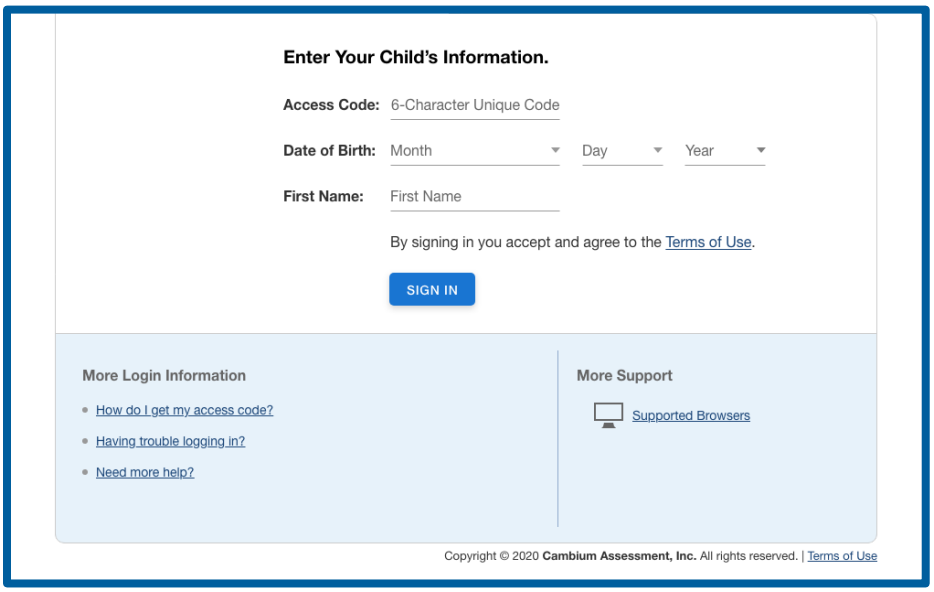
The parent portal is designed to meet the highest security standards. All personally identifiable information (PII) is encrypted in the database, and any system-generated reports are always encrypted at rest.

The next section provides screen captures of the parent portal pages.

Sample Parent Portal Pages

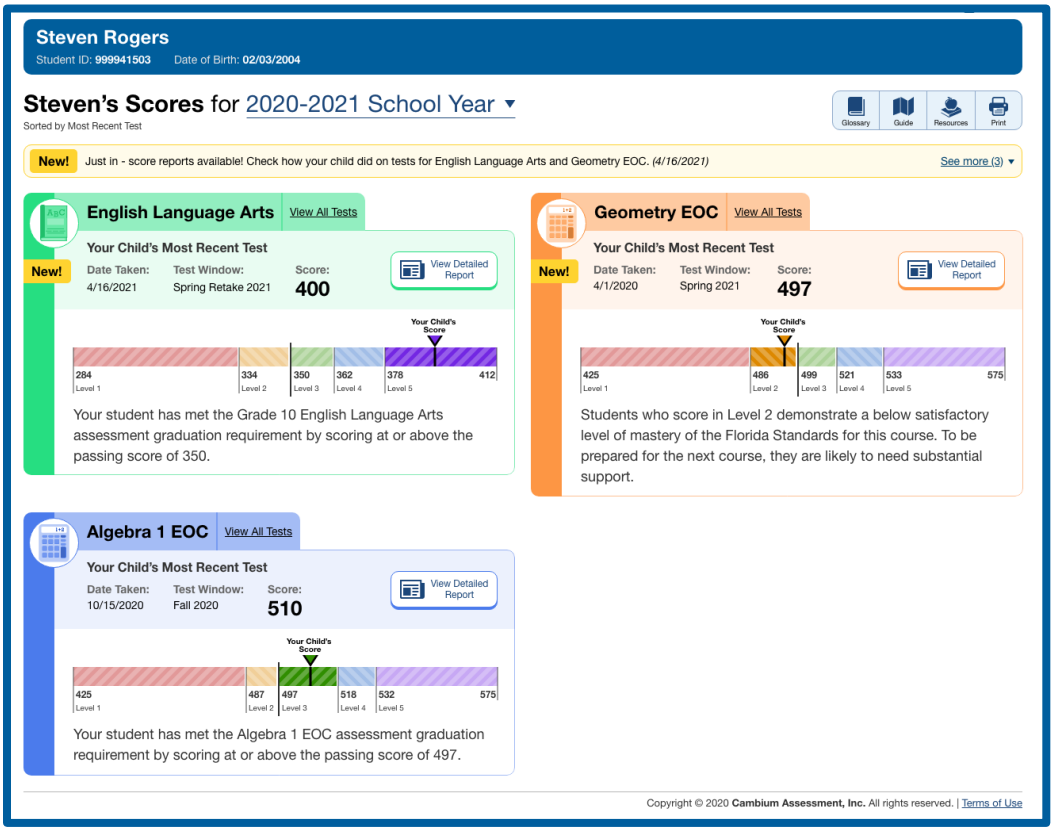
Log-In Page. Exhibit 1.16.3-14 shows sample log-in pages for a parent.

Exhibit 1.16.3-14: Sample Parent Log-In



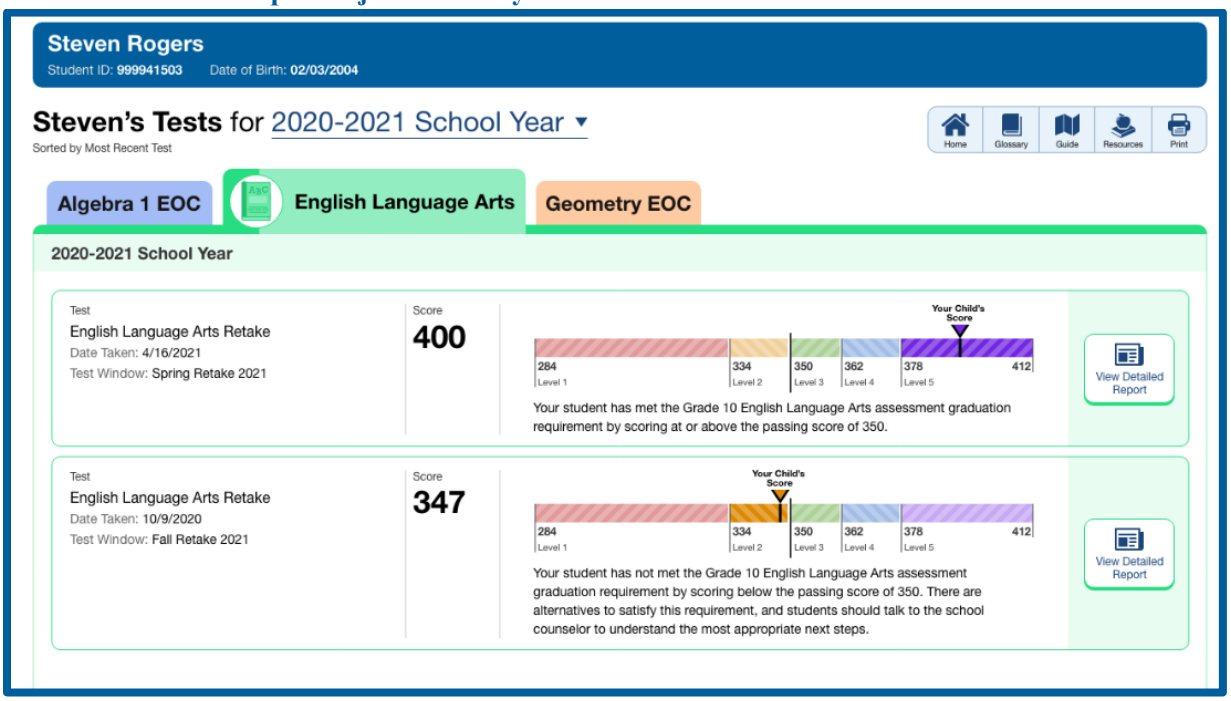
Landing Page. Upon login, the parent portal presents parents with overall test results for assessments the student has taken for the current year. Exhibit 1.16.3-15 shows a sample landing page for a parent.

Exhibit 1.16.3-15: Sample Landing Page



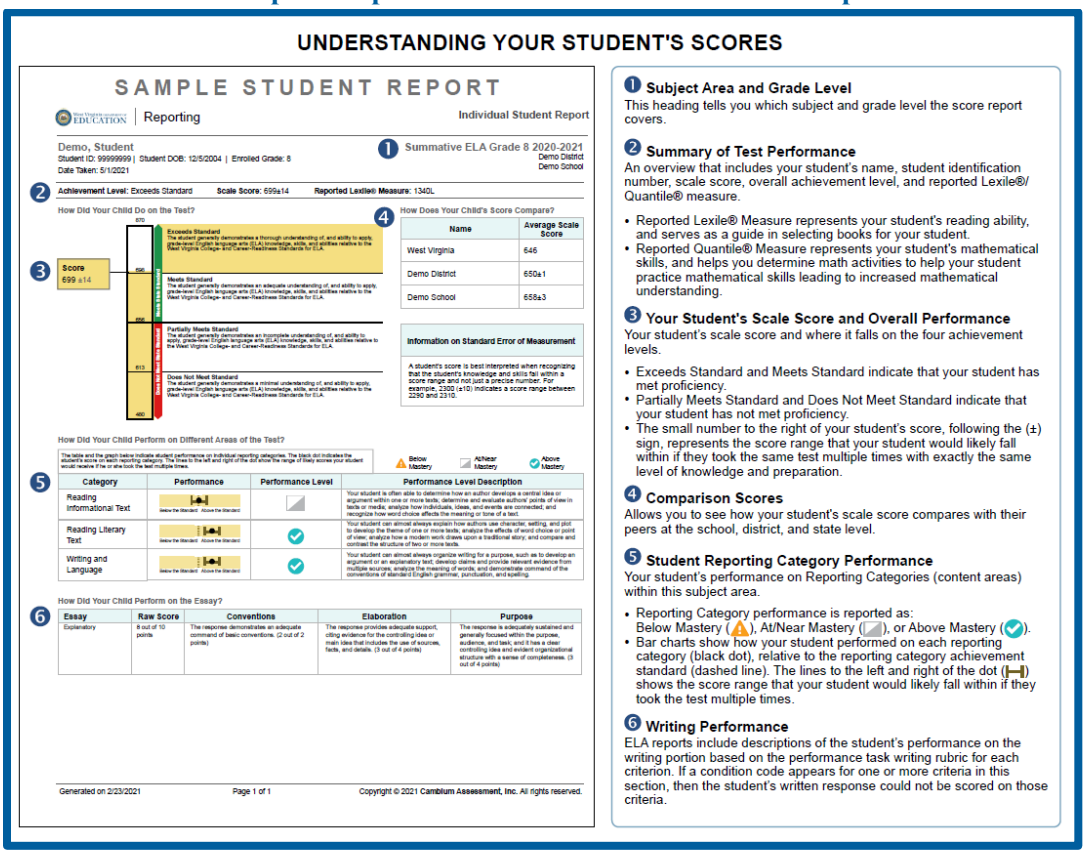
Subject Summary Results. The subject summary reports show overall test results across all tests for a selected subject. Exhibit 1.16.3-16 shows a student's sample subject summary report.

Exhibit 1.16.3-16: Sample Subject Summary Results



Individual Student Report Interpretive Guide. The parent portal also provides an ISR interpretive guide. If parents click "View Detailed Report," they have the option to print an ISR for that test and to download the interpretive guide. Exhibit 1.16.3-17 shows a sample ISR interpretive guide.

Exhibit 1.16.3-17: Sample Interpretive Guide for Individual Student Report



CAI commits to producing customized brochures and user guides for the parent portal. We will use plain language explanations in each section and provide resources to help parents understand their student's results on the assessment. We will work with IDOE to develop these resources to support parents' understanding of test results.

Timelines for Results

QA/Cleanup Process for Demographic Data Associated with Assessment Scores

Discrepancy resolution is available in TIDE to resolve paper-pencil tests that are missing student information that are preventing the test booklets from being processed for reporting in the CRS. Data are resolved once all paper-pencil records have been received by CAI and prior to final reporting in the state output score data file and the CRS.

Delivery of Student, Class, School, Corporation, and State Results

The delivery of student score reports in the CRS and the delivery of the state data file will be outlined in the annual program schedule.

Timeline for Required Rescore Process

The rescore process will be scheduled to support a rescore window prior to final reporting for ILEARN. This will be outlined in the annual program schedule for all three ILEARN administrations.

Delivery of Final Electronic Data to IDOE

The final student data file will be uploaded according to dates outlined in the annual program schedule. All analyses are guided by specifications documents drafted in sufficient detail to reproduce these analyses. Analysis programs are separately implemented by independent teams, and these results are compared to ensure fidelity to the documented specifications.

Operational systems are tested with artificial data. CAI's computer scientists generate simulated data files that are designed to model known and anticipated characteristics of the assessment data, as well as cases designed to evaluate the performance of the analysis, scoring, and reporting software under extreme or unusual conditions. These simulated data files are used to test all software supporting operational test analysis, scoring, and reporting, including performance of the data layout generator, data analysis software for computing classical item statistics, and calibrating and equating test items, as well as all scoring and reporting software.

The software is tested and refined until it is error-free. This process happens well in advance of any operational data becoming available. Our test data generator is able to generate challenge cases, including inconsistent data, missing data, out-of-range data, and other anomalies that mimic real-world complications. This testing and refinement phase ensures that we have anticipated any problems while we have plenty of time to address them (i.e., before the operational data arrive).

When the operational data arrive, we have all analyses replicated by two analysts to ensure that the programs are applied correctly. Any discrepancy in their results is thoroughly investigated and resolved. Resulting estimates, such as item parameters and conversion tables, are compared with historical expectations under the belief that substantive changes may signal a problem.

CAI has an excellent record of delivering perfect data. We continually work to improve our processes in this regard, and we commit to IDOE that we will continue to innovate to make our processes more efficient and as impervious to errors as possible.

Psychometric Plan

As we describe in Section 1.21 (3t), the ILEARN ELA and mathematics assessments are maintained on the underlying Smarter Balanced scale. Smarter Balanced field-tests items annually and calibrates and equates those items to their bank scales. Based on a vertical linking study conducted by Smarter Balanced, linking constants between each of the grade-level assessments allow ELA and mathematics to be reported on a vertical scale. Following standard setting in Summer 2019, a set of transformation constants was identified to transform ability estimates from the underlying Smarter Balanced theta scale to ILEARN-specific reporting scales. This approach allows Indiana to leverage the Smarter Balanced vertical scale, but to report results on ILEARN-specific reporting scales and rigorous Indiana performance standards.

As also described in Section 1.21 (3t), all ILEARN assessments are calibrated using the 2PL/GPC IRT model, consistent with the model used by Smarter Balanced. The I AM items are calibrated using the Rasch model since the more

constrained model allows for much smaller sample sizes for calibration. The ILEARN assessments in ELA, mathematics, and science, as well as all I AM assessments, are administered adaptively and thus require pre-equated item parameters to continually update ability estimates to support adaptive item selection. Even for fixed-form assessments, pre-equated item parameters allow for immediate or quick turnaround scoring and reporting of test results. Thus, all Indiana assessments employ pre-equated item parameters. Each year, newly developed items that have successfully passed through all stages of review are administered in embedded slots within summative test administrations for field-testing. Because the items are field-tested within the context of operational test administrations, and neither students nor educators can discern field-test items from those operational items that contribute to scoring, student responses to field-test items can be calibrated and equated back to the reference scale for each assessment. In this way, the assessments are equated from year to year, maintaining the interpretation of test scores and performance levels across years.

As we describe in Section 1.13 (3l) under *Data Forensics Work*, CAI provides forensic reports that can be used to identify possible irregularities in test administrations. These reports include analysis of item score changes to identify unusually large numbers of items with scores that change from incorrect to correct, unusually large changes in student ability between test administrations, unusual test administration times, and unusually large numbers of item responses that are inconsistent with expected performance based on student ability. The flagging rules can be set to the values required in the RFP, and IDOE can use these reports and flagging rules to investigate flagged corporations.

Printed Student Reports and Labels

In addition to the online ISRs that are available in the CRS, we will provide one paper copy of student reports and student label to corporations. CAI is uniquely positioned to meet the reporting objectives outlined in the RFP and offers Indiana the following benefits:

- For the past three years, CAI has successfully delivered approximately two million customized, full-color score reports and labels to corporations in Indiana each school year. In addition to reporting on the Indiana assessments, we successfully deliver approximately 25 million pages of customized, full-color, paper score reports each Spring to families in 24 states.
- Indiana corporations are used to consistently receiving their reports on time in packaging developed in consultation with IDOE that make it easier for corporations to identify and distribute reports.
- Virtually infinite flexibility in designing new paper reports that meet the needs of students, teachers, and administrators. We can place any text, graphic, or color on any part of the page.

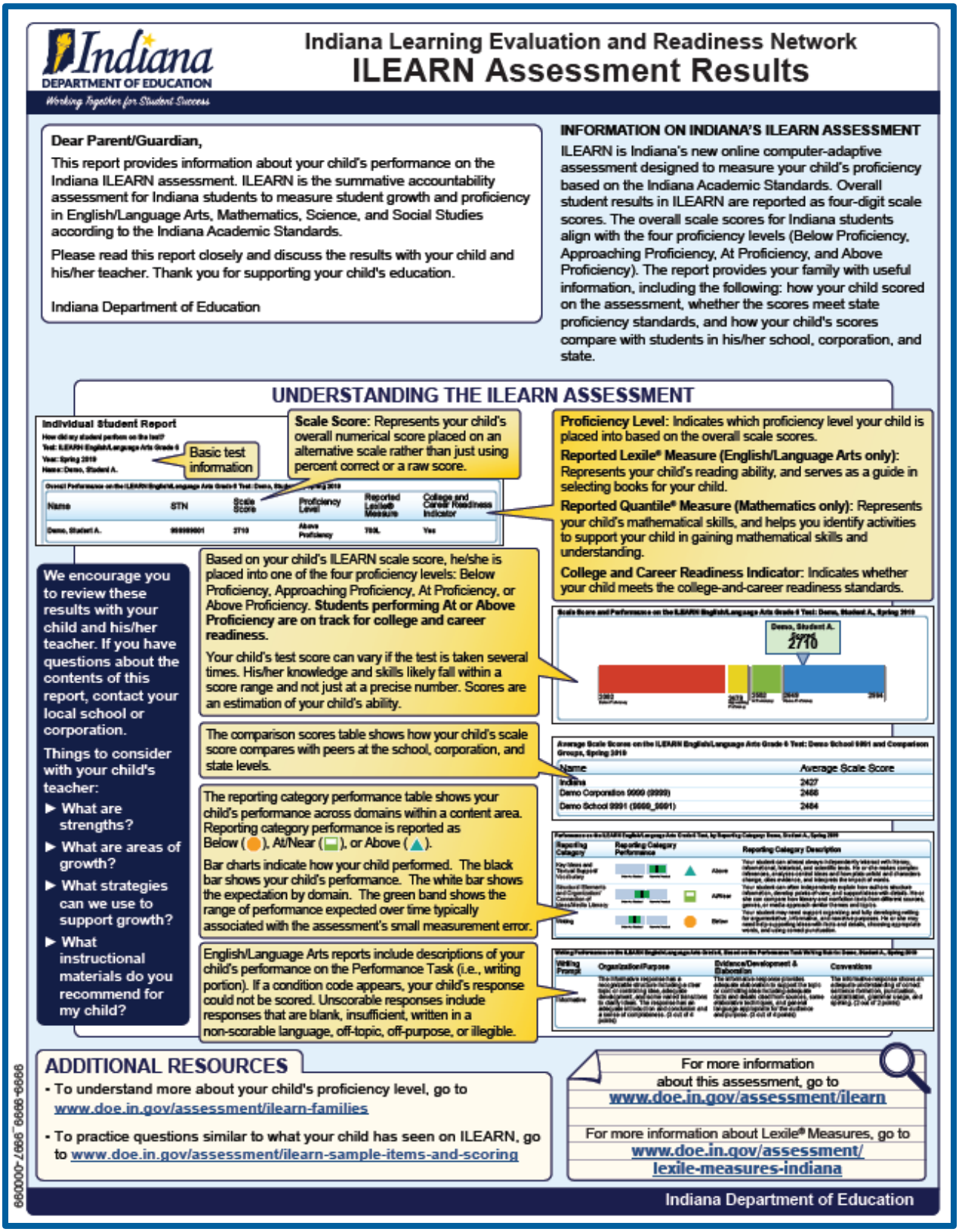
Design of Printed Reports and Labels. Similar to the current process, CAI will closely work with IDOE to finalize the design of the printed student reports and labels, at the start of each school year for each of the summative tests: ILEARN, I AM and IREAD-3. CAI will use the current student report and label layouts as the basis for designing the new reports for IDOE's review and approval. These will then be systematically evaluated and reviewed by CAI and IDOE. The CAI team of report designers and software developers offers a combined experience of more than 75 years of providing assessment reports. Our development process delivers reports that provide the information IDOE wants to express in a form most useful to recipients.

The extensive customizability offered by CAI in the design of printed reports allows us to closely replicate the layout of the printed ISRs with the ISRs available through the CRS, as is currently the case. However, should IDOE want to add measures the printed reports, CAI will work with IDOE to update the current printed reports.

CAI will work with IDOE to make sure score reports are available in ADA format, upon request by parents with an ADA-defined disability.

Exhibit 1.16.3-18 shows a sample student report for ILEARN.

Exhibit 1.16.3-18: ILEARN Student Report



Complete Specifications. Once IDOE approves mockups, the next step is to finalize the Reporting Specifications document, which specifies rules for aggregating and merging data, handling special populations, and resolving discrepant records. All the data displayed on the paper reports will conform to the specifications agreed on between IDOE and CAI psychometricians and statisticians.

Conduct Rigorous Quality Assurance Checks. After IDOE has reviewed and approved mockups and report specifications, CAI tests the programs used to produce them. Each program is extensively tested on test decks and real data from past administrations. The final programs are reviewed by two senior statisticians and one senior member of the software team to ensure that agreed-on procedures are accurately implemented. Once we receive the final data, CAI's score reporting team reviews proofs that contain actual data and verify that the data follow approved specifications and appear as they should on the reports. This rigorous review typically is conducted over several days and takes place in a secure environment. Two to three weeks prior to printing the reports, CAI provides a live data file and reports with sample corporations as chosen by IDOE for its fatal flaw review. CAI will work closely with IDOE to resolve questions and correct any problems. The reports will not be delivered unless IDOE approves the sample reports.

Printing and Shipping of Reports. After the close of the statewide testing window, in a single shipment to school corporations, CAI will deliver printed ISRs and labels. We will work with IDOE to develop a packaging and shipping specifications document that identifies how reports will be distributed.

CAI works with an established network of printing vendors around the country that are thoroughly trained on our report printing specifications. Our print vendors are ISO certified, provide fully secure print facilities, and are capable of printing and packaging high volumes of full-color reports in exceedingly compressed timelines.

CAI uses digital printing to print score reports. During printing, reports are checked for color against color samples, and print site staff review reports as they are printed, to make sure that graphics are printing properly, all pages are printed correctly, and there are no printing errors such as ink smudging or faulty lines.

Distribution of Printed Reports. We understand the importance of reliable, on-time shipping so corporations can be confident that their reports will arrive when expected. CAI has partnered with UPS for 12 years and successfully ships more than 25 million pages of score reports on time, each Spring, across 24 states, including Indiana. We propose to use UPS to ship the printed student reports and labels, but we are open to using another vendor if IDOE prefers. We will work with UPS to ensure that all shipments arrive within the agreed-on delivery window, and shipments can be tracked until delivered.

CAI tracks report shipments using the UPS WorldShip application. WorldShip is an application provided by UPS that allows users to process shipments. Print vendors use this application to generate shipping labels for score report packages from an address file provided by CAI. They also use WorldShip to generate a report containing the tracking information for the shipments that have been processed. Tracking information can also be exported from WorldShip to a Microsoft Excel spreadsheet and provided to IDOE and the help desk to enable quick tracking of packages.

If a corporation or school encounters an issue with their score report delivery, they can contact the help desk, which can quickly access PrintTracker and retrieve shipment tracking information to resolve the issue.

To further streamline the shipping process, CAI will work with IDOE to develop packaging and shipping specifications that include the following information:

- Packaging order that indicates how reports are packaged (typically by school or corporation) and whether they are shipped to a corporation office or directly to schools
- Directions on how reports should be sorted and bundled (For example, some states prefer their reports to be printed in ascending order by a corporation identification number and then sorted first by school, then by grade, then by student last name, and lastly by student first name.)
- Instructions for "Special Schools" such as non-public hierarchies and community schools that may need to be packaged and shipped differently than public school corporation schools
- A list of all packaging materials, including paper stock, dividers sheets, labels, and boxes
- A delivery timeline to ensure that all reports and accompanying materials (memos) will arrive within an agreed-on delivery window

Video Reports

We would be happy to work with IDOE to produce video reports for parents as a cost option. Video reports explaining the child's performance to parents provide a number of benefits. Video reports

- are easy for parents to understand;
- can be produced in English and Spanish and other languages if needed;
- can potentially be delivered faster to parents given the elimination of printing and shipping time; and
- are easier to access than paper reports shipped to corporations, which may or may not reach parents before the end of the school year.

We suggest developing the video reports and piloting them in a few Indiana corporations to understand parents' usage and consumption patterns. Once we understand this, we will work with IDOE to roll out the video reports statewide.

In developing video reports for Indiana families, CAI will work closely with IDOE to accomplish the following:

- Establish an outline of the scripts to be used for various templates to explain a child's scores
- Develop a storyboard and script for each video template so that each video report is no more than three minutes long
- Review the storyboard and script according to the blackline process we discuss in Section 1.12 (3k).
- Determine the credentials parents will require in order to access the video reports in a secure manner
- Determine the length of time the link to the video report will be available
- Determine a secure, encrypted delivery mechanism for video reports (video reports can be accessed via parent cell phones, on a secure portal, or by other means)
- Ensure the treatment and destruction of all PII in the reports adhere to IDOE data security policies

Reporting Communications and Interpretive Guide Materials

Reporting communications and interpretive guide materials can be made available to the field such as

- a letter from IDOE or a one-page interpretive guide to be added to ISRs upon download or print; and
- a CRS system user guide to be posted to the portal and available via a help button in the CRS

4. Test Deck

CAI will ensure that all online systems are set up to support a full end-to-end testing of IDOE Test Deck cases for each operational administration. CAI will assign a specific demo corporation and school that is for IDOE use only, in both user acceptance testing (UAT) and production environments. IDOE will participate in test deck activities for online and paper-pencil tests with CAI support, from a systems perspective. CAI and IDOE will collaboratively review a Test Deck process plan on an annual basis, obtaining IDOE approval before test deck activities begin each year.

Paper-Pencil Test Deck Cases

IDOE will order paper-pencil test materials in the Test Information Distribution Engine (TIDE) in the IDOE-specific corporation when the Additional Orders module opens for each ILEARN, IREAD-3, and I AM administration. The shipping address in TIDE will match the IDOE office exactly, as confirmed in the annual Test Deck process plan. IDOE will order paper-pencil materials when the paper-pencil additional order window opens for each administration. CAI will alert Data Recognition Corporation (DRC) that the order has been placed so that the order can be monitored upon receipt. Once the paper-pencil order is submitted overnight via TIDE, DRC will fulfill the order, ship the materials directly to IDOE, and provide a tracking number. IDOE will confirm receipt of the paper-pencil materials onsite and will complete the test deck cases internally. Once this is complete, IDOE will ship the materials back to DRC and provide a tracking number. DRC will confirm receipt and process the materials to CAI for score data verification.

Online Test Deck Cases

At the beginning of each operational test administration, IDOE will take online tests for ILEARN, IREAD-3, and I AM in the IDOE specific corporation. IDOE will enter the test cases into the CAI production test delivery system (TDS). For handscored items, IDOE and CAI will confirm the process to record the number of points for the items in the annual Test Deck process document. Once the responses have been entered, IDOE will confirm to CAI that the cases are complete and ready for scoring. CAI will inform DRC that the online handscored responses can be scored. DRC will score the online handscored responses and submit the data back to CAI. The handscored responses will then be combined with the machine scored responses and submitted to the CAI CRS data verification environment.

The CRS data verification environment will allow IDOE an opportunity to review the data and ensure that the scoring is appearing as expected and in line with the outlined test deck cases per IDOE's internal process. IDOE and CAI will meet as needed during the CRS data verification timeline to ensure that any inquiries are reviewed and addressed so that IDOE can provide approval of the CRS score go-live date. The scores for each administration will not go live until CAI receives IDOE approval.

5. Score Replication

CAI is experienced working with department of education staff and supporting third-party score replication work. CAI will continue to support IDOE in all scoring and analysis replication activities. Third-party data replication parties will be required to sign a nondisclosure agreement.

In Exhibit 1.16.5-1, we provide an overview of the annual program deliverables for score replication.

Exhibit 1.16.5-1: Score Replication–Annual Program Deliverables

	ILEARN Biology ECA (Fall/Winter)	ILEARN Spring Grades 3–8 and ECA	Spring IREAD-3	Summer IREAD-3	I AM
Simulation Data Replication	X	X			X
Student Data File (SDF) Data Replication	X	X	X	X	X
Technical Report Data Replication	X	X	X	X	X

Simulation Data Replication–Prior to the Opening of the Test Window

CAI psychometricians will run simulations on adaptive ILEARN assessments to ensure that the tests are meeting the blueprint, unbiased estimates of student ability are obtained, and item exposure is at levels expected for each item bank. The simulation data will be provided to the IDOE third-party vendor to perform simulation verification via a Secure File Transfer Protocol (SFTP) location. CAI will provide simulation report Microsoft Word documents, an items report, and an item distribution report to the third-party vendor to ensure that they can replicate the data. CAI, IDOE, and the third-party vendor will meet as needed during the replication time frames to address and resolve any open questions.

Student Data File (SDF) Data Replication–During and After the Close of the Test Window

Prior to the release of score reporting in the Centralized Reporting System (CRS) for each ILEARN, IREAD-3 and I AM administration, CAI will support IDOE and the third-party vendor in performing score data replication of each administration's SDFs, including both the initial/preliminary SDFs and final SDFs. CAI will provide an SFTP location to access the SDFs, and the access to this location will be restricted to only permissioned staff. CAI will provide IDOE and the third-party vendor with the SDF layout, scoring specifications, and test configuration file. CAI and IDOE will collaborate and confirm if a separate business rules document is needed based on each testing program. CAI, IDOE, and the third-party vendor will meet as needed during replication time frames to address and resolve any open questions.

Technical Report Data Replication–After the Close of the Test Window

CAI will work with IDOE and the third-party data replication vendor on the replication of technical report analyses. While technical reports are not considered secure documents, CAI will ensure that any supporting documentation provided that contains secure information is placed on an SFTP location for access by permissioned staff only. There is no personally identifiable information (PII) included in the data files used by CAI for scoring quality control and data analysis that is provided to the third party. CAI will provide IDOE and the third-party vendor with a business rules document, if needed, to ensure that the third-party vendor has the information needed to perform final replication. CAI, IDOE, and the third-party vendor will meet as needed during replication time frames to address and resolve any open questions.

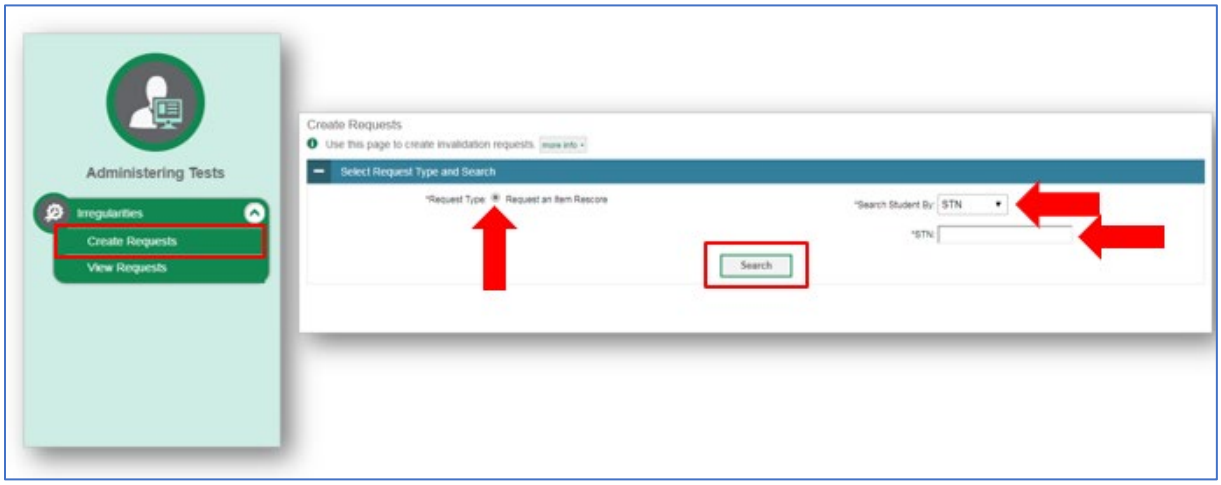
1.17 (3p) Rescores

CAI recognizes that Indiana has legislation that provides parents, guardians, and designated school personnel the opportunity to request a rescore for ILEARN open-ended handscored items, and CAI systems are configured to support rescore requests for all ILEARN assessments in a secure online environment currently implemented within the Test Information Distribution Engine (TIDE), CAI's student registration system. Parents and designated school personnel can request a rescore for some or all of the handscored items on the ILEARN assessments after both the test and handscoring are completed. Each rescore window will open on the same day as preliminary results become available in the Centralized Reporting System (CRS) and will last for a duration of at least two weeks.

CAI has implemented system configuration and a proven process to allow item responses to be viewed and item rescores to be requested within one system, TIDE, for ease of navigation for users. Designated users, called *principals*, will log into TIDE, view a response, and request an item rescore as part of the test appeals process. Only school-level principals will be able to access data for students within their school. Parents and guardians will work on-site with the school principal user to securely view the student responses as part of the rescore process. Along with the item and student response, the principal user will be able to view the stimulus and passage for an item, where applicable, as well as the handscored item anchor papers and scoring rubrics. The anchor papers and scoring rubrics will be provided as supplemental materials to support the rescore review and are required as part of the state legislation. All principal users are required to sign a nondisclosure agreement in the TIDE system prior to accessing any handscored items. Parents and guardians will sign a printed nondisclosure form that will be maintained locally at the school per IDOE's policy.

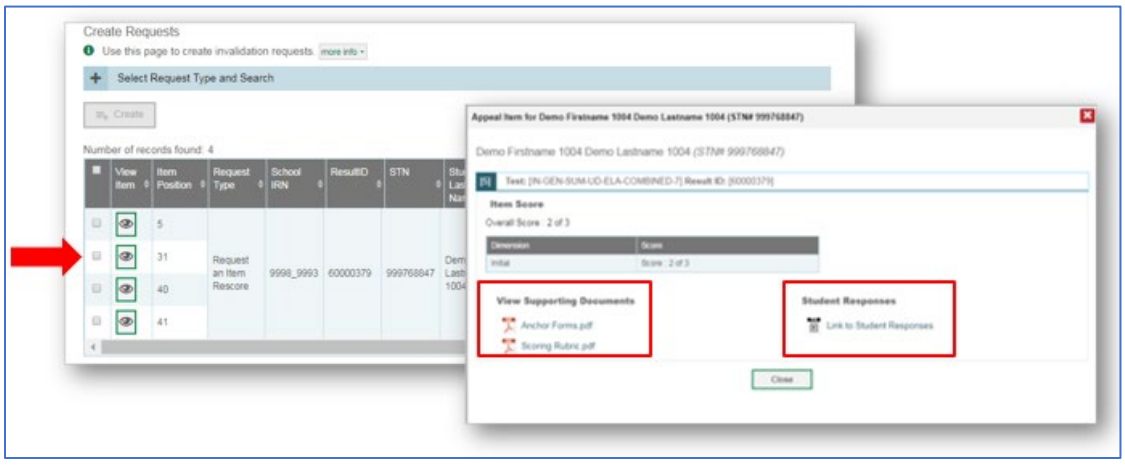
Rescore appeals will be accessed in TIDE (see Exhibit 1.17-1) by selecting the appeal request type and searching by student test number.

Exhibit 1.17-1: Rescore Appeal Request



All available items on a student test will be available for principal, parent, and guardian review. The principal user will select each item to view in TIDE. The items will be numbered based on their position on the assessment and the current item-level score will be available. Once an item is selected, the principal user will be able to access a link to the student item and response, as well as the item anchor papers and scoring rubric, as displayed in Exhibit 1.17-2.

Exhibit 1.17-2: Accessing Student Item and Response



After a rescore request is submitted, the response will be sent directly to the handscoring vendor to be rescored. Once the item has been rescored, the rescored test is automatically reported in CRS and a new individual student report (ISR) will be available in CRS.

CAI will provide an online system training module that presents an overview of the rescore process for school administrators, parents, and guardians. This module will be approved by IDOE and posted to the ILEARN portal at least two months in advance of the Fall ILEARN Biology end-of-course assessment test administration window annually.

Following the conclusion of each rescore window, CAI will develop a corporation- and school-level rescore report for designated corporation- and school-level users to provide information about all submitted rescores. The rescore report will be easy to read for school personnel and will include original and rescored item-level scores or condition codes, content-area dimension-level scores, and reporting category scores. All rescore reports will be available to corporations to coincide with the annual July 1 final aggregate reporting date. CAI will also provide IDOE a master file of all statewide rescores requested for each ILEARN administration.

If a student item response review is requested for a machine-scored item by IDOE, CAI can provide IDOE access to the Secure Item Review Viewing Environment (SIRVE) which provides secure access to student item and score responses for machine-scored items. SIRVE is a component of the Test Delivery System (TDS) and presents the item exactly as it is shown to the student in TDS.

Technical Advisory Committee

CAI psychometricians regularly work with states and their Technical Advisory Committees (TACs) to identify measurement issues of concern, to design and execute research studies, and to report the results of those investigations to the state and the TAC. To support IDOE, CAI will attend TAC meetings three times per year (on-site or virtual) on behalf of IDOE. We will assume all costs associated with sending the appropriate representatives from CAI to the annual on-site meetings, as needed, and will have representatives available for virtual meetings and telephone conferences with the TAC upon request from IDOE.

CAI will provide clearly written questions and prepare supporting materials for IDOE to review three weeks prior to each TAC meeting. Psychometric processes including test design, scaling, and equating, and validation procedures, as well as technical reports, will be presented to the TAC for review and to IDOE for approval. CAI will provide additional support or follow up on all information and documentation within scope, as required by the TAC and/or IDOE. Should IDOE or the TAC request additional studies, research, or documentation outside of the original scope, CAI would be happy to provide these as an additional cost option and work with IDOE to design solutions.

1.18 (3q) Pilot Testing

Summary of ILEARN Field-Test Process in Current Contract

During the first administration of ILEARN in Spring 2019, CAI and IDOE successfully field tested (piloted) items at all tested grade levels across all four subject areas. In order to assess Indiana-specific standards in ELA and mathematics not covered by licensed item pools and that were required to meet blueprint, items were operationally administered randomly under the constraint of blueprint match so that items could be calibrated and equated back to the Smarter Balanced scales. For future administrations, it is expected that any changes to standards will be known prior to an implementation of a new blueprint so that items can be piloted in embedded field-test (EFT) slots.

ILEARN Import Plan

IDOE will author and review new Indiana-owned content in a separate item banking system. These items and passages will be delivered to Cambium Assessment as XML files, metadata spreadsheets, and graphics for import into CAI's Item Tracking System (ITS). Before importing this content, CAI will expect to receive the following materials from IDOE:

- XML files that contain the final version of items and passages (including all revisions from prior IDOE and educator committee reviews) in machine-readable Question and Test Interoperability (QTI) format, with the item parts clearly delineated;
- spreadsheets with item and passage metadata required by ITS; and
- graphics (if applicable) that conform to CAI's Graphic Style Guide.

Upon delivery of the above elements, CAI will perform the following tasks:

- Initial import of items, metadata, and graphics into ITS at the CAI Final Content Approval level
- For all item types, CAI will programmatically associate Reporting Category and Indiana Academic Standard information during the initial import.

- CAI content staff will complete a high-level quality control (QC) check of imported items and passages to ensure that all content renders and that metadata provided by IDOE is present in ITS.
- Upon completion of the high-level QC check, CAI content staff will promote items and passages to IDOE Web Approval and notify IDOE content specialists that content is ready for review.

Immediately after the import and prior to IDOE's Web Approval, CAI will not edit items or passages in ITS but will provide support to IDOE as needed. During IDOE's Web Approval of items in ITS, IDOE staff will ensure that all formatting is intact, make any necessary edits (e.g., to restore hard returns and recreate tables and text boxes), and populate additional attributes, as needed, prior to approving imported content. Once items have been approved by IDOE, all accommodation work will continue directly in ITS, and no content will be re-imported from the item banking vendor.

CAI expects all imported content to be received from the item banking vendor no later than September 1 of the school year in which items are to be field tested in the Spring.

Incorporation of Smarter Balanced Field-Test Items for ILEARN

As described in Section 1.9 (3h), any newly developed Smarter Balanced field-test items that IDOE wishes to field test in Indiana must either be accepted by business rules or via an Item Acceptance Review Meeting. CAI assumes that IDOE will continue to field test only Smarter Balanced CAT items and not performance task sets, due to the requirement that all public-facing elements of the ILEARN mathematics and ELA blueprints must be met. Should IDOE wish to participate in the field-testing of Smarter Balanced performance tasks, additional scope will be needed to account for efforts associated with the annual modification of the test design.

Further, in order to allow for field-testing of both Indiana-owned and Smarter Balanced items, IDOE and CAI will annually review the estimated counts of both items to determine how many items from both sources can be supported by the field-test plan.

ILEARN Field-Test Design

CAI assumes an online testing population of 80,000 students per grade and subject. CAI generally seeks to obtain 4,000 responses per field-test item in order to calibrate items using more general item response theory (IRT) models, including the two-parameter logistic/generalized partial credit (2PL/GPC) models used for the ILEARN assessments. Exhibit 1.18-1 denotes this information along with the current number of EFT slots and the number of items that can be field tested each year given these constraints. Should IDOE wish to field test more items, the number of EFT slots can be increased.

Exhibit 1.18-1: Field-Test Plan Assumptions by Subject and Grade

Subject and Grade	Estimated Population Testing Online	# of EFT Slots	Min # of Student Responses	Max # of Field-Test Items
ELA Grades 3–8	80000	8	4000	160
Mathematics Grades 3–8	80000	5	4000	100
Science Grades 4 and 6	80000	5	4000	100
Biology	80000	5	4000	100
Social Studies Grade 5	80000	5	4000	100

As described in the previous section, CAI recognizes IDOE's desire to include Smarter Balanced field-test items in the EFT slots. Exhibit 1.18-2 denotes the current estimated EFT counts for Spring 2022, by grade and source, for mathematics and ELA. Should IDOE develop a larger quantity of items in future years, the number of Smarter Balanced field-test items would need to be reduced or the number of available EFT slots increased.

Exhibit 1.18-2: Estimated EFT Counts for Spring 2022 Assessments

Grade	Smarter Balanced	New IDOE/Educator-Authored	Totals
Mathematics			
3	31	23	**54**
4	52	20	**72**
5	43	23	**66**
6	21	21	**42**
7	33	22	**55**
8	41	21	**62**

Grade	Smarter Balanced	New IDOE/Educator-Authored	Totals
ELA			
3	0	19	**19**
4	0	45	**45**
5	0	29	**29**
6	0	11	**11**
7	0	44	**44**
8	0	9	**9**
Total	**221**	**287**	**508**

Summary of I AM Field-Test Process in Current Contract

As with ILEARN, operational field-test (OFT) items and EFT items were deployed during the Spring 2019 administration of I AM. The I AM assessments followed a field-test design that was slightly more complex than that of the ILEARN assessments. For the I AM tests,

Part 1 consisted of the following three sections:

- Segment 1: Two practice items confirming the student's participation in the practice test and three operational or OFT items of varying complexity
- Segment 2: 17 operational or OFT items of varying complexity
- Segment 3: EFT items that matched the same blueprint as a subset of the OFT items. These EFT items were used for scoring only if they were needed to meet the blueprint after item data review (IDR). The items included in this EFT section were fixed, meaning that every student participating in the assessment saw the same items.

In Part 2 more targeted items were administered to the student based on his or her performance in Part 1. There were three stage-adaptive segments of Part 2: Tier 1 (low complexity), Tier 2 (moderate complexity), and Tier 3 (high complexity). Each form in Part 2 included two sections, one Tier segment and EFT, as follows:

- Segments 4–6: 12 operational items
- Segment 7: Randomly selected EFT items that were not used for scoring

In the sections that follow, we describe our proposed approaches to the field-test design of I AM for future administrations.

I AM Import Plan

Our proposed import plan mirrors the ILEARN import plan described above. We note that for the Spring 2022 assessments, IDOE does not plan to import new items. Instead, IDOE plans to re-field test the same items from Spring 2021. This decision was based on a TAC recommendation due to limited participation in the Spring 2021 administration. For the new contract, CAI will be able to import I AM items developed in another item banking system according to the same assumptions discussed under *ILEARN Import Plan*.

I AM Field-Test Design

The Spring 2021 I AM test forms contained new field-test items. The EFT slots (in paper-and-pencil tests) or segments (in online tests) were located with fixed positions across all subjects, such that item location and motivation effects, if they existed, did not propagate into the estimates of the item parameters.

The EFT items were administered by using one of the EFT blocks, which included six field-test items. Exhibit 1.18-3 shows the number of EFT blocks and items per grade administered in 2021. Three EFT blocks for grades 3–6 and four EFT blocks for grades 7, 8, and 10 were constructed. For the online assessments, one of the EFT blocks was randomly administered to each of the students.

Exhibit 1.18-3: Number of EFT Blocks and Items for Spring 2021 I AM

Grade	Number of EFT Blocks	Number of EFT Items (6 items in each block)
3	3	18
4	3	18
5	3	18
6	3	18
7	4	24
8	4	24
10	4	24

The field-test engine randomly sampled a field-test block for each individual test administration. This randomization ensured that (1) each item block was seen by a representative sample of Indiana students and (2) every item block was as likely as every other item block to appear in a class or school, minimizing clustering effects.

Alternate test design. CAI acknowledges IDOE's intention to explore an alternative test design for I AM using an external organization. CAI will support this effort to ensure the most effective test design and field-test plan for I AM. One advantage of moving to item adaptive tests would be the impact on the field-test design. Specifically, EFT items could be randomly selected for administration and randomly placed across the range of available positions.

Regardless of the test design selected, CAI is able to pilot and analyze items developed during the research study utilizing the same system as I AM. Changes in requirements will be addressed and a final process implemented at the time the plan is formalized.

1.19 (3r) Item Analysis

In this section, we describe the procedures CAI uses to evaluate the performance of field-tested items for inclusion in the Indiana item pools. We propose to continue to administer ILEARN assessments in English/Language Arts (ELA) and mathematics using the Smarter Balanced item pool. However, because IDOE implements a custom Indiana blueprint that requires CAI's ICCR item pool, as well as Indiana-specific item development to measure alignment to the Indiana Academic Standards, analysis of Indiana field-test items is required. In addition, we propose to continue to administer ILEARN science assessments adaptively, employing the Hawaii science item pool in addition to Indiana-specific item development. The ILEARN social studies assessments, as well as the IREAD-3, are fixed-form assessments constructed from Indiana item pools. IAM is a stage-adaptive assessment that also requires Indiana-specific item development. To support both adaptive test administration and immediate scoring and reporting of student assessment results, we propose scoring student records using pre-equated item parameter estimates. Precise and stable item parameters for pre-equated scoring are calibrated on the basis of student responses to field-test items embedded in operational test administrations. Thus, student responses are obtained under operational test conditions so that resulting item parameter estimates are precise and stable. That said, the performance of items can change over time; so we also describe CAI's tools and procedures for monitoring the performance of test items throughout each test administration.

Field-Test Item Analyses

Following the close of the testing window each year, CAI will analyze field-test data in preparation for item data review meetings and the promotion of high-quality test items to Indiana's item pools. The item analyses include classical item statistics and Item Response Theory (IRT) item calibrations. Classical item statistics are designed to evaluate the relationship of each item to the overall scale, evaluate the quality of the distractors, and identify items that may exhibit a bias across subgroups (i.e., differential item functioning, or DIF, analyses). The IRT item analyses allow us to examine the fit of items to the measurement model and provide the statistical foundation for operational form construction and test scoring and reporting. Our proposed approach to IRT calibration, equating, and scaling of test items is described in Section 1.21 (3t). In this section, we describe the classical item analyses that will be instrumental in the evaluation of field-test item performance by the data review committees following field-test administration.

Classical Item Analysis

Classical item analyses ensure that the items function as intended with respect to the underlying scales. CAI's analysis program computes the required item and test statistics for each multiple-choice and constructed-response item to check the integrity of the item and to verify that the difficulty of the item is appropriate for the grade level. Key statistics that we compute and examine include the following:

- **Item Discrimination.** The item discrimination index indicates the extent to which each item differentiates between those test-takers who possess the skills being measured and those who do not. In general, the higher the value, the better the item is able to differentiate between high- and low-achieving students. The discrimination index for multiple-choice items is calculated as the correlation between the item score and the student's IRT-based ability estimate. For polytomous items, we compute the mean total number of items correct for students scoring in each of the possible score categories.
- **Distractor Analysis.** Distractor analysis for multiple-choice items is used to identify items that may have marginal distractors or ambiguous correct responses. In the distractor analysis, the correct response should be the most frequently selected option among high-scoring test-takers. The discrimination value of the correct response should be substantial and positive, and the discrimination values for distractors should be lower and, generally, negative. The biserial correlation for distractors is the correlation between the item score—treating the target distractor as the correct response—and the student's IRT ability estimate, restricting the analysis to those students selecting either the target distractor or the keyed response.
- **Item Difficulty.** Items that are either extremely difficult or extremely easy are flagged for review but are not necessarily deleted if they align with the test specifications. For multiple-choice items, we compute the proportion of test-takers in the sample selecting the correct answer (*p*-values) as well as those selecting the incorrect responses. For constructed-response items, item difficulty will be calculated both as the item's mean score and as the average proportion correct (this is analogous to *p*-value and indicates the ratio of an item's mean score divided by the number of points possible).

Analysis of Differential Item Functioning

CAI conducts differential item functioning (DIF) analysis on all field-tested items to detect potential item bias across major ethnic and gender groups. The following DIF groups will be included in this analysis:

- Ethnicity
  - African American
  - Hispanic
  - Native American
  - Asian
  - White
- Gender
- Special Education Status
- Limited English Proficient Status
- Free/Reduced Price Lunch Status
- Accommodation Status

DIF refers to items that appear to function differently across identifiable groups, typically across different demographic groups. Identifying DIF is important because sometimes it is a clue that an item contains a cultural or other bias. Not all items that exhibit DIF are biased; characteristics of the educational system may also lead to DIF. For example, if schools in low-income areas are less likely to offer geometry classes, students at those schools might perform more poorly on geometry items than would be expected, given their proficiency on other types of items. In this example, it is not the item that exhibits bias but the curriculum. However, DIF can indicate bias, so all field-tested items are evaluated for DIF; and all items exhibiting DIF are flagged for further examination by a Fairness and Sensitivity Committee. Committee members are asked to re-examine each flagged item, using the statistics as a guide, and to make a final decision about whether the item should be excluded from the pool of potential items given its performance in field testing.

CAI typically uses a generalized Mantel-Haenszel (MH) procedure to evaluate DIF. The generalizations include (1) adaptation to polytomous items and (2) improved variance estimators to render the test statistics valid under complex sample designs. IRT ability estimates for each student on the test are used as the ability-matching variable. That score is divided into five intervals to compute the MH chi-square DIF statistics for balancing the stability and sensitivity of the DIF scoring category selection. The analysis program computes the MH chi-square value, the log-odds ratio, the standard error of the log-odds ratio and the MH-delta for the multiple-choice items, the MH chi-square, the standardized mean difference (SMD), and the standard error of the SMD for the constructed-response items. The purification method described by Holland and Thayer (1988) is included in the DIF procedure.

Items are classified into three categories (A, B, or C), ranging from no evidence of DIF to severe DIF according to the DIF classification convention illustrated in Exhibit 1.19-1. Items are also categorized as positive DIF (i.e., +A, +B, +C), signifying that the item favors the focal group (e.g., African American, Hispanic, female), or negative DIF (i.e., –A, –B, –C), signifying that the item favors the reference group (e.g., white, male). Items are flagged if their DIF statistics fall into the "C" category for any group. A DIF classification of "C" indicates that the item shows significant DIF and should be reviewed for potential content bias, differential validity, or other issues that may reduce item fairness.

Exhibit 1.19-1: DIF Classification Rules for Items

Dichotomous Items	
Category	**Rule**
C	$MH\chi^2$ is significant and $\lvert\hat{\Delta}_{MH}\rvert \geq 1.5$
B	$MH\chi^2$ is significant and $\lvert\hat{\Delta}_{MH}\rvert \geq 1.5$
A	$MH\chi^2$ is not significant
Polytomous Items	
Category	**Rule**
C	$MH\chi^2$ is significant and $\lvert SMD\rvert / \lvert SD\rvert \geq .25$
B	$MH\chi^2$ is significant and $\lvert SMD\rvert / \lvert SD\rvert < .25$
A	$MH\chi^2$ is not significant

Item Statistic Flags

Following our analysis of field-test items, items are submitted to a second round of external reviews before they are eligible for selection into the operational test item bank. As a first step in the field-test item review, field-test items that did not perform as expected are flagged for additional review. Flagging rules for items are configurable and are defined in the Analysis Specifications document. The flagging criteria presented here are for illustration only but do represent values typical for statewide assessment programs:

- **Item Discrimination Flags.** Multiple-choice items are flagged for subsequent review if the biserial correlation for the item is less than 0.25 for the keyed (correct) response and greater than zero for distractors. For constructed-response items, items are flagged if the polyserial correlation is less than 0.25.
- **Item Difficulty Flags.**
  - Multiple-choice items are flagged for review if the *p*-value is less than 0.25 or greater than 0.95, but flagging rules are configurable. Multiple-choice items are also flagged when the keyed response is not the modal response. In conjunction with low or negative biserial correlations, non-modal responding to the keyed response may indicate that the item has been miskeyed. These general flagging values assume traditional multiple-choice items with four response options. Items with a different number of response options or no guessing component will have quite different expected lower-bound values.
  - Constructed-response items are flagged when the proportion of students assigned any score-point category is greater than 0.95. A very high proportion of students in any single score-point category may suggest that the other score points are not useful or, if the score point is in the minimum or maximum score-point category, that the item may not be grade-appropriate. In addition, constructed-response items are flagged if the average ability estimate of students in a score-point category is lower than the average ability estimate of students in the next lower score-point category. For example, if students who receive three points on a constructed-response item score lower, on average, on the total test than students who received only two points on the item, the item will be flagged for review.
- **DIF Flags.** A DIF classification of C means that the item shows significant DIF and should be reviewed for potential content bias, differential validity, or other issues that may reduce item fairness. Items in the C category for any group are flagged and reviewed by the Fairness Data Review Committee.

The flagging rules presented above are used to identify items for external review committees but do not constitute the extent of CAI's review of test items. As described in Section 1.21 (3t), CAI also examines the fit of IRT parameters to the underlying measurement model. The information provided by classical and IRT item analyses is in many ways redundant, but each approach provides a different perspective on item functioning. However, because classical item statistics are understood more intuitively by external item committees, CAI recommends presenting only those statistics for item data review.

Item Statistics Review

Items flagged for review on the basis of any of these criteria must typically pass through an additional series of reviews to be included in the final item pool from which operational forms are created and adaptive tests are administered. First, a team of CAI psychometricians reviews all flagged items to ensure that the data are accurate and properly analyzed, response keys are correct, and no other obvious problems with the items exist. CAI content staff then review each of the flagged items to ensure that the items are accurate and administered as intended. In addition, Department assessment and curriculum staff, as well as the Content Review Committee and Fairness Review Committee, meet to re-evaluate flagged field-test items in the context of each item's statistical performance.

Effectively evaluating the quality of test items, including the alignment of the knowledge and skill requirements of test items to the Indiana Academic Standards, requires reviewers to be able to view and interact with test items using the same interface and online tools available to students during a test administration. The Web Preview feature in the Item Tracking System (ITS) uses the same software to render test items that is used by the Test Delivery System (TDS) so that CAI and IDOE test development staff and reviewers for the Content Review Committee and Parent Review Committee can fully evaluate the knowledge and skill requirements of test items as administered online. Even items that are nominally consistent across test administration modes may be rendered quite differently in paper and online. An example is the display of reading passages or other stimulus-bound items, where stimuli and items are displayed simultaneously to students in split screens. For these reasons, electronic review of test items by external review committees is critical.

Operational Item Analyses

CAI psychometricians actively monitor the performance of test administrations throughout the testing window using a set of quality assurance (QA) reports generated from the Quality Monitor (QM) system. Throughout the testing window, QA reports will be routinely generated and evaluated to ensure the quality of Indiana's statewide assessments. The QA reports provide information on item behavior, blueprint match rates, and item exposure rates. Additional reports, detailed in Section 1.13 (3l), include a forensic analysis report that flags unlikely patterns of behavior in testing administrations aggregated at the test administration, test administrator, and school levels. The QA reports can be generated on any desired schedule. Item analysis and blueprint match reports are evaluated frequently at the opening of the testing window to ensure that test administrations conform to blueprint and items perform as anticipated.

Each time the reports are generated, the lead psychometrician reviews the results. If any unexpected results are identified, the lead psychometrician alerts the project manager immediately to resolve any issues. Exhibit 1.19-2 presents an overview of the QA reports.

Exhibit 1.19-2: Overview of Quality Assurance Reports

QA Reports	Purpose	Rationale
Item Analysis	To confirm whether items work as expected	Early detection of errors (key errors for selected-response items and scoring errors for constructed-response, performance, or technology items)
Blueprint Match Rates	To monitor unexpected low blueprint match rates	Early detection of unexpected blueprint match issues
Item Exposure Rates	To monitor unlikely high exposure rates of items or passages or unusually low item-pool usage (high unused items/passages)	Early detection of any oversight in the blueprint specification
Cheating Analysis	To monitor testing irregularities	Early detection of testing irregularities

Item Analysis Report

The item analysis report is used to monitor the performance of test items throughout the testing window and serves as a key check for the early detection of potential problems with item scoring—including incorrect designation of a keyed response or other scoring errors—as well as potential breaches of test security that may be indicated by changes in the difficulty of test items. To examine test items for changes in performance, this report generates classical item analysis indicators of difficulty and discrimination, including proportion correct and biserial/polyserial correlation, as well as IRT-based item fit statistics. The report is configurable; it can generate reports using only items with statistics that fall outside a specified range or using all items in the pool.

Blueprint Match Report

The QA system generates two blueprint match reports for each assessment: one based on evaluation of match to content standards and a second for evaluating cross-cutting specifications, such as item type and Depth of Knowledge (DOK)

level. For each blueprint element (e.g., strand, standard, benchmark), the report indicates the minimum and maximum number of items specified in the blueprint, the number of test administrations in which those specifications were met, the number of administrations in which the blueprint requirements were not met, and, for administrations in which specifications were not met, the number of items by which the requirement was not met.

Item Exposure Rates

This report allows test items to be monitored for unexpectedly large exposure rates or unusually low item-pool usage throughout the testing window. As with other reports, it is possible to examine the exposure rate for all items or flag items with exposure rates that exceed an acceptable range. Often, item overexposure indicates a blueprint element or combination of blueprint elements that are underrepresented in the item pool and should be targeted for future item development. Such item overexposure is also usually anticipated in the simulation studies used to configure the adaptive algorithm.

Cheating Detection

As we detail in Section 1.13 (3l), the QM system also provides a forensics report to identify possible irregularities in test administration for further investigation. Unusual patterns of responding at the student level are aggregated to the test session, test administrator, and school levels in order to identify possible group-level testing anomalies. CAI psychometricians monitor testing anomalies throughout the testing window. Evidence evaluated includes changes in test scores across administrations, item response times, and item response patterns using the person-fit index. The flagging criteria used for these analyses are configurable and can be changed by the user. The analyses used to detect the testing anomalies can be run anytime in the testing window.

Summary

Item analysis results are always available to IDOE. Once item statistics have been uploaded to the Item Authoring Tool (IAT), the Department and all test development staff can view item statistics along with any other attribute of test items. Item statistics can be viewed as a "card" for each individual item, or summary reports can be generated to view item statistics for entire pools or any subset of test items. In addition, results of item analyses will be summarized and reported annually as part of CAI's technical reporting, as described in Section 1.24 (3w).

1.20 (3s) Technical Analysis

As we have demonstrated in our successful delivery of multiple statewide assessments, including Indiana's ILEARN, IREAD-3, and I AM assessments, all of CAI's work related to Indiana's assessments will fully comply with the requirements of the Every Student Succeeds Act (ESSA) and will adhere to industry best-practice standards as documented in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014). CAI is committed not only to adherence to best practices as they evolve but to actively participating in the development and implementation of best practices for educational assessment, especially during this period of rapid transformation in assessment technology.

Technical Problem Solving

CAI works closely with state departments of education and their Technical Advisory Committees (TACs) to identify and solve a range of technical issues. In this section we describe some key issues in educational measurement in which CAI has been at the forefront in investigating and providing solutions.

Sampling. CAI is the industry leader in sampling designs for large-scale assessments. The impact of sampling design on test results can be substantial, but most testing companies overlook it. A smaller sample, randomly selected according to an appropriate sample design, provides better estimates of a population than a larger sample selected using ad hoc methods. Random sampling offers two critical advantages that have been the pillars of statistical science over the past century and a half:

- Random selection ensures that the probability of selection into the sample is independent of anything that might affect the target statistics, eliminating potential biases.
- Random selection yields estimates with known sampling properties, enabling statisticians to estimate accurate standard errors. With ad hoc sampling methods, accurate estimators for the standard errors are unavailable, and therefore the resulting statistics' reliability is unknowable.

The National Research Council's (NRC) review of the National Assessment of Educational Progress (NAEP) underscored the importance of appropriate variance estimates in testing. It determined that the reliability of NAEP estimates was overstated because they neglected to appropriately consider the standard errors of the item parameters (NRC, 1999, p. 69). Shortly thereafter, the National Center for Education Statistics (NCES) contracted with the American Institutes for Research (AIR) (now CAI) to develop estimators for the standard error of Item Response Theory (IRT) item parameters under complex samples (Cohen, Jiang, Seburn, & Chan, 2008). These estimators are available through the *iAM* software, which CAI distributes without charge (Cohen & AIR, 2002).

Clustering generally refers to the idea that students in the same school or district are more similar to one another than would be true of a simple random sample of students drawn from the general population. Because schools are typically the primary sampling unit for educational research, clustering is observed in virtually all education-related samples.

Moreover, because clustering decreases the effectiveness of samples, larger samples of schools and students are necessary to achieve the same level of statistical precision obtained using a simple random sample of students.

For example, in evaluating comparability of items across test administration modes, researchers typically identify matched samples of students participating in online and paper test administrations. In this approach, students matched on achievement and demographic characteristics are identified from both paper and online test administration modes. Responses for those groups are independently calibrated under the assumption of equivalent group ability, and parameter estimates of test items are compared across modes. However, the standard errors of resulting parameter estimates are estimated under the assumption of simple random samples, which is typically not the case. The matched paper sample typically comprises a highly clustered sample of districts that are not prepared to move to online test administration, with the result that apparent differences in item parameter estimates across test administration modes are often overinterpreted.

Equating. CAI has also worked with states and their TACs to investigate the volatility of test scores and associated performance classification outcomes across years, especially in the context of post-equated test results. While psychometricians routinely investigate and take steps to reduce measurement error in test scores, little attention has been paid to equating error, which can also impact the stability of test scores between forms on equated tests. *Equating error* refers to the standard error of the linking constant identified to equate test forms. The magnitude of equating error is affected by the effective size of the equating samples, as described above, as well as by the number of linking items. CAI has worked with state TACs over many years to evaluate the impact of equating error in conjunction with industry-standard equating practices, with the result being that many TACs have revised their recommendations about best practices in the identification of linking sets for equating test forms.

Bi-Factor IRT Models. As we describe in Section 1.8 (3g), CAI has been at the forefront in developing new item types that measure student knowledge and skills more deeply by providing students with real-world problems to investigate and solve. These new item types involve multiple interactions that support a range of assertions about the knowledge and skills demonstrated in a student's interactive responses. These new item types violate some underlying assumptions of general IRT models, and thus CAI has also been active in research on psychometric approaches that take into account some of the complexities inherent in these new item types. As we describe in Section 1.8 (3g), scoring assertions resulting from the multiple interactions within each item cluster are likely to be correlated.

It is sometimes suggested that several items, or in this case scoring assertions, simply be summed up and treated as a polytomous item. The idea is that each "testlet" can be scored as a polytomous item using either a partial credit model (Masters, 1982; Muraki, 1992) or a graded-response model (Samejima, 1969). Unfortunately, the models for polytomous items currently in operational use do not adequately address this issue.

Both of these approaches fail to accurately model the local dependence among interactions or assertions within a testlet. Partial credit models assume the same conditional independence among score points that traditional binary models assume, thereby overestimating the information available from the item cluster. Graded-response models make the opposite assumption—they assume perfect conditional dependence (a single draw on an error term), thereby underestimating the information from the cluster.

We solve the problem by explicitly modeling and accounting for the correlation among assertions within compound items. Examples of IRT models that follow this approach are the bi-factor model (Gibbons & Hedeker, 1992) and the testlet model (Bradlow, Wainer, & Wang, 1999). The testlet model is a special case of the bi-factor model (Rijmen, 2010).

Benchmarking. CAI's incorporation of benchmarking into the standard-setting process is an innovation that has facilitated state adoption of more rigorous performance standards that more accurately reflect the intent of adopted state standards. By providing standard-setting panelists with the location of performance standards for other important national

and international assessments, they can more readily identify the neighborhood of likely proficient-level performance standards in the context of their own statewide assessments. While panelists continue to make judgments about the location of performance standards based on the knowledge and skill requirements of test items as they relate to state academic standards, panelists can better evaluate the likelihood that 'Just Barely Meets' students can respond successfully in the context of rich benchmarking information. The validity of test score interpretations is strengthened when the achievement levels indexed by multiple important assessment systems converge, providing consistent feedback about student achievement.

Accommodations. As we describe in Section 1.11 (3j), CAI has the most extensive range of accommodations and accessibility tools available and currently in use for delivering state summative assessments. The purpose of accommodations and accessibility tools is to remove construct-irrelevant barriers to accessing test content so that students can demonstrate what they know and are able to do. Beyond simply providing such tools, it is incumbent upon test developers to investigate whether accessibility tools remove construct-irrelevant barriers as intended. CAI collaborates with states to investigate the differential impact of accessibility tools not only for students who are the intended beneficiaries of these accessibility tools but also for the general education population. For example, CAI recently completed a study in collaboration with the Arizona Department of Education (ADE) to evaluate the differential impact of glossaries for limited English proficient (LEP) versus non-LEP students. Results of this study indicated that the performance of LEP students improved when glossaries were provided, while the performance of general education students was unaffected by the presence or absence of glossary terms. As a result of this finding, CAI is working with states to implement glossaries to reduce construct-irrelevant barriers to accessing test content for LEP students.

Psychometric Analyses

As we describe in Section 1.24 (3w), following the close of the test administration window each Spring, CAI will prepare a technical report for delivery to the Department that fully documents all facets of test development, administration, and scoring and reporting. CAI's technical reports are comprehensive and have successfully supported multiple states through peer review. As we describe in Section 1.19 (3r), following test administration each Spring, all field-tested items will be analyzed using a range of classical and IRT statistics. In Section 1.19 (3r) we describe the classical item statistics that are used to support item data review of all field-tested items, including indicators of item discrimination, difficulty, and differential item functioning (DIF). CAI will work with IDOE to implement custom flagging rules for all state-developed items.

Section 1.21 (3t) describes our proposed approach to calibrating IRT parameters for all test items. For the ILEARN assessments, we propose to maintain the two-parameter logistic/generalized partial credit (2PL/GPC) IRT models adopted by Indiana, which are consistent with the models adopted for Smarter Balanced English Language Arts (ELA) and mathematics assessments. We further propose to maintain the Rasch model that is currently used to score I AM assessments. In addition, Section 1.21 (3t) describes our proposal to use pre-equated item parameters to facilitate adaptive test administration in ELA, mathematics, and science, and enable immediate scoring and reporting of results for all assessments. Parameter estimates will be calibrated on the basis of student responses to field-test items embedded in summative test administrations, which will result in high, precise, and stable parameter estimates. We also describe our approach to monitoring items for parameter drift over time.

As we describe in Section 1.13 (3l), the optimal configuration of the adaptive algorithm based on the unique pool each year is identified through a series of simulations. These simulations ensure that all blueprint specifications are met while maximizing test information near the students' ability for the test overall and for each reporting strand. The simulation results for the final configuration of the adaptive algorithm will be provided as a report to the Department and will be incorporated into the technical report. As we also describe in Section 1.13 (3l), fixed-form assessments are constructed using our Fixed Form Builder tool that interactively constructs test characteristic curves (TCCs) and standard error of measurement curves (SEMCs), as well as other form statistics, as test developers select items into and out of the test form. Each iteration of the test form submitted to the Department for review will include TCCs, SEMCs, and other form statistics. The final form characteristics will be incorporated into the technical report each year.

In Section 1.22 (3u), we outline a series of validity studies that CAI will conduct to support the validity of test score interpretations for Indiana's ILEARN assessments. Validity studies will provide the Department with evidence based on test content, evidence based on internal structure, evidence for relationships with other variables, as well as evidence for the consequences of testing.

Section 1.23 (3v) describes the analyses we propose to conduct annually to document the reliability of ILEARN, IREAD-3, and I AM test scores and performance-level classifications. Reliability of test scores will be evaluated using both classical indicators of internal consistency, as well as IRT-based conditional standard errors of measurement (CSEMs) to evaluate the precision of test scores across the range of student ability. We note that adaptive test administrations result in greater measurement precision for high- and low-achieving students than is possible with fixed-form assessments. In addition to evaluating the reliability of test scores and performance-level classifications for test scores overall, CAI will provide subscale reliabilities and standard errors of measurement (SEMs) for all reporting category subscales. Internal consistency will also be evaluated for all demographic subgroups, as well as for students administered accommodated tests.

Peer Review Support

As we describe in Section 1.24 (3w), following administration of Indiana's ILEARN, IREAD-3, and I AM statewide assessments each year, a technical report will be prepared for delivery to the Department. The technical report will be provided to the Department electronically for review by their TAC. Upon final approval of the technical report by the Department, a PDF version of the technical report will be provided to the Department for posting on the assessment portal.

As we have demonstrated in our delivery of many statewide assessments, CAI is committed to working with IDOE to provide all the technical documentation necessary to successfully complete the peer review process. To support the Department and their TAC in the development and review of peer review evidence, CAI will provide the Department with a crosswalk between the peer review guidelines and the technical report sections that provide the required evidence.

1.21 (3t) Scaling and Equating

As noted throughout, we propose to continue to adaptively administer the English/Language Arts (ELA) and Mathematics assessments aligned to a custom Indiana blueprint. The assessments use the robust Smarter Balanced item pools augmented with CAI's Independent College and Career Readiness item pools and Indiana-owned items to measure the Indiana Academic Standards not assessed in the Smarter Balanced item banks. We also propose to continue to adaptively administer the ILEARN Science assessments using the Hawaii Science item pools and Indiana-owned items. Because the Indiana item pools for the Social Studies assessments and the IREAD-3 assessments are limited, we propose to continue to administer those assessments as fixed-form tests. We also propose to continue administering the I AM) assessments from Indiana item pools. For all assessments, we propose to continue to use pre-equated item parameters to score all test administrations to support adaptive test administration and immediate reporting of assessment results. Pre-equated item parameters are calibrated on student responses to field-test items embedded within summative test administrations, resulting in item response data based on summative test conditions that yield precise and stable item parameter estimates.

IRT Calibration Models

Calibration is the process by which we estimate the statistical relationship between item responses and the underlying trait being measured. CAI psychometricians employ a wide range of item response theory (IRT) models in the execution of state assessment programs. These models extend from the simple one-parameter (or Rasch) model (Rasch, 1980; Cohen & Kolstad, 2000) to multi-parameter models (Johnson, 1992; Beaton, Johnson, & Ferris, 1987) and even to cutting-edge multi-component models (Cohen & Kolstad, 2000).

Although Indiana has traditionally used the three-parameter logistic/generalized partial credit (3PL/GPC) IRT models to calibrate item difficulty, Smarter Balanced employed the two-parameter (2PL)/GPC models to describe student performance on test items. Although the 3PL model includes an additional term that acknowledges the possibility of guessing on multiple-choice (MC) items, in practice, the *a* (discrimination) and *c* (guessing) parameters are substantially correlated so that the fit between the 2PL and 3PL models is virtually identical. We can also note that the *c* parameter is often fixed or estimated using strong prior estimates because the *c* parameter is frequently not freely estimable. Moreover, equating procedures such as the Stocking-Lord procedure are based only on the discrimination and difficulty parameters. Because very little information is lost when applying the 2PL model, IDOE elected to maintain the Smarter Balanced 2PL/GPC models for the ELA and Mathematics item pools. The ILEARN Social Studies assessments are also calibrated using the 2PL model. The ILEARN Science assessments were calibrated using the Rasch model for stand-alone items and the bifactor model for the performance task. The I AM item pools are calibrated using the Rasch model. The IREAD-3 is a legacy assessment with items calibrated based on the 3PL/GPC model.

Both the 2PL and 3PL models recognize that some items measure with less error than others and thus do not offer a one-to-one correspondence between raw scores and scale scores. Some psychometricians (Thissen & Orlando, 2000; Thissen, Nelson, & Swygert, 2000; Yen, personal communication, 1999) advocate mechanisms by which raw score conversion tables can approximate the scores that would be assigned based on these more complex models. CAI recommends that scores be calculated using maximum likelihood with boundaries for the perfect scores (all correct or all incorrect).

Traditional IRT models assume a single underlying trait, and they assume that items are independent given that underlying trait. In other words, the models assume that given the value of the underlying trait, knowing the response to one item provides no information about responses to other items. This basic simplifying assumption allows the likelihood function for these models to take the relatively simple form of a product over items for a single student:

$$L(Z) = \prod_{j=1}^{n} P(z|\theta),$$

where *Z* represents the pattern of item responses and θ represents a student's true proficiency.

For MC models, the 3PL model takes the form

$$P(x_j = 1|\theta_k, a_j, b_j, c_j) = c_j + \frac{1-c_j}{1+e^{-1.7a_j(\theta_k - b_j)}} = P_{j1}(\theta_k).$$

The *b* parameter is called the *location* or *difficulty* parameter. The *a* parameter is referred to as the *slope* or *discrimination* parameter. The slope parameter is essentially the inverse of the standard deviation of the measurement error associated with the item. The third parameter, *c*, defines a lower asymptote. In the absence of the *c* parameter, the probability of a correct response approaches zero as proficiency decreases toward negative infinity. The *c* parameter allows the probability to approach some other lower bound. Given MC items, a student with very little ability on the target trait could guess a correct answer. The *c* parameter captures the effect of such guessing.

For items that have multiple, ordered response categories (i.e., partial-credit items), we again have the choice of a simple Rasch family model (Masters' 1982 partial credit model) or a more general variant such as Muraki's (1992) generalization of Samejima's (1972) graded response model. We recommend the Rasch-family variants for tests with smaller sample sizes, such as state-specific alternate assessments, because they can be reliably estimated with fewer cases. Under the Masters' model, the probability of a response in category *i* for an item with m_j categories can be written as

$$P\left(x_j = i|\theta_k, b_{j0} \ldots b_{jm_j-1}\right) = \frac{e^{\sum_{v=0}^{i} 1.7(\theta_k - b_{jv})}}{\sum_{g=0}^{m_{j-1}} e^{\sum_{v=0}^{g} 1.7(\theta_k - b_{jv})}}.$$

Muraki's generalization adds an item-dependent discrimination parameter as follows (again, Masters' formulation does not usually include the arbitrary constant 1.7):

$$P\left(x_j = i|\theta_k, b_{j0} \ldots b_{jm_j-1}\right) = \frac{e^{\sum_{v=0}^{i} 1.7a_j(\theta_k - b_{jv})}}{\sum_{g=0}^{m_{j-1}} e^{\sum_{v=0}^{g} 1.7a_j(\theta_k - b_{jv})}}$$

Returning to the likelihood equation, the contribution of each item to the overall likelihood function remains independent of all other items, given θ. This is convenient for two reasons: mixing models within an analysis (e.g., one-parameter and partial-credit items on the same scale) becomes no more complicated, and the likelihood of the response pattern may be calculated as the product of the likelihood of responses to individual items.

The number of items that a student answers correctly and the difficulty of the items presented are used to assign maximum likelihood estimates to student ability. In this approach, we maximize the log likelihood function, given as:

$$\ln(L(\theta_i)) = \sum_{j=1}^{k_i} \ln\left(p_j(z_{ji}|\theta_i; \beta_i)\right)$$

where θ_i is an estimate of the student score, z_{ji} is student *i*'s response to item *j*, and $\beta_i$represents the item parameters, treated as fixed and known, associated with the items seen by student *i*. The function p_j(.) represents the particular IRT model employed for item *j*. The summation is over the k_i operational items administered to student *i*. This likelihood

function is maximized using Newton Raphson or Steepest Ascent iterations, each potentially with adaptive step sizes. Non-concave likelihoods are maximized starting from multiple starting points.

The student's performance in each content-area test is reported in an overall test score referred to as a *scaled score*. The scaled scores represent a linear transformation of the ability estimates (theta scores). CAI proposes to use MLE scoring based on pre-equated item parameters to score all of Indiana's tests, whether administered as adaptive or fixed-form assessments.

Bifactor IRT Models for Integrated Cluster Items

An important assumption, known as local independence, is required when using unidimensional IRT models. In certain instances, this assumption may not hold true, and in others, the IRT may be needed when there is, in fact, *dependence* between item responses. This often occurs when items appear nested within groups or share common stimuli. Generally, these items are clustered within the grouping structure.

The effects of item clusters can be accounted for by including additional dimensions in the IRT model. These dimensions are considered to be nuisance dimensions. Examples of IRT models that follow this approach are the bifactor model (Gibbons & Hedeker, 1992) and the testlet model (Bradlow, Wainer, & Wang, 1999). The testlet model is a special case of the bifactor model (Rijmen, 2010). The testlet model with the 3PL version takes the form

$$P\left(x_{jc}=1\middle|\theta,u_c;a_j,b_j,c_j\right)=c_j+\frac{1-c_j}{1+e^{-a_j(\theta+u_c-b_j)}}=P_{j1}(\theta,u_c),$$

where u_c indicates the nuisance dimension for item cluster c. The item response function $P_{j1}(\theta,u_c)$ now becomes a response surface that is a function of two latent variables: the latent trait θ representing a student's proficiency (the underlying trait of interest), and the nuisance dimension u_c accounting for the conditional dependencies between items of the same item cluster. A Rasch version of the testlet model is obtained by setting the guessing parameters to zero and the discrimination parameters to 1, as proposed by Wang and Wilson (2005).

Whereas traditional unidimensional IRT models assume that all items are independent, given a single underlying trait θ, the testlet and bifactor models assume conditional independence of items, given the underlying latent trait θ and all nuisance dimensions:

$$P(\boldsymbol{x}|\theta,\mathbf{u})=\prod_{c=1}^{C}\prod\nolimits_{j\in c}P(x|\theta,u_c),$$

where $\mathbf{u}$ is the vector of all C nuisance dimensions.

The application of the Rasch testlet model for calibrating item cluster scoring assertions has been reviewed and endorsed by technical advisory committees (TACs) in multiple states, including Connecticut, Hawaii, New Hampshire, Rhode Island, Utah, Vermont, and West Virginia. It also supported summative test scoring for three-dimensional Science tests in New Hampshire, Utah, and West Virginia in Spring 2018. A similar model is employed to calibrate English Language Proficiency Assessment for the 21st Century (ELPA21) test items, which are administered in 10 states.

CAI has fully developed systems to estimate and score these models reliably. For unidimensional models, a marginal likelihood function is maximized as follows:

$$L(\theta)_{marginal}=\int_{\mathbf{u}}P(x|\theta,\mathbf{u})p(\mathbf{u})d\mathbf{u},$$

where $P(x|\theta,\mathbf{u})$ is defined above and $p(\mathbf{u})$ is the prior (i.e., normal) distribution for $\mathbf{u}$ in the population.

Ability Estimation

We propose to continue using the maximum likelihood method to compute scores based on the pattern of correct and incorrect student responses to operational items. For the unidimensional IRT models, the likelihood equals the conditional probability for the observed response pattern but is considered as a function of theta:

$$L(\theta)=P(\mathbf{x}|\theta)=\prod_{j=1}^{n}P\left(x_j|\theta\right).$$

The likelihood function (or technically, its logarithm) is maximized with respect to θ using the Newton Raphson method.

For the bifactor and (Rasch) testlet models, the conditional probability $P(\mathbf{x}|\theta, \mathbf{u})$ for an observed response pattern $\mathbf{x}$ contains the vector $\mathbf{u}$ of nuisance dimensions associated with item clusters, in addition to θ, the general proficiency. We propose to marginalize the nuisance dimensions and maximize the marginalized likelihood function for θ,

$$L(\theta)_{marginal} = \int_{\mathbf{u}} P(\mathbf{x}|\theta, \mathbf{u})p(\mathbf{u})d\mathbf{u},$$

where $P(\mathbf{x}|\theta, \mathbf{u})$ is defined above and $p(\mathbf{u})$ is the prior (i.e., normal) distribution for $\mathbf{u}$ in the population. The marginal likelihood is maximized with respect to θ using the Newton Raphson method.

Reporting scales will be constructed as a linear transformation of the underlying trait θ that is common to all items.

Estimation of IRT Models

CAI psychometricians employ a range of statistical software to calibrate items across state assessment programs, and CAI will use any software requested by IDOE to calibrate item parameters. We prefer to use our own software, the IRT Plugin to our *AM* statistical software (*iAM*), which we distribute without charge (Cohen & AIR, 2002). *iAM* offers some capabilities that are not available from other packages, as we discuss in the following paragraph. However, CAI psychometricians currently use flexMIRT, IRTPRO, Multilog, Parscale, and other software to calibrate item parameters using the more general IRT models in other state assessment programs. Therefore, we are prepared to use any software requested by IDOE.

iAM offers a key advantage over other available software because it provides design-consistent standard errors and yields accurate estimates of linking errors under complex designs. Like Parscale, *iAM* includes various constructed-response models (including the generalized partial-credit model) that can be simultaneously estimated with two- and three-parameter logistic models on the same test. Like Bilog-MG, *iAM* can simultaneously estimate the proficiency distributions in multiple groups. Building on its design-consistent estimators, *iAM* provides fit statistics that reflect the complex sample design.

Like Parscale and Bilog-MG, *iAM* estimates item parameters using marginal maximum likelihood (MML), which provides consistent estimates under the assumed proficiency distribution. MML estimation numerically integrates over the population proficiency distribution. In the absence of analytic solutions to the problem, finding the parameter values that maximize the likelihood of the data requires numerical optimization. The preferred method for finding the maximum likelihood estimate of such models is to use the expectation maximization (EM) algorithm (Dempster, Laird, & Rubin, 1977). Bock and Aitkin (1981) propose an EM algorithm for this class of models, and this is the approach taken in popular IRT software.

Evaluation of Model Fit

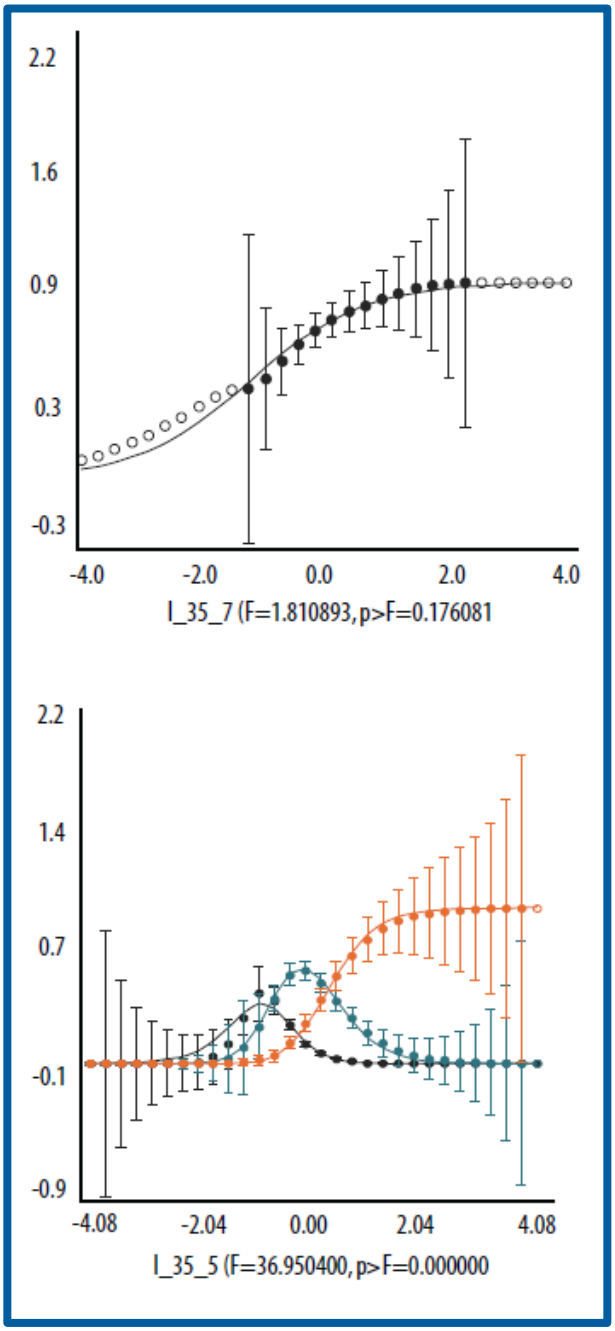
Psychometricians use a variety of measures to evaluate the fit between models based on IRT and observed item data (Yen, 1981; McKinley & Mills, 1985; Fitzpatrick et al., 1996). These statistics operate by evaluating the variance between observed and predicted item responses, a task made difficult because both the observed and the predicted item responses are contingent on the value of a latent trait (θ). Typically, some estimate of θ is used, and the discrepancy between the true and estimated values of θ is ignored. Fit statistics typically ignore a second source of error as well: the estimates of θ and the predictions both depend on a common set of item parameters that are themselves estimates. Hence, IRT fit statistics are notoriously conservative. This problem is compounded by the fact that item data almost always come from a complex, clustered sample. The end result is that typical IRT packages report significant χ^2 statistics for most items, regardless of actual fit.

CAI uses a fit statistic that overcomes these problems, incorporating uncertainty in the item parameter estimates and uncertainty in the latent trait estimates and taking into account uncertainty in the item statistics. When these sources of uncertainty are correctly addressed, the χ^2 becomes an F statistic. *iAM* reports fit statistics along with innovative graphics that characterize the item fit, as shown in Exhibit 1.21-1.

The top panel in Exhibit 1.21-1 shows a sample fit graph for a well-fitting MC item, and the bottom panel shows a sample fit graph for a poor-fitting partial-credit item. In both graphs, the x-axis represents the range of student ability values and the y-axis represents the probability. The solid line represents the item characteristic curve (ICC), the dots represent the empirical estimates, and the bars indicate the standard error of the distance of the empirical estimates from the ICC. Note that the standard error bars are smaller near the center of the distribution and grow larger toward the tails. When the standard errors grow to be virtually infinite, the empirical estimates are represented as an empty circle.

The item in the first panel of Exhibit 1.21-1 shows a well-fitting item; misfit appears only at the tails of the distribution, where data are sparse and often not enough to draw valid conclusions. However, the second graph shows misfit along the one-point line (represented as a black ICC). The empirical data points fall substantially off of the ICC line. Although no single point is outside its confidence limit, the cumulative misfit across points is statistically significant, as depicted by the *F* printed at the bottom of the graph. These fit graphics were designed to provide clearer insights than the fit graphics typically produced by off-the-shelf programs. For example, some graphics use larger symbols to denote scores with more cases: this practice is visually misleading. Estimates from large samples are precise and should appear at a precise point on the page, while estimates from small samples should appear more diffuse. Our graphics achieve this by graphing standard error bars. The estimates are precise near the center of the proficiency distributions, as shown by narrow error bars; they grow diffuse in the tails where little data appear, as shown by wide error bars.

Exhibit 1.21-1: Item Fit Graphics



Vertical Scale in ELA and Mathematics

During the formation of the item bank, Smarter Balanced vertically linked both subjects across grades. The linkage was accomplished by embedding a representative set of lower-grade items in the upper, adjacent grade and using the Stocking-Lord procedure to link these items to their home grade. This linking approach is designed so that the within-grade score also provides an unbiased estimate of a student's performance on the adjacent, lower-grade test. Hence, the difference between the current score and the prior year's score in the lower grade provides an unbiased estimate of growth. CAI is prepared to conduct a vertical scale validation using the Indiana-specific blueprints.

Equating

Equating is a statistical process used to adjust scores on test forms so that scores on different forms can be used interchangeably. Both pre-equating and post-equating methods are used in statewide assessment programs. The principal advantage of pre-equating methods is that they can be applied before the assessment, allowing for immediate scoring and reporting of test results. In addition, they allow the possibility of computer-adaptive item selection. However, pre-equating methods rely on the assumption that the item parameters are invariant across measurement occasions. This assumption may be violated when items were calibrated several years prior to their current use (item drift over time) or when the items were calibrated for a different population (differential item functioning).

Post-equating methods are applied after the operational test administration. They rely on a set of anchor items, a representative set of items that are common between the current test and a previous test (or item bank). After the operational test administration, all items are (re)calibrated, and the anchor items are used to linearly transform the new item parameters so that they are expressed on the existing scale. Whereas pre-equating methods rely on the assumption that the psychometric properties of items did not change from one measurement occasion to another, it is sufficient for post-equating methods that the assumption of item parameter invariance holds for the common items. The item parameters of all other items are always based on the most current test administration.

In practice, a mixed approach is often used. For example, the pre-equated item parameters are used by default for all items, but the items that show item drift are recalibrated and post-equated to the base scale using the remaining items as common items.

Adaptive test administrations require the use of pre-equated item parameters to enable adaptive item selection. More generally, one of the most consequential features of online test administration, coupled with automated scoring of test items, is the ability to immediately score and report assessment results. In fact, students and educators participating in online assessments expect to view assessment results immediately or with minimal delay. For these reasons, the slight advantages accrued by post-equating may be outweighed by delays in score reporting. Thus, we propose a pre-equating design for scoring and reporting assessment results.

Monitoring Scale Drift

CAI will design a study investigating scale drift in the item banks and present the details of that study to IDOE and its TAC. There are two key areas of work that CAI must consider to support IDOE in this area. To begin, it is important to understand the linking and equating methods that are likely to mitigate the effects of scale drift over time (Harris & Kolen, 1994). CAI is cognizant of these recommendations, and our test development protocols used for large-scale testing programs build linking sets and use linking methods known to minimize the effects of scale drift.

Additionally, CAI will provide IDOE with a complete research plan for review and distribution to the TAC. That review will include a review of the literature on scale drift and methods for assessing its impact. Various methods for assessing drift have been proposed (Guo, Liu, Dorans, & Feigenbaum, 2011; von Davier, 2009). A technical report documenting the implementation of the study will be provided to IDOE, detailing the methods, results, and implications.

Linkages to Indiana Scale via Smarter Balanced

Adopting the Smarter Balanced item bank for Indiana's ELA and Mathematics assessments allows for linkages between Indiana's assessments and other assessment systems. Most obviously, the linkage to Smarter Balanced facilitates comparison of Indiana performance with states in the Smarter Balanced Assessment Consortium. In addition, the Smarter Balanced assessments have been linked to the MetaMetrics Lexile and Quantile scales to support reporting of those scales for Smarter Balanced test administrations. As part of the field-test administration, NAEP and PISA items were embedded in the Smarter Balanced test administration to provide Smarter Balanced standard setting panelists with benchmarks to

those assessments in grades 4, 8, and 11. Moreover, linkages between Smarter Balanced and the ACT college and career readiness cut scores can be identified.

1.22 (3u) Validity

Evidence that Items and Test Forms Represent an Adequate Sample of the Content Frameworks

The ILEARN assessments are designed to measure student achievement of the Indiana Academic Standards. The Indiana State Board of Education approved the Indiana Academic Standards in April 2014 for English/Language Arts (ELA) and Mathematics and in March 2015 for Social Studies. The Indiana Academic Standards for Science were initially revised in 2010 and updated in 2016 to reflect changes in science content. The Indiana Academic Standards are intended to implement more rigorous standards and challenge Indiana's students to acquire stronger critical thinking, problem-solving, and communications skills, promoting college and career readiness.

The adaptive algorithm is configured to ensure that all Indiana students are administered ILEARN tests that conform to all blueprint specifications. Similarly, fixed-form assessments are constructed to meet all blueprint specifications.

Evidence that Items Sufficiently Align with the Test Blueprint

All Smarter Balanced, Independent College and Career Readiness (ICCR), and custom Indiana items have been through an exhaustive external review process. The items in the Smarter and ICCR item banks were reviewed by content experts in several states and reviewed and approved by multiple stakeholder committees to evaluate both content and bias/sensitivity. Custom Indiana items were reviewed by Indiana educators only.

After items have been developed, state content experts review any eligible items before committee review. Once items have been reviewed and accepted by IDOE and are ready for Content/Fairness Committee review, Linguistic Complexity ratings are applied in CAI's Item Tracking System. For CAI-authored items, content staff trained on IDOE's Linguistic Complexity rubric assigned ratings. IDOE staff assigned Linguistic Complexity ratings for educator-authored items.

During the Content/Fairness Committee reviews, items are reviewed for content validity, grade-level appropriateness, and alignment to the content standards. Content/Fairness Committee review members are typically grade-level and subject-matter experts, but may also be Mathematics coaches (who can speak to standards across grades) or literacy specialists. Educators also ensure that the rubrics for machine-scored constructed-response items reflect the anticipated correct responses during this review.

Additionally, each committee includes two members specifically charged with reviewing for accessibility and fairness. These stakeholders review items to identify item properties that might unfairly impact students based on their background. For example, these members can include representatives from the special education, low vision, hearing impaired, and other student populations, including English learners (ELs). Further, the diversity of the members of this committee represents students of various ethnic and economic backgrounds to ensure that all items are free of bias and sensitivity concerns.

After all approved state and committee recommended edits have been applied, the items are considered "locked" and ready for accessibility tagging. Accessibility markup is embedded into each item as part of the item development process rather than as a post-hoc process applied to completed test forms.

Accessibility markup, such as translations or text-to-speech (TTS), follows similar processes. One trained expert enters the markup. A second expert reviews the work and recommends changes if necessary. If there is disagreement, a third expert is engaged to resolve the conflict.

Items are then field-tested by embedding the new items in operational test administrations. Following test administration, field-test items are reviewed with respect to a series of classical item analyses and item response theory analyses. Items are flagged if item statistics indicate possible issues with item performance, and these flagged items are further reviewed by IDOE's subject matter experts and Indiana educators on the Content/Fairness Committee.

Because ILEARN relies heavily on licensed item banks, a process for ensuring alignment of those items to the Indiana Academic Standards was implemented by CAI and IDOE. In a series of item acceptance review meetings, Indiana educators reviewed all Smarter and ICCR items for alignment to the Indiana Academic Standards in a series of item acceptance review meetings. Only those items passing the acceptance review process were eligible for administration to Indiana students.

Evidence that the Assessments Were Administered in a Sound Manner and Scores Represent the Achievement of Students

CAI works with IDOE to develop test administration manuals and training materials to ensure that test administrators are properly trained to administer Indiana's assessments and follow all Indiana assessment procedures to ensure fair and valid test scores.

CAI psychometricians generate a series of quality assurance (QA) reports during the assessment window to monitor the quality of test administrations. The QA reports include an item analysis report that allows CAI psychometricians to monitor whether items are performing consistently with their bank values and a blueprint match report. The blueprint match report is used to monitor whether the blueprint match rate of test administrations is consistent with simulations used to configure the adaptive algorithm. An item exposure rate report is used to verify that the exposure rates of bank items are consistent with expectations-based simulations and point to deficits in the item banks that should be targeted for future item development.

The QA reports also include a set of forensic reports that can be used to alert CAI and IDOE to possible irregularities in test administrations. These analyses include response change analysis that identifies test records and test groups with an unusually large number of incorrect to correct response changes; performance change analysis that identifies test records and test groups with unusually large gains in achievement between test administrations; and person-fit analysis that detects student records and test groups with an unusually large number of correct responses inconsistent with student ability levels.

Evidence that Test Item Formats Measure the Intended Content

ELA/Mathematics. Smarter Balanced published results of a series of cognitive labs investigating whether the Smarter items were accessible to students and measuring the intended cognitive processes and content standards (cognitive-laboratories-technical-report.pdf (smarterbalanced.org)). The cognitive labs used think-aloud protocols to investigate cognitive processes elicited across item types and with respect to accessibility tools such as glossaries and TTS.

Science. In 2017, when the development of item clusters for 10 participating states started, CAI conducted cognitive lab studies to evaluate and refine the process of developing item clusters aligned to the three-dimensional science standards. Results of the cognitive lab studies confirmed the feasibility of the approach. Item clusters were completed within 12 minutes on average, and students reported being familiar with the format conventions and online tools used in the item clusters. They appeared to easily navigate the item clusters' interactive features and response formats. In general, students who received credit on a given item displayed a reasoning process that aligned with the skills that the item was intended to measure.

A second set of cognitive lab studies was conducted in 2018 and 2019 to determine if students using braille can understand the task demands of selected accommodated three-dimensional science standards-aligned item clusters and navigate the interactive features of these clusters in a manner that allows them to fully display their knowledge and skills relative to the constructs of interest. In general, both the students who relied entirely on braille and/or the Job Access With Speech (JAWS) screen-reading software and those who had some vision and were able to read the screen with magnification were able to find the information they needed to respond to the items, navigate the various response formats, and finish within a reasonable amount of time. The item clusters were clearly different from (and more complex than) other tests with which the students were familiar; however, the study recommended that students be given adequate time to practice with at least one sample item cluster before taking the summative assessment. The study also resulted in tool-specific recommendations for accessibility for visually impaired students.

Documentation of the Rationale for the Relative Emphasis Assigned to Particular Standards

IDOE convened Indiana educators to develop ILEARN blueprints that cover the intended breadth and depth of the Indiana Academic Standards, and ensure that high-priority standards were assessed for all students. The outcome of these meetings was a set of ILEARN test blueprints that specified the length of each of the assessments, the academic standards to be assessed, the number of items administered to assess each standard, and the number of performance tasks administered as part of each assessment. By specifying the minimum and maximum number of items to assess each standard, Indiana educators were able to measure the importance of standards necessary for students to demonstrate they are on track for college and career readiness.

Evidence that Alternate Forms of Each Test Cover the Same Content

For adaptive test administrations of ILEARN ELA, Mathematics, and Science, the adaptive algorithm is configured to administer tests adaptively under the constraint of blueprint match. Thus, the priority of the adaptive algorithm is to meet all blueprint specifications and then to select items that maximize test information for the student under the constraint of blueprint match. This is achieved by selecting a set of items that best serve the goal of blueprint match and then selecting a subset from those items that best maximizes test information near the student's ability.

The results of the simulations used to configure the adaptive algorithm, including blueprint Mathematics rates, are provided to IDOE each year before the test window opens. In addition, CAI psychometricians generate QA reports throughout the assessment window, including a blueprint match report, to monitor the performance of the adaptive algorithm. The blueprint match rates for each test administration are documented in the ILEARN technical reports annually.

Fixed-form tests are constructed in our Fixed-Form Builder, which enforces blueprint match requirements for all test forms and generates test characteristic curves (TCCs) and standard error of measurement curves (SEMCs) to ensure that test information is distributed equivalently across all fixed-form assessments. TCCs and SEMCs for fixed-form assessments are published in the technical reports annually.

Evidence of the Interrelationship Among "Standard" Scores

The ILEARN technical report presents the intercorrelations among the ILEARN subscale scores within each subject area assessment. Observed correlations among subscales are quite high, and when these correlations are adjusted to account for unreliability in the subscale scores (due to the small numbers of items contributing to each subscale), the intercorrelations are essentially 1.0, indicating that subscale scores within each subject area measure the same underlying construct.

A more sensitive approach that is better able to evaluate the contribution of subdomains within subject areas is afforded by confirmatory factor analysis (CFA). To conduct the CFA, CAI psychometricians identified a covariance matrix of items that met blueprint specifications and were widely administered to Indiana students. For each subject area assessment, a second-order factor model was specified such that each item was an indicator of a single subdomain within the subject area, and each subdomain was an indicator of the subject area more generally. The structural model is illustrated in Exhibit 1.22-1.

Exhibit 1.22-1: Illustration of Second-Order Factor Model

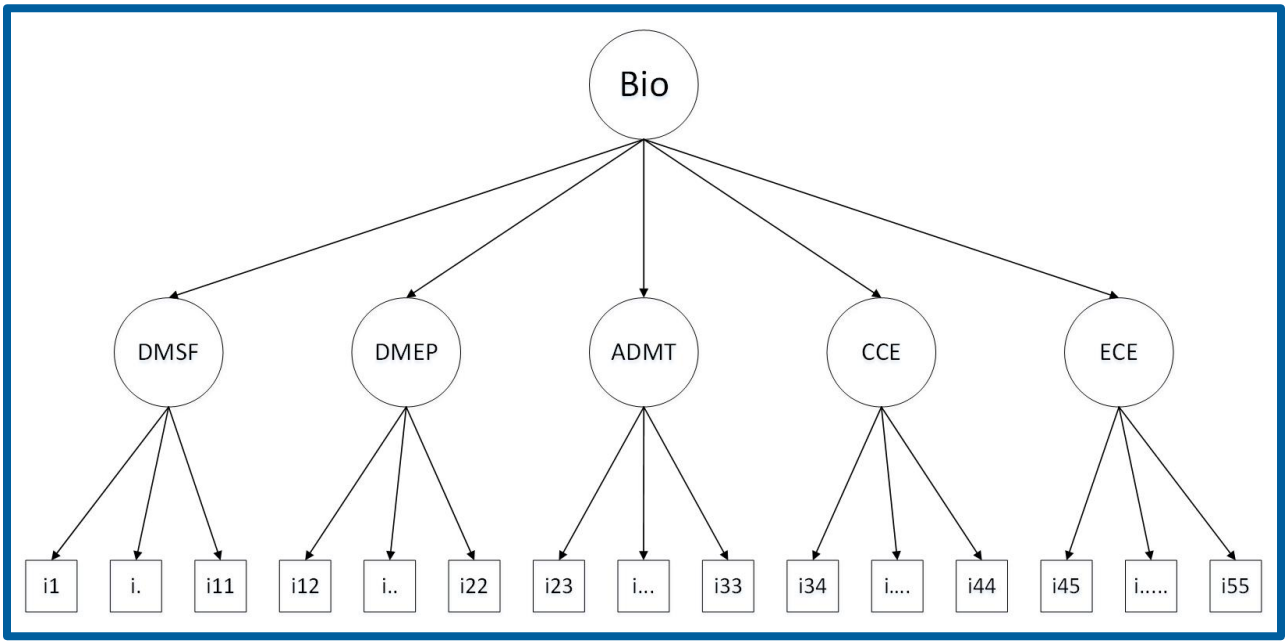


Exhibit 1.22-2 shows the goodness of fit of the second-order model for each ILEARN assessment. Based on the fit indices, the model showed good fit across content domains. For all tests, the root mean square error of approximation (RMSEA) was below 0.05 and the comparative fit index (CFI) and Tucker-Lewis index (TLI) were equal to or greater than 0.95. These results suggest that the subdomains within each subject area account for unique variation in student test performance even though the subdomains are highly interrelated.

Exhibit 1.22-2: Goodness of Fit Second-Order CFA

ELA					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
3	524	0.014	0.983	0.981	Yes
4	557	0.014	0.983	0.982	Yes
5	591	0.009	0.984	0.983	Yes
6	492	0.014	0.984	0.983	Yes
7	460	0.012	0.982	0.981	Yes
8	557	0.010	0.985	0.984	Yes
Mathematics					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
3	1076	0.017	0.983	0.982	Yes
4	1076	0.014	0.958	0.955	Yes
5	1076	0.015	0.977	0.976	Yes
6	1075	0.019	0.942	0.939	Yes
7	1075	0.013	0.983	0.982	Yes
8	1075	0.025	0.916	0.912	Yes
Science					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
4	1032	0.019	0.975	0.974	Yes
6	1031	0.019	0.981	0.98	Yes
Biology (Spring)	1321	0.021	0.975	0.974	Yes
Social Studies					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
5	699	0.020	0.977	0.975	Yes
U.S. Government	1322	0.015	0.986	0.986	Yes

Evidence for the validity of test scores is an ongoing process, with each study adding evidence to bolster our confidence in test score interpretations and extend the inferences that can be made from student test performance. CAI will work with IDOE and their Technical Advisory Committee (TAC) to continue designing and implementing studies that add to the validity evidence of the Indiana assessments.

Evidence Regarding Cognitive Processes

As described in the preceding sections, Smarter and CAI have conducted cognitive lab studies of the ELA and Mathematics items consisting of most of the ILEARN item pools in those subject areas and for Science item clusters consisting of performance tasks administered in Science. Evidence from these cognitive labs supports inferences that the ILEARN items measure the intended cognitive processes and content standards and that accessibility tools effectively remove content-irrelevant barriers to student achievement. IDOE is also developing item content to assess Indiana Academic Standards not evaluated within the context of the Common Core State Standards. Therefore, CAI proposes to extend the cognitive labs studies to include Indiana-specific item development.

Consistent with cognitive labs that CAI has conducted for our own ICCR item pools, as well as Smarter Balanced and other state assessments, we propose to conduct cognitive lab studies of Indiana-specific items to address the following research questions:

1. *Reading, Mathematics, and Science Items Using Newer Formats.* For students who have already been exposed to CAI item formats on their Indiana assessments, are there item formats that appear to introduce construct-irrelevant biases for some students, particularly lower-performing, special education, or ELs? Method: Investigate content areas separately. For students in the target groups, use observation and retrospective think-aloud techniques to compare their ability to perform on traditional and selected innovative item formats, using sets of items that address similar constructs and present similar levels of difficulty.
2. *Assessing Higher Depth of Knowledge (DOK) Levels for Reading, Mathematics, and Science Items.* How often do students use the anticipated and DOK skills to respond to selected Reading, Mathematics, and Science items? Does frequency vary by students' ability level? Method: Investigate content areas separately. For students of varying abilities, use observation and retrospective think-aloud techniques to compare their actual cognitive processes with those anticipated by the item writers (e.g., in Mathematics, do students use modeling strategies

when responding to items intended to measure modeling?). Use subject matter experts to review and evaluate the transcripts of the students' think-aloud responses.

3. *Impact of Multimedia Features on Engagement and Cognitive Load.* Do students—particularly lower-performing, special education, or ELs—show evidence of distraction or cognitive overload when working on simulations or items with multimedia features? Alternatively, do multimedia features appear to enhance understanding or engagement? Method: Investigate content areas separately. For students of varying abilities, use observation and retrospective think-aloud techniques to compare their interactions with multimedia-enhanced items with their responses to traditional items.

Evidence Regarding Relationships with Conceptually Related Constructs

Tests purporting to measure similar constructs should be strongly correlated. Some evidence for the convergence between ILEARN ELA and Mathematics scores and measures of those constructs in independently developed assessments have been provided to Indiana as part of CAI's formative assessment grant proposal for our ClearSight interim assessments.

The sample used to investigate the relationships between ClearSight and *ILEARN* test scores was based on the results of students who took the Spring 2019 ILEARN Mathematics and ELA tests. Each student was offered up to three opportunities to take the ClearSight Mathematics and ELA tests during the test window from August 2018 to April 2019. For the purposes of this investigation, when students participated in multiple testing opportunities, we used the test record corresponding to the earliest testing opportunity only. Students who did not have valid ClearSight test scores were excluded from the analyses. While the ClearSight test window was open from August to April, 90% of students completed their interim test administrations by December 2019. Exhibit 1.22-3 shows the number of students included in the analysis for each test and the Pearson correlation between ClearSight and ILEARN scores.

Exhibit 1.22-3: Analysis Sample Size and Correlation Between ClearSight and ILEARN Test Scores

Test	Sample Size	Marginal Reliability		Correlation	
		ClearSight	ILEARN	Observed	Corrected for Attenuation
Mathematics					
G3M	4760	0.87	0.94	0.78	0.86
G4M	5157	0.88	0.94	0.84	0.92
G5M	5003	0.83	0.95	0.84	0.95
G6M	5280	0.87	0.93	0.85	0.94
G7M	6039	0.86	0.94	0.86	0.96
G8M	5938	0.87	0.87	0.83	0.95
ELA					
G3E	4760	0.87	0.88	0.76	0.87
G4E	5157	0.89	0.88	0.78	0.88
G5E	5003	0.88	0.88	0.80	0.91
G6E	5280	0.89	0.88	0.79	0.89
G7E	6037	0.90	0.88	0.80	0.90
G8E	5938	0.89	0.88	0.77	0.87

As indicated in Exhibit 1.22-3, correlations between the interim and summative test scores are quite substantial, averaging 0.83 across grades for Mathematics and 0.78 across grades for ELA. In fact, the magnitude of the correlations is primarily limited by the reliability of the test scores.

We also observed a *floor effect* for the interim assessments due to truncation of test scores below the lowest observable scale score. This floor effect is likely more pronounced in the interim assessments because students are being tested on academic content for which they have yet to receive grade-level instruction, and this truncation of the range also depresses the observed correlation between test scores.

Although student performance on achievement tests is strongly correlated across subject area assessments, we expect that tests purporting to measure similar constructs to be more highly correlated, while tests measuring conceptually different constructs should be less strongly correlated. Thus, we propose to extend the investigation of relationships between conceptually related assessments to include ELA, Mathematics, Science, and Social Studies, and to examine patterns of convergent and discriminant validity across assessment systems.

CAI will work with IDOE to obtain test scores from Indiana corporations administering independent assessments to evaluate relationships between ILEARN, IREAD-3, I AM, and those independent assessments. In addition, we will work with IDOE to obtain college entrance examination test scores for Indiana students to investigate relationships between ILEARN and performance on college entrance exams.

Evidence Based on Consequential Validity

Assessment systems, especially high-stakes assessment systems, have consequences for students, educators, schools, and districts. Some consequences are intended. Adopting comprehensive and rigorous academic standards may not in itself lead to changes in classroom instruction in the absence of an assessment system that holds educators accountable for achieving those standards. For example, before implementing SAGE (now RISE) assessments in Utah, Writing was assessed in only two grades. Students' writing performance improved with the introduction of Writing in every grade on the state accountability assessments. Assessing Writing on state assessments appears to focus classroom instruction on developing writing skills.

CAI will work with IDOE to design and implement validity studies investigating the consequences of the ILEARN assessment system. At the student level, it will be important to examine the performance of Indiana students across test administrations to evaluate whether adopting new academic standards and new ILEARN assessments results in gains in student achievement over time. More broadly, IDOE may also wish to examine the effects of the assessment on college readiness, investigating changes in the rate of students pursuing post-secondary education and their preparedness for college success as indicated by their performance in freshman year coursework.

It will be critically important to evaluate the consequences of the new ILEARN assessment on educators and in classrooms. We will work with IDOE to develop educator surveys that measure educator attitudes about the Indiana Academic Standards, ILEARN, and their utility for improving instruction. Survey items can also measure educator behaviors intended to improve instruction through professional development and changes to the curriculum. Should IDOE desire, CAI will work with IDOE and their TAC to design and implement a survey that can be used to establish a baseline for evaluating the consequences of testing over time in the initial year of ILEARN.

1.23 (3v) Classification Consistency

Reliability refers to the consistency or precision of test scores and performance-level classifications. It addresses the question of how likely a student would be to achieve the same score or be classified in the same performance level across multiple administrations of equivalently constructed and administered test forms. As part of each test administration, the reliability of test scores and performance classifications is evaluated from various perspectives, using classical and item response theory (IRT) indices of internal consistency, the precision of reported test scores, decision accuracy, and consistency of performance-level classifications. Reliability analyses will be reported for subject-area test scores and performance levels, as well as subscale scores. Any responses requiring handscoring will also be evaluated for inter-rater consistency in the application of scoring rubrics.

In classical test theory, reliability is defined as the ratio of the true score variance to the observed score variance, assuming the error variance is the same for all scores. Within the IRT framework, measurement error varies across the range of abilities. The amount of precision is indicated by the test information at any given point of distribution. The inverse of the test information function represents the standard error of measurement (SEM). The SEM is equal to the inverse square root of the test information. The larger the measurement error, the less test information is being provided. The amount of test information provided is at its maximum for students toward the center of the distribution, as opposed to students with more extreme scores. Conversely, measurement error is minimal for the part of the underlying scale at the middle of the test distribution and greater on scaled values farther away from the middle.

We note that adaptive test administrations significantly improve measurement precision for low- and high-performing students since test information is targeted near student ability rather than, for example, the proficient cut score or population mean. This means that standard errors for low- and high-performing students will be much smaller than can be obtained with fixed-form assessments, resulting in more stable ability estimates that yield better indicators of student growth over time.

When student performance is reported in terms of performance categories, a reliability index is computed in terms of the probabilities of consistent classification of students, as specified in Standard 2.16 in the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014). This index considers the consistency of

classifications for the percentage of test takers who would, hypothetically, be classified in the same category on a second ILEARN administration, using either the same form or an alternate, equivalent form.

Students can be misclassified in one of two ways. Students who are below a proficiency cut point but are classified based on the assessment as above the cut point are considered *false positives*. Similarly, students who are above a proficiency cut point but are classified as below the cut point are considered *false negatives*.

The classification index can be examined for *decision accuracy* and *decision consistency*. Decision accuracy refers to the agreement between the classifications based on the form taken and the classifications that would be made based on the test takers' true scores if their true scores could be known. Decision consistency refers to the agreement between the classifications based on the form taken (adaptively administered items) and the classifications that would be made based on an alternate, equivalently constructed test form or test administration (e.g., another set of adaptively administered items given the same ability). That is, the percentages of students consistently classified in the same performance levels on two equivalent test administrations.

1.24 (3w) Technical Reports

CAI works with each client to develop state-specific annual technical reports. The reports are structured in multiple volumes, for example the ILEARN technical report currently comprises six volumes:

- Volume 1. Annual Report
- Volume 2. Test Development
- Volume 3. Test Administration
- Volume 4. Evidence for Reliability and Validity
- Volume 5. Score Interpretation Guide
- Volume 6. Special Studies

This structure allows most volumes to be updated only as new studies are conducted or processes are changed. The central focus of *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014) is on the validity of test score interpretations. CAI's annual technical report therefore concentrates on documentation of evidence for the validity of intended test score interpretations. Because validity evidence accrues over time, this documentation will be expanded as additional studies are completed. The reliability of test scores and performance-level classifications, both overall and for subscales, is documented for each test administration. Volume 1 is the annual volume, which presents administration-specific information. For this reason, the structure permits optimal use of IDOE's and CAI's resources when reviewing and copy-editing the extensive technical documentation. It also enables readers to focus attention each year on variable elements of the report.

As we have demonstrated with our successful delivery of many statewide assessments, including Indiana's ILEARN, IREAD-3, and I AM assessments, CAI is committed to working with the Department to provide all the technical documentation necessary to complete the peer review process. This success derives from following industry best practices in all areas and from documenting high-quality technical work in an easily accessible way in order to fulfill peer-review critical elements.

To support the Department and its Technical Advisory Committee (TAC) in the development and review of peer review evidence, CAI will provide IDOE with a crosswalk between the peer review guidelines and the technical report sections that contain the required evidence. Each volume is designed to map easily to the peer-review critical elements.

The proposed outline of our technical report is presented in Exhibit 1.24-1.

Exhibit 1.24-1: Outline of Proposed Indiana Technical Report

Volume 1. Annual Technical Report

1. **OVERVIEW**
   - 1.1. Background and Historical Context of Test
     - 1.1.1. Development of Indiana Academic Standards
     - 1.1.2. Online Item Pool Construction
   - 1.2. Available Test Formats and Special Versions
     - 1.2.1. Computer-Adaptive Test Administration
     - 1.2.2. Paper-Pencil Test Administration
   - 1.3. Student Population and Participation
2. **RECENT AND FORTHCOMING CHANGES TO THE TEST**
3. **SUMMARY OF OPERATIONAL PROCEDURES**
   - 3.1. Test Administration Procedure
     - 3.1.1. Test Administration Window
     - 3.1.2. Test Administration Process
   - 3.2. Summary of Simulation Studies Performed Prior to the Operational Testing Window
     - 3.2.1. Testing Plan
     - 3.2.2. Statistical Summaries
     - 3.2.3. Summary of Adaptive Algorithm
     - 3.2.4. Match to Blueprint
     - 3.2.5. Match Overall Test Information to Student Ability
     - 3.2.6. Match Subscale Test Information to Student Ability
   - 3.3. Summary of Statistical Analyses
     - 3.3.1. Summary of Standard Error of Estimated Abilities
     - 3.3.2. Item Recycling
   - 3.4. Accommodations
4. **ESTABLISHING AND MAINTAINING THE ITEM BANK**
   - 4.1. Item Migration, Release, and Retirement Policies
     - 4.1.1. Migration from Summative to Interim Assessment Pool
   - 4.2. Item Banks
     - 4.2.1. Establishing the Item Banks
     - 4.2.2. Item Bank Maintenance
5. **ITEM BANK ANALYSIS OVERVIEW**
   - 5.1. Rubric Validation for Machine-Scored Items
   - 5.2. Item Analyses for Data Review
     - 5.2.1. Item Discrimination
     - 5.2.2. Item Difficulty
     - 5.2.3. Differential Item Functioning
   - 5.3. Field-Test Item Data Review Committee Meetings and Results
6. **ITEM CALIBRATION AND SCALING**
   - 6.1. Methodology
   - 6.2. Item Calibration
7. **ESTABLISHING A VERTICAL SCALE IN ELA AND MATHEMATICS**
   - 7.1. Selecting Linking Items
   - 7.2. Linking Analysis
   - 7.3. Final Linking Set
   - 7.4. Chain Linking

Volume 4. Validity of ILEARN and IREAD-3 Test Score Interpretations

Volume 5. Score Interpretation

1.25 (3x) Comparability Studies

The ILEARN, IREAD-3, and IAM assessments are all administered online, with paper-and-pencil test administrations offered as an accommodation for students for whom available accessibility tools are not adequate or for whom online participation is prohibited for religious reasons. For ILEARN and I AM, which are both adaptively administered, pre-equated item parameters are necessary to support adaptive item/stage selection. For all assessments, CAI recommends that tests administered online are scored using pre-equated item-parameter estimates to support immediate reporting of test results to students and educators. For these paper-and-pencil assessments, we have developed gridded-response options that allow us to render most machine-scored items for processing and scoring on paper answer documents. Although the paper-and-pencil test administrations will not be immediately scored and reported, the sample of students administered the paper-and-pencil accommodations will likely continue to be too restricted to support post-calibration of item parameters. We note that currently less than 1% of Indiana's assessments are administered on paper.

That said, for any assessments where more than 10% of test administrations are administered on paper, CAI proposes to conduct a matched samples mode comparability study to (1) identify whether there are significant effects of mode on item-parameter estimates and (2) identify the linear transformations necessary to place the paper item parameters on the online scale. Should any identified mode effects be negligible (i.e., within measurement error), IDOE may choose to score

responses to paper-and-pencil forms using online item bank parameters. In the event of substantial mode differences, however, IDOE may choose to apply the mode-based linking constant to the online item parameters to create a set of mode-adjusted item-parameter estimates for scoring responses to paper-and-pencil test forms.

Our experience with states offering dual mode assessments has been that (1) mode effects are typically small but present and (2) mode effects interact with items so that mode effects are inconsistent across test forms. Rather than attempting to conduct mode comparability studies on increasingly small and unrepresentative samples of schools following each paper-and-pencil test administration, the states we have worked with—on the advice of their Technical Advisory Committees (TACs)—have chosen to rapidly transition schools to online with paper-and-pencil test administrations provided only as an accommodation and scored using the online item bank parameters.

1.26 (3y) Quality Control

Quality Assurance

Quality assurance processes are deeply embedded in virtually every aspect of the work that we perform. CAI recognizes the stakes associated with the services that we deliver and in providing accurate information on student achievement. Further, we recognize that demonstrated quality in our products, systems, and services is dependent on standardized, clearly documented processes and procedures for all our critical business functions.

CAI has an established Business Process Management (BPM) system using IBM Blueworks Live as our central repository and BPM modeling and management tool. All processes, from contract initiation to the final delivery of score reports, are documented and organized to support the sequence of tasks, work activities, and critical hand-offs. The documentation required to support a process, including process maps, narratives, work instructions, and checklists, are organized and tagged under a simple process architecture that follows the assessment program life cycle. Our BPM system provides a clear framework to support CAI staff in accurately and consistently completing critical business functions and provides the ability to monitor processes to detect and correct problems that fall outside standards or requirements.

CAI has assigned a quality assurance specialist whose responsibility will be to manage and oversee quality assurance practices and deliverables.

Our overarching approach to building quality into the work we perform can be highlighted in several key methodologies. We build systems that

- use multiple layers of review when human knowledge, talent, innovation, and insight are required by the product or service;
- automate when possible, including the integration of real-time quality checks in our online systems;
- train staff so that everyone knows the systems and the systems' importance;
- are self-enforcing (for example, the Item Tracking System [ITS] will not allow reviews to be skipped); and
- continue to build new systems and infrastructure to deliver a better product faster, more reliably, and less expensively.

Summaries of the quality processes to be completed by CAI for tasks and deliverables such as production, manual development, scoring and reporting, data analysis, and test delivery, are covered in greater detail throughout our proposal.

Risk Management and Quality Assurance

While effective communication is crucial to the success of any program—which is the reason a structured communication system has been implemented around key program specifications—CAI program management philosophy employs a systematic approach that enables us to anticipate potential risks and avoid having to operate in a reactive mode. Managing risk begins with proactive planning to identify risks before they escalate and develop mitigation plans to deal with them, especially as they relate to the development, production, shipping and receipt, administration (online assessments), scoring, data processing, reporting, and psychometric activities for high-stakes assessments.

Throughout the program life cycle, program management teams at CAI monitor risks and record them in the program's established Risk Register (see sample Risk Register in Appendix E). Methods for risk identification include brainstorming with program team members and experts from functional areas and interviewing experienced program participants and stakeholders.

Risk is analyzed both qualitatively and quantitatively to determine the overall level of risk to the project's successful completion. After performing Qualitative Risk Analysis, a priority level (high, medium, or low) will be assigned to the identified risk. Quantitative Risk Analysis, which assesses the impact of a risk through numerical and/or statistical analysis, is usually understood in terms of cost increases and/or schedule disruptions.

The structured review of program documentation is another technique used to identify risk. Regular reviews of key program documents with the broader team allow CAI staff to recognize and analyze risks to the success of the program, and then respond to and monitor risks. A systematic review of the key program documents also clarifies questions about program deliverables and expectations. The program manager presents an overview of the program and the program scope, and team members from each functional area make invaluable contributions to the risk management process by using their own perspectives and expertise to help identify risks and program challenges.

For assessment programs at CAI, risk is discussed at every internal team meeting, where members are encouraged to raise concerns that may cause the program to stray from its critical path. Often, the internal team meeting, which brings together leads from across each team for open communication, provides the forum to resolve concerns on the spot. In other cases, the concerns raised by team members are evaluated by program leaders and added to the Risk Register.

CAI's program leaders encourage an environment in which any team member, regardless of role or responsibility, may identify a potential risk for cross-team discussion. Ultimately, even if a team member's concern does not warrant an addition to the Risk Register, fostering a risk-conscious environment leads to remarkable opportunities to engage all team members so that they are committed to providing timely, high-quality deliverables and superior service to our clients.

CAI has structured processes and pathways for identifying and tracking risks against program specifications. These include regular meetings, program updates, and issues logs. Weekly conference calls between CAI and the State will cover both near-term deliverables and longer-term scheduling conflicts and allow us to address issues as they arise.

Effective risk management entails identifying unique situations and pressures that diverge from standard processes. Anything not covered by our usual processes is often identified as a risk, such as atypical workflows, unusual configurations, and unknowns in the technical solution that can compromise quality or timelines.

Program schedules capture the quality control steps while providing sufficient time for the steps to be conducted, so tighter-than-usual critical paths are examined carefully for any impact on the schedule. CAI's program teams follow guidelines for scheduling each quality assurance and quality control activity, and deviations from standard durations require approval. Uncontrolled change can also negatively impact budget, scope, schedules, and program quality. Managing change is part of managing risk and regulating quality.

Once the component risk points are isolated, we can address each risk and identify mitigation strategies through communication and documentation, creating clear visibility into the issue and promoting open discussion about mitigation strategies.

Conducting root cause analyses of any unexpected issue is part of CAI's process of continuous improvement. Performing these analyses ensures a common understanding of issues and the broad and sustained application of corrective action.

Ensuring the collection and delivery of timely and accurate data to our clients is at the core of CAI's mission. CAI's analytic tools and program management approach are nimble enough to evolve and adapt as circumstances change, while providing an unmatched level of reliability. To mitigate risks, our quality assurance protocols include the following six integrated components:

1. Structured review sequences and auditable histories in item development
2. Careful, detailed specifications for all transformations and analysis, sufficient for replication
3. Internal software testing, platform review, and user acceptance testing (UAT) prior to a test going live
4. Independent replication of statistical analysis
5. Quality assurance of data files
6. A Production Control Board (PCB) that implements strict standards for any changes or modifications to our production servers and enforces those standards with a tiered review of every proposed change

CAI will create detailed logs tracing the application of quality control procedures to the state score reports after each test administration. CAI is responsible for maintaining quality products and services in all aspects of all assessment programs, from the replication of the items in the system and on paper to the production of electronic data files and score reports.

CAI will plan and prepare data quality assurance schedules that will allow work to flow in a timely, effective manner while maintaining high-quality deliverables. IDOE will review and approve the data quality assurance schedules annually via their review of the cross-program schedule.

CAI will provide IDOE with a report summarizing any problems noted in the completed and returned scorable data files. This report will allow IDOE to detect any patterns in the errors, problems, and/or discrepancies noted in the report, use that information to clarify instructions in Corporation Test Coordinator (CTC) and School Test Coordinator (STC) guides, and focus and improve the training provided at CTC training sessions.

CAI will retain student response files for possible rescoring for a designated period agreed upon by CAI and IDOE.

CAI will immediately notify the State when an item error, scoring error, or reporting error is discovered. CAI and IDOE will develop a plan for correcting the error. The plan will include a detailed description of how timely and forthright information will be communicated to all affected stakeholders.

No data migration plan is needed as CAI currently administers the ILEARN, IREAD-3, and I AM assessments.

1.27 (3z) Remote Proctoring

We recognize Indiana does not currently allow remote proctoring for high-stakes standardized assessments. However, in the event there is a future need for this option, we provide a description of our remote proctoring capabilities in this section.

CAI's Test Delivery System (TDS) allows proctors to remotely administer tests to their students. While remote testing is a departure from traditional methods of administering tests, the urgent demand for virtual instruction mandated by the COVID-19 pandemic prompted CAI to build its Remote Proctoring application, which has now been embedded in the TDS platform. With this new software, proctors can see and talk with all of their students via broadcast or one-on-one as they test in multiple remote locations. Specifically, proctors can

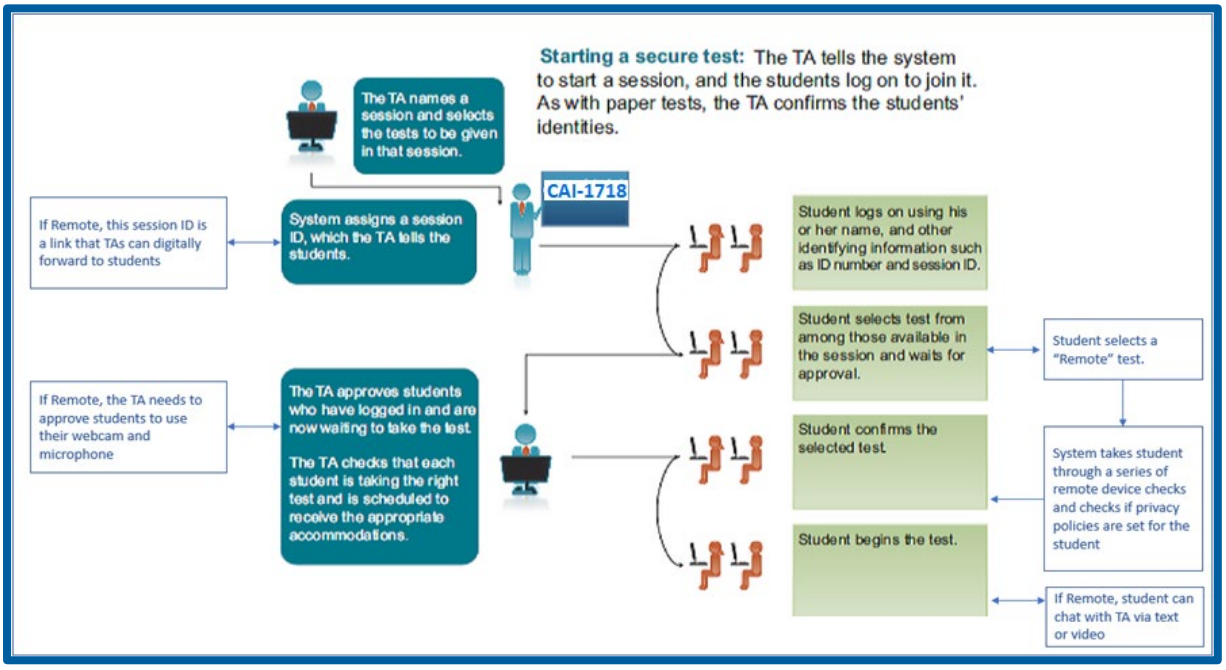
- administer tests remotely using the new video and voice chat capability embedded in TDS;
- schedule test sessions in advance of the test day; and
- assign tests that can be taken without a proctor.

Readers can access sample remote proctoring resources here: https://smarterbalanced.alohahsap.org/resources/resources-2020-2021/remote-summative-test-administration-2020-2021

Starting Remote Sessions

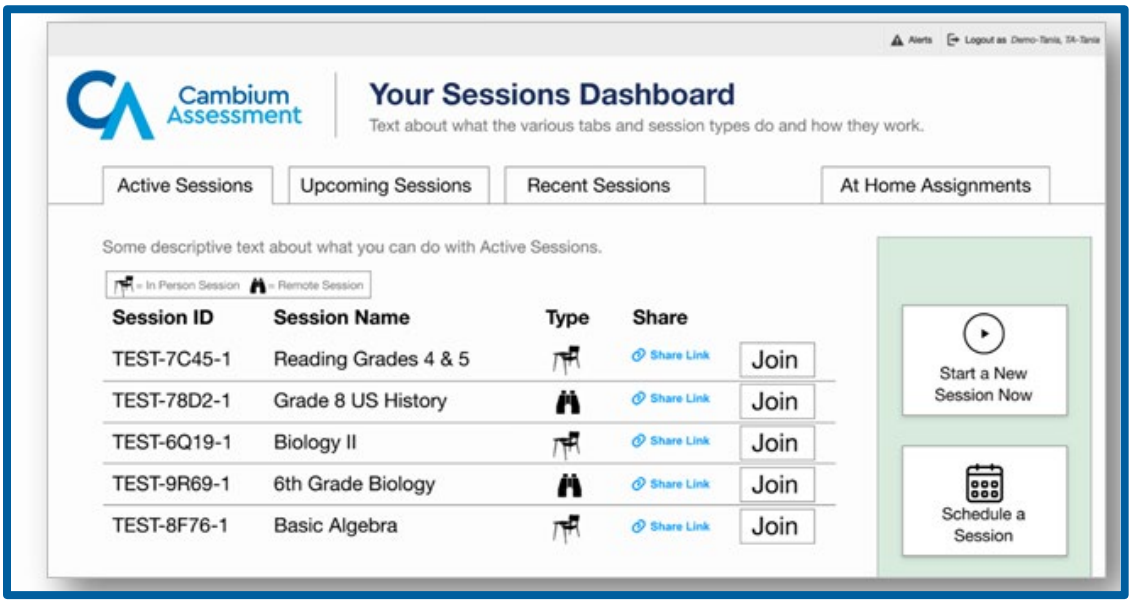
The Remote Proctoring application blends seamlessly with the current intuitive and lightweight Test Administrator (TA) Interface. Exhibit 1.27-1 juxtaposes the processes for remote and on-site test administration. The data interchange between proctor and student remains the same but includes a few additional, remote-specific checks.

Exhibit 1.27-1: Remote Administration Compared with On-Site Testing



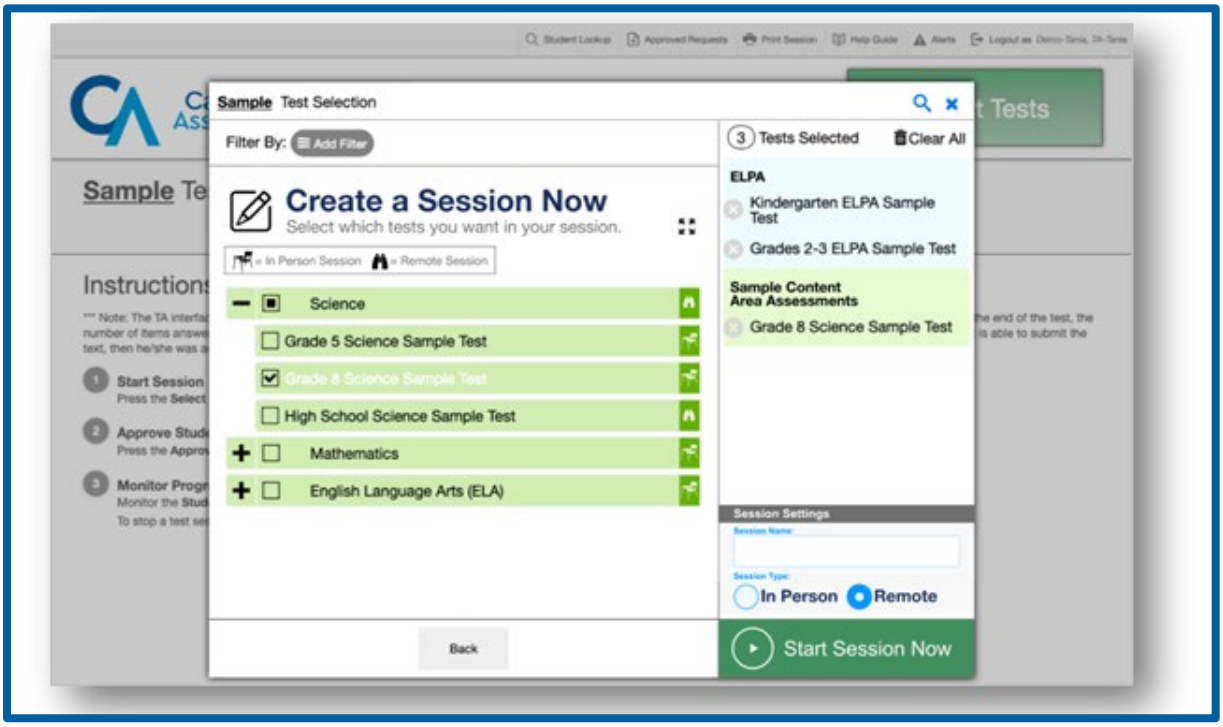
After successfully logging into the TA Interface with a username and password, the proctor has the option to either start a session immediately or schedule a session in advance (see Exhibit 1.27-2).

Exhibit 1.27-2: Scheduling Test Sessions in the Remote Proctoring Application



Clicking *Start a New Session Now* enables the proctor to select the tests he or she wants to administer to his or her students. Clicking *Schedule a Session* will prompt the proctor to designate the test session as either *In Person* or *Remote*. By choosing the *Remote* option, the proctor indicates in TDS that students will take the test in a location different from the proctor's (see Exhibit 1.27-3).

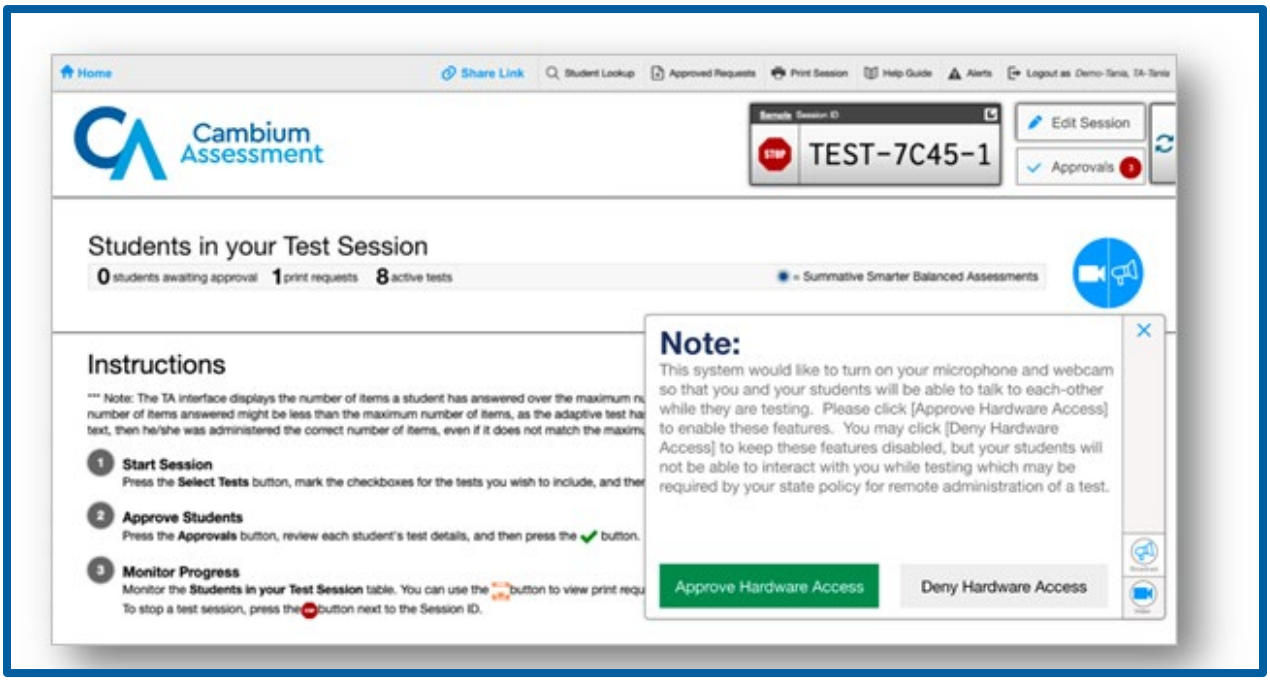
Exhibit 1.27-3: Proctor Chooses the *Remote* Option



After starting a session, the proctor will be taken to a new screen that helps him or her to communicate the login steps to students in the test session. Similar to a GoToMeeting or Zoom meeting code, the session ID serves as a customized link that allows students to join the session. The proctor copies this link and provides it to his or her students.

Once the proctor has started a session, students will join the session just as they do in a traditional classroom setting. The proctor can approve remote requests to admit students to the session one by one or in bulk. Once the proctor approves a student's request, the student can start testing and the proctor can monitor his or her progress, as shown in Exhibit 1.27-4.

Exhibit 1.27-4: Proctor Approves Hardware Access



Taking Tests Remotely

Signing in for remotely administered tests requires students to use the customized link with either a supported browser (for nonsecure benchmark tests) or the CAI Secure Browser (for secure interim and summative assessments). Students must also provide their first name and their Statewide Student Identifier (SSID). After logging in successfully and selecting an eligible test, the student is then led through a series of remote checks to confirm that his or her device will support remote testing (e.g., has a working camera and microphone, passes network connectivity checks, etc.). The TDS system also ensures that privacy policies, such as parental consent for each student in the test session, and other requirements have been met.

Once these checks have been passed, the system signals the proctor that the student is waiting for approval to start the test. After the proctor approves, the student will see his or her image in the chat bubble at the bottom of the screen (see Exhibit 1.27-5). Students are visible in the chat bubbles on each row of the TA Interface, allowing the proctor to monitor them throughout the test session. The proctor can send broadcast messages to all the students in the session by clicking the broadcast icon.

During the test, students can communicate with a proctor either by text or video message (see Exhibits 1.27-6–1.27-7). If a student needs assistance, he or she can use the *Raise Hand* feature to alert the proctor. Both the proctor and students can use bidirectional text messaging to communicate. Proctors can also initiate video calls with a student. Once the student accepts the incoming call, the proctor and student can see and talk with each other. Apart from these remote communication features, the test interface will appear and function just as it does during an in-person test session.

Exhibit 1.27-5: Chat Bubble*

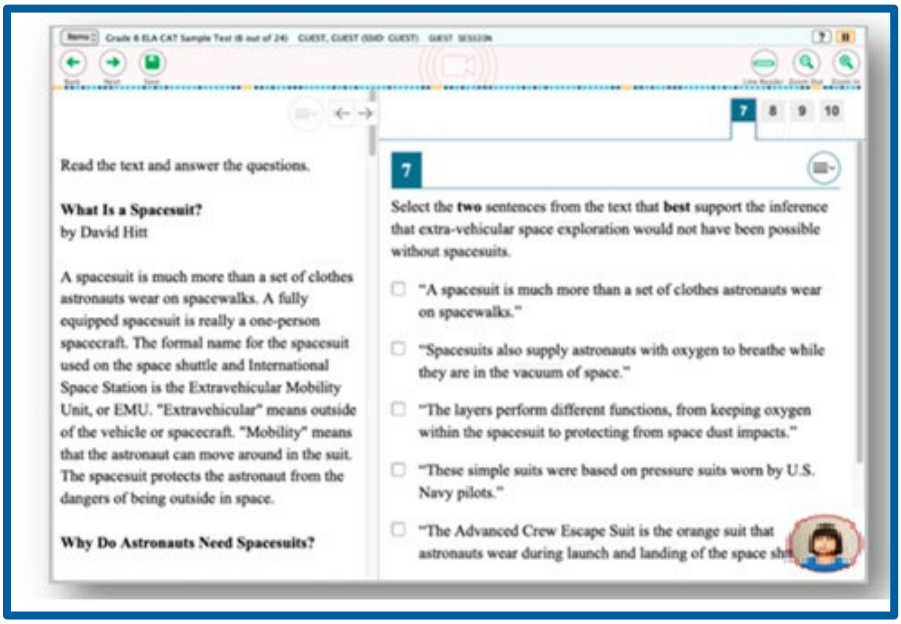
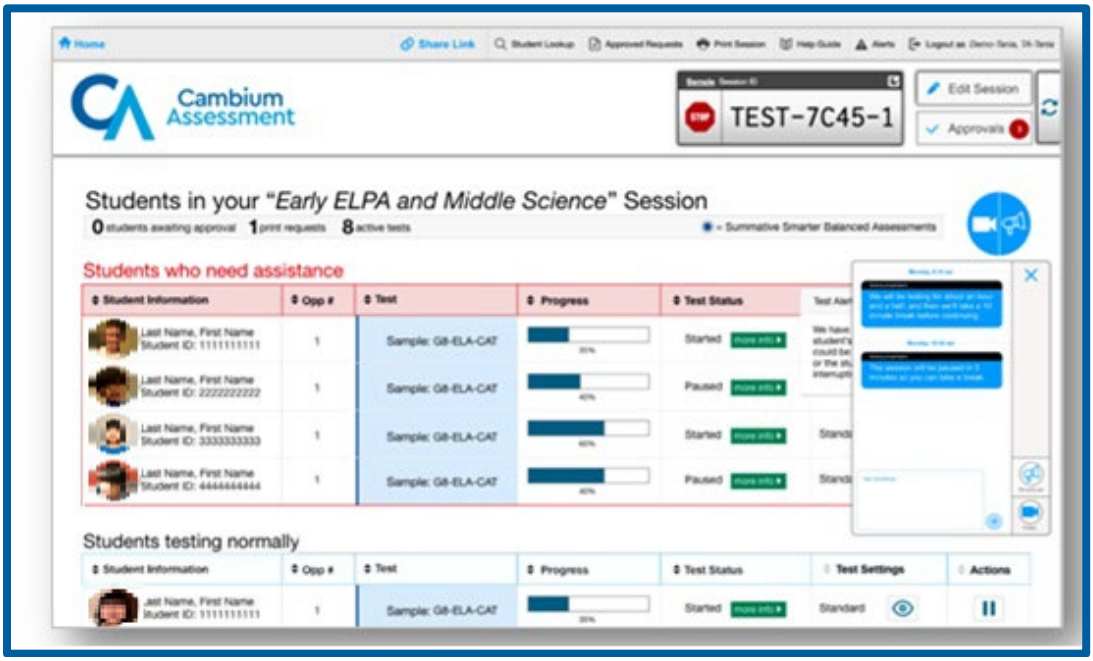


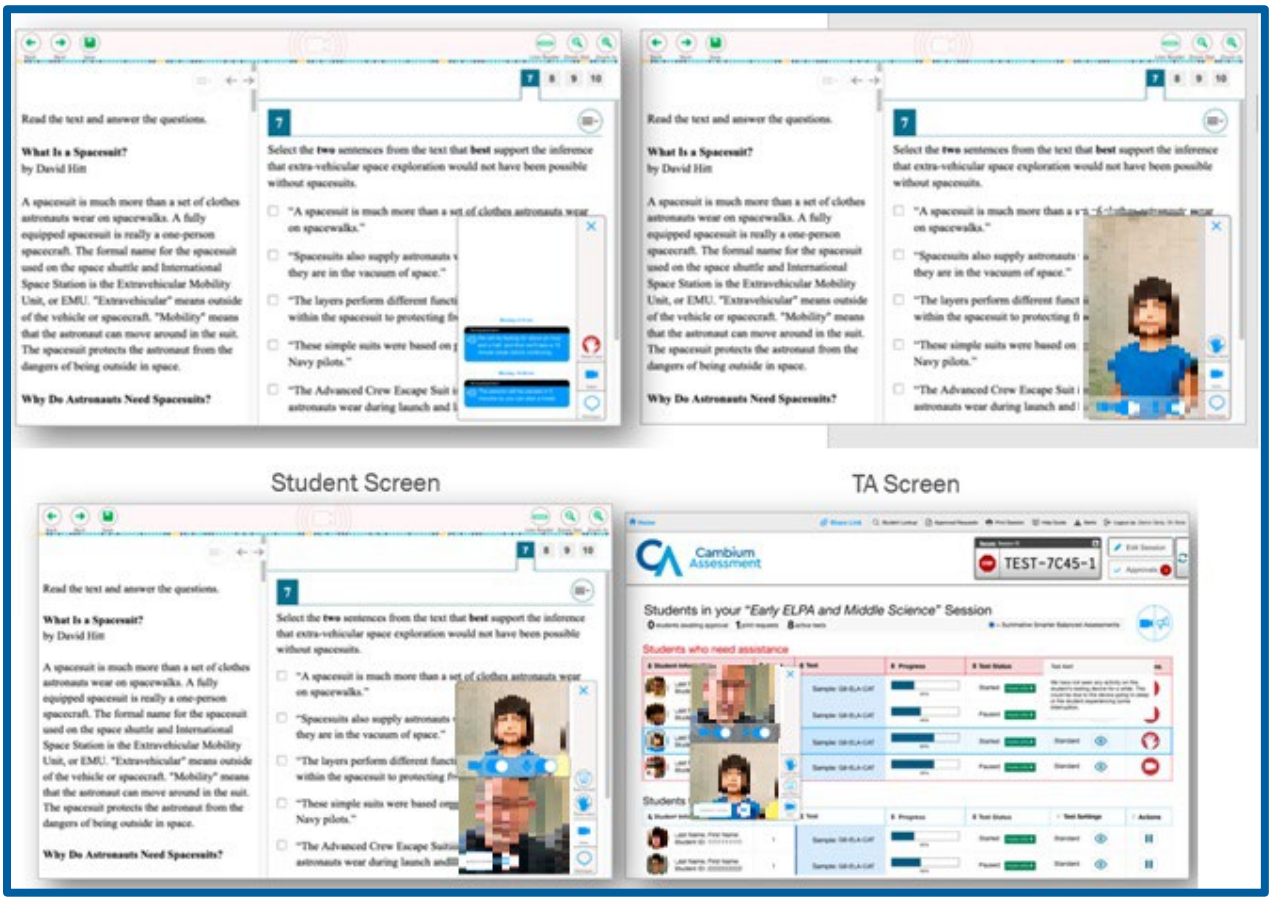
*Image of student at lower-right corner has been intentionally blurred.

Exhibit 1.27-6: Chat Feature (Text Form)*



*Images of students in left-hand column have been intentionally blurred.

Exhibit 1.27-7: Chat Feature (Video Form)*



*Images of students and proctor have been intentionally blurred.

Security and Data Privacy

The Remote Proctoring application is embedded in TDS, which continues to have a minimal technological footprint. The purchase or installation of additional software by schools, corporations, students, or parents is not required.

Data privacy is critical to this feature. To ensure privacy, CAI provides the following protections:

- The same proctors and educators who are authorized to administer in-person tests can proctor remote tests. Our system does not engage third-party personnel for any remote proctoring.
- Proctors can interact with all students in the session or one-on-one.
- Students cannot see or talk with one another.
- All video-conferencing capabilities happen over a peer-to-peer connection between the TA and student devices. After a connection is made between the two parties, CAI has no ability to view ongoing conversations.
- No communications between proctors and students are saved or routed through CAI's servers, so this application has no performance impact on existing system capacity.

1.28 (3aa) Research Studies

Data Recognition Corporation (DRC) will act as an independent researcher to develop a program of research studies that will examine the impacts of the COVID-19 pandemic from different perspectives in order to provide context for the upcoming implementation of large-scale assessments in 2022 and beyond. The goal of this research program will be to connect the results from multiple studies to provide clearer insight regarding the pandemic's effects on the assessment system.

DRC's psychometrics department maintains a large and talented staff with doctorates in psychometrics, educational measurement, statistics, and related areas. They actively conduct research to ensure that test results are fair and consistent and supply useful information to teachers and students while maintaining focus on the assessment program's goals. DRC's staff work in a variety of areas, including item response theory (IRT), dimensionality, standard setting, growth models, computer-adaptive testing (CAT), automated test assembly, scaling and equating, classification consistency (CC), accommodations and special populations, and many other areas that inform educational measurement theory and practice. Since DRC has not been, and will not be, involved in the design or development of the Indiana assessments, their researchers are well positioned to serve as independent arbiters. They will lead the design, administration, and documentation of research studies that may be undertaken to support the efficacy of the assessments and the decisions made on the basis of the test results.

DRC's Psychometric Team will be led by senior research scientist Dong-In Kim. Dr. Kim has more than 20 years of experience in educational research. He and his team will provide IDOE with a strong, experienced psychometric group that will implement a coherent set of studies designed to address COVID-19-related learning loss in Indiana.

CAI acknowledges that up to 100 hours per year will be utilized in performance of these research studies, at a rate of $300 per hour.

1.29 (3ab) Special Study Topic

Automated scoring is the use of statistical and computational linguistic methods to model scores assigned by human raters to unconstrained, open-ended test items. Automated scoring has been widely adopted in K–12 assessment, licensure, and certification programs and is one of the most recognized applications of machine learning in education measurement (Foltz, Yan, & Rupp, 2020). The incorporation of automated scoring for the ILEARN assessments offers faster scoring, higher-quality scoring of items when combined with targeted human scoring, and cost savings. Importantly, automated scoring models do not drift and can help ensure that the scoring rubrics are applied consistently across years. Automated scoring can be applied strategically, including using automated scoring only on the set of items or subject areas that offer the most benefit in terms of cost, accuracy, and reliability.

CAI offers automated scoring in Writing, English/Language Arts (ELA), Mathematics, and Science assessments and has used automated scoring in programs since 2016. We have implemented hybrid automated/human scoring in six state summative programs and in 15 state interim programs. Importantly, we have implemented automated scoring for 103 Smarter Balanced interim full-writes, brief-writes, Reading items, and Mathematics items. Across the set of programs and states, Autoscore assigns scores to about 3.25 million responses in a typical academic year, with most responses scored in the Spring.

We expect to deploy our models alongside human scoring. Thus, we build into each of our models the ability to detect unusual responses, as well as responses residing midway between two rubric scores, which are then routed to human scorers. This approach helps to ensure that all responses, even unusual ones or borderline scores, receive valid and reliable scores. Each response is first routed through a series of algorithmic condition code filters that can be configured to flag and score condition codes. If the response is not flagged with a condition code, it is submitted to the scoring engine. The engine then outputs either a score with a confidence level or a statistically based condition code. If the confidence level is below a threshold (e.g., below the 15th percentile) then it is considered aberrant and we recommend human review. As a monitoring check, we also recommend that a random percentage of responses (say, 5%) be routed for handscoring. CAI's downstream systems support both the routing of these responses for handscoring and the monitoring of performance, including reports on agreement rates and routing percentages.

CAI's automated scoring program, Autoscore, analyzes response characteristics and human-provided scores and predicts what a human rater would do. The response characteristics are collected using features, which are then used to predict scores. Autoscore can use features associated with writing quality and can use features associated with response meaning. Writing quality features include measures of syntax, grammatical/mechanical correctness, spelling correctness, text complexity, paragraphing quality, and sentence variation and quality. Measures of response meaning include the use of latent semantic analysis (LSA) and *deep learning* methods, which consider not just the pattern of word frequencies in a response, but also order of words in the response. LSA ignores word order but identifies key topics associated with the sets of words in a response. Deep learning methods use word order and sets of localized word patterns that are related to scores humans have assigned. Finally, in Autoscore, we build multiple models in parallel and combine the outputs of these models to predict the response score. This approach allows for a more stable score estimate, similar to the use of two or more human raters.

The metrics CAI uses to evaluate engine performance are exact agreement, quadratic weighted kappa (QWK), and the standardized mean difference (SMD). Our performance evaluation criteria are that the engine–human QWK be no lower than 0.1 of the human–human QWK, that the engine–human exact agreement be no lower than 5.25% of the human–human exact agreement, and that the standardized mean difference of the engine and human score have a magnitude not exceeding 0.15. These metrics are fairly common in the industry and represent minimal standards for performance (Williamson, Xi, & Breyer, 2012). Exhibit 1.29-1 illustrates the excellent performance of Autoscore on the Smarter Balanced Interim items, with Autoscore showing higher agreement with a final resolved score as compared to agreement between two raters for all item types. Autoscore also closely approximates the average human scores, as indicated by the SMD and absolute SMD value averages.

Exhibit 1.29-1: Performance of Autoscore, by Item Type, on Smarter Balanced Interim Items

Item Type	Number of items	QWK			Exact Agreement			HS-AS SMD	|HS-AS SMD|
		H1-H2	HS-AS	Diff	H1-H2	HS-AS	Diff		
Mathematics	8	0.70	0.76	0.06	79%	81%	2%	0.01	0.03
Brief-Writes	50	0.62	0.74	0.12	73%	82%	8%	0.00	0.04
Reading	24	0.62	0.73	0.11	76%	83%	7%	-0.02	0.04
Performance Tasks – Reading	14*	0.61	0.68	0.07	88%	92%	4%	-0.03	0.06
Full Writes –Conventions	7	0.58	0.71	0.13	65%	76%	11%	0.09	0.09
Full Writes –Elaborations	7	0.76	0.83	0.07	71%	81%	10%	-0.02	0.05
Full Writes –Organization	7	0.76	0.83	0.06	72%	82%	10%	-0.02	0.05

*Performance data are at the assertion level. A negative SMD value means that the Autoscore mean is lower than the human mean.

It is often best to phase in the adoption of automated scoring—with each phase submitted to technical oversight—to help better understand any emergent issues that arise (Shermis & Lottridge, 2019). We suggest a two-phase approach, starting with a proof-of-concept study to illustrate performance of the engine on a set of items, and then to deploy the engine in a hybrid scoring model. Each phase should be reviewed by the Technical Advisory Committee (TAC), including a review of proposed next steps based upon the results of the first phase. When automated scoring is proposed for any new item type or subject area, the two-phase approach can be used to help ensure the process produces valid, reliable, accurate, timely, and cost-efficient scores.

We recommend the first proof of concept study (Phase 1) to focus on full-writes because automated scoring of Writing is well established (Shermis & Hamner, 2014) and because full-writes are the costliest to score. We propose selecting one

item in each of the three genres for each of grades 3, 5, and 7, for a total of nine items. As part of the proof-of-concept study, CAI identifies a sample that reflects the population of interest, submits that sample to handscoring using high-quality procedures (two independent reads with expert adjudication of discrepant scores), creates training (approximately 75%) and validation samples (25%), trains models using the training sample, and evaluates engine performance on the validation sample using the earlier-mentioned criteria. We provide technical reports on performance on the validation sample for each trained model for each administration. Following engine training and evaluation on a validation sample, CAI will score a 15% random sample of responses from a spring administration to examine model performance on 'live' student responses. The methods and results of the engine training and validation will be shared with the TAC, along with a recommendation for hybrid scoring approaches as well as thresholds for condition codes. Once the TAC and IDOE recommend and approve a hybrid model, CAI will implement that model in the second phase.

Implementation (Phase 2) involves a number of steps. First, the scoring plan and specifications are updated to reflect the hybrid scoring plan. This involves determining all engine-scoring rules and routing conditions and is submitted for Department review and approval. The engine-scoring rules include which condition codes and thresholds to use, which condition codes should be routed for human scoring, thresholds for routing response due to low confidence, and rules for routing responses for engine score validation. Second, plans for how to involve Indiana educators in scoring need to be identified, as well as a communication plan for stakeholders around automated scoring. Educator involvement can include informing decisions around setting routing thresholds, review of automated scoring results, and participating in the scoring process itself for routed responses. The communication plan includes a discussion of why automated scoring is being used, how it works, how hybrid scoring is implemented, and performance results. Finally, the schedule for preparing for operational use will be adjusted to include automated scoring. This includes the identification of samples to train the engine, handscoring those samples, training and validating the engine, deploying the engine to the user acceptance testing and production environments, and test decks to ensure deployments are consistent across environments. This also includes the monitoring of engine performance during live scoring and the inclusion of automated scoring methods and results as part of the annual technical report.

CAI can expand the use of automated scoring to other content areas and item types using a similar two-phase process. CAI will work with the Department to determine and implement the plan after full-write automated scoring is implemented.

2. Assessment Criteria and Evidence Questions

Part A. Meet Overall Assessment Goals and Ensure Technical Quality[4]

2.1 Ensuring that Assessments are Valid for Required and Intended Purposes

Section 1.22 (3u) provides evidence for the validity of ILEARN test score interpretations and describes CAI's approach to continually expanding validity evidence for the Indiana assessments. As we describe in Section 1.22 (3u), the ILEARN assessments are designed to measure student achievement of the Indiana Academic Standards (IAS). In this section, we review validity evidence for the ILEARN assessments, but note that validity evidence for the ILEARN, IREAD-3, and I AM assessments are provided in their respective technical reports published annually.

Evidence Based on Test Content

To ensure that the ILEARN assessments covered the intended breadth and depth of the IAS, IDOE convened panels of Indiana educators to develop ILEARN blueprints. The outcome of these meetings was a set of ILEARN test blueprints that specify the length of each of the assessments, the academic standards to be assessed, the number of items administered to assess each standard, and the number of performance tasks administered as part of each assessment. By specifying the minimum and maximum number of items to assess each standard, Indiana educators were able to measure the importance of the standards necessary for students to demonstrate they are on track for college and career readiness.

The adaptive algorithm is configured to ensure that all Indiana students are administered ILEARN tests that conform to all blueprint specifications. Similarly, fixed-form assessments are constructed to meet all blueprint specifications. We note

[4] The term "technical quality" here refers to the qualities necessary to ensure that scoring and generalization inferences based on test scores are valid both within and across years. Also, refer to other sources, primarily *The Standards for Educational and Psychological Testing*.

that in the context of adaptive test administrations, the validity of test score interpretations at all aggregate levels is bolstered because students are assessed with respect to the full range of items measuring each standard within the adaptive ILEARN item pools.

All Smarter Balanced, Independent College and Career Readiness (ICCR), and custom Indiana items have been through an exhaustive external review process. The items in the Smarter and ICCR item banks were reviewed by content experts in several states and reviewed and approved by multiple stakeholder committees to evaluate both content and bias/sensitivity. Custom Indiana items were reviewed by Indiana educators only.

During the Content/Fairness Committee reviews, items are reviewed for content validity, grade-level appropriateness, and alignment to the content standards. Content/Fairness Committee review members are typically grade-level and subject-matter experts, but may also be Mathematics coaches (who can speak to standards across grades) or literacy specialists. Educators also ensure that the rubrics for machine-scored constructed-response items reflect the anticipated correct responses during this review.

Additionally, each committee includes two members specifically charged with reviewing for accessibility and fairness. These stakeholders review items to identify item properties that might unfairly impact students based on their background.

Items are then field-tested by embedding the new items in operational test administrations. Following test administration, field-test items are reviewed with respect to a series of classical item analyses and item response theory analyses. Items are flagged if item statistics indicate possible issues with item performance, and these flagged items are further reviewed by IDOE's subject matter experts and Indiana educators on the Content/Fairness Committee.

Because ILEARN relies heavily on licensed item banks, a process for ensuring alignment of those items to the Indiana Academic Standards was implemented by CAI and IDOE. Indiana educators reviewed all Smarter and ICCR items for alignment to the Indiana Academic Standards in a series of item acceptance review meetings. Only those items passing the acceptance review process were eligible for administration to Indiana students.

To ensure that test items measure the intended cognitive processes and that accessibility features effectively remove construct-irrelevant barriers to accessing test content, Smarter Balanced and CAI have conducted a series of cognitive lab studies that employ think-aloud protocols to examine the cognitive processes students engage in when administered test items. These cognitive labs were described in Section 1.22 (3u). In that section, we also proposed to conduct additional cognitive labs focused on Indiana-specific item development to ensure that the full range of items and associated standards are included in these evaluations.

Evidence Based in Internal Structure

The ILEARN technical report presents the intercorrelations among the ILEARN subscale scores within each subject area assessment. Observed correlations among subscales are quite high, and when these correlations are adjusted to account for unreliability in the subscale scores (due to the small numbers of items contributing to each subscale), the intercorrelations are essentially 1.0, indicating that subscale scores within each subject area measure the same underlying construct.

A more sensitive approach that is better able to evaluate the contribution of subdomains within subject areas is afforded by confirmatory factor analysis (CFA). To conduct the CFA, CAI psychometricians identified a covariance matrix of items that met blueprint specifications and were widely administered to Indiana students. For each subject area assessment, a second-order factor model was specified such that each item was an indicator of a single subdomain within the subject area, and each subdomain was an indicator of the subject area more generally. The structural model is illustrated in Exhibit 2.1-1.

Exhibit 2.1-1: Illustration of Second-Order Factor Model

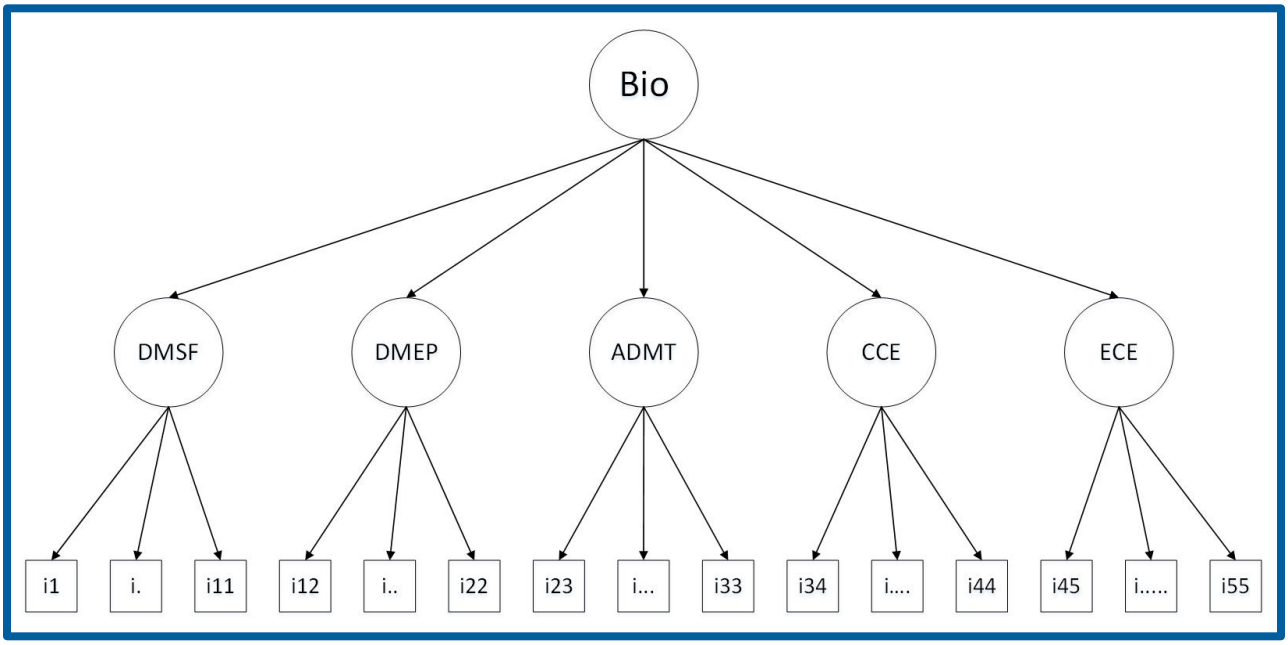


Exhibit 2.1-2 shows the goodness of fit of the second-order model for each ILEARN assessment. Based on the fit indices, the model showed good fit across content domains. For all tests, the root mean square error of approximation (RMSEA) was below 0.05 and the comparative fit index (CFI) and Tucker-Lewis index (TLI) were equal to or greater than 0.95. These results suggest that the subdomains within each subject area account for unique variation in student test performance even though the subdomains are highly interrelated.

Exhibit 2.1-2: Goodness of Fit Second-Order CFA

ELA					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
3	524	0.014	0.983	0.981	Yes
4	557	0.014	0.983	0.982	Yes
5	591	0.009	0.984	0.983	Yes
6	492	0.014	0.984	0.983	Yes
7	460	0.012	0.982	0.981	Yes
8	557	0.010	0.985	0.984	Yes
Mathematics					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
3	1076	0.017	0.983	0.982	Yes
4	1076	0.014	0.958	0.955	Yes
5	1076	0.015	0.977	0.976	Yes
6	1075	0.019	0.942	0.939	Yes
7	1075	0.013	0.983	0.982	Yes
8	1075	0.025	0.916	0.912	Yes
Science					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
4	1032	0.019	0.975	0.974	Yes
6	1031	0.019	0.981	0.98	Yes
Biology (Spring)	1321	0.021	0.975	0.974	Yes
Social Studies					
Grade	*df*	*RMSEA*	*CFI*	*TLI*	*Convergence*
5	699	0.020	0.977	0.975	Yes
U.S. Government	1322	0.015	0.986	0.986	Yes

Evidence Based on Relationships with Conceptually Related Constructs

Tests purporting to measure similar constructs should be strongly correlated. Some evidence for the convergence between ILEARN English/Language Arts (ELA) and Mathematics scores and measures of those constructs in independently

developed assessments have been provided to Indiana as part of CAI's formative assessment grant proposal for our ClearSight interim assessments.

The sample used to investigate the relationships between ClearSight and ILEARN test scores was based on the results of students who took the Spring 2019 ILEARN Mathematics and ELA tests. Each student was offered up to three opportunities to take the ClearSight Mathematics and ELA tests during the test window from August 2018 to April 2019. For the purposes of this investigation, when students participated in multiple testing opportunities, we used the test record corresponding to the earliest testing opportunity only. Students who did not have valid ClearSight test scores were excluded from the analyses. While the ClearSight test window was open from August to April, 90% of students completed their interim test administrations by December 2019. Exhibit 2.1-3 shows the number of students included in the analysis for each test and the Pearson correlation between ClearSight and ILEARN scores.

Exhibit 2.1-3: Analysis Sample Size and Correlation Between ClearSight and ILEARN Test Scores

Test	Sample Size	Marginal Reliability		Correlation	
		ClearSight	ILEARN	Observed	Corrected for Attenuation
Mathematics					
G3M	4760	0.87	0.94	0.78	0.86
G4M	5157	0.88	0.94	0.84	0.92
G5M	5003	0.83	0.95	0.84	0.95
G6M	5280	0.87	0.93	0.85	0.94
G7M	6039	0.86	0.94	0.86	0.96
G8M	5938	0.87	0.87	0.83	0.95
ELA					
G3E	4760	0.87	0.88	0.76	0.87
G4E	5157	0.89	0.88	0.78	0.88
G5E	5003	0.88	0.88	0.80	0.91
G6E	5280	0.89	0.88	0.79	0.89
G7E	6037	0.90	0.88	0.80	0.90
G8E	5938	0.89	0.88	0.77	0.87

As indicated in Exhibit 2.1-3, correlations between the interim and summative test scores are quite substantial, averaging 0.83 across grades for Mathematics and 0.78 across grades for ELA. In fact, the magnitude of the correlations is primarily limited by the reliability of the test scores.

We also observed a *floor effect* for the interim assessments due to truncation of test scores below the lowest observable scale score. This floor effect is likely more pronounced in the interim assessments because students are being tested on academic content for which they have yet to receive grade-level instruction, and this truncation of the range also depresses the observed correlation between test scores.

Evidence for Interpretation of Performance Standards

Alignment of test content to the Indiana Academic Standards ensures that test scores can serve as valid indicators of the degree to which students have achieved the learning expectations detailed in those standards. However, the interpretation of the ILEARN test scores rests fundamentally on how test scores relate to performance standards, which define the extent to which students have achieved the expectations defined in the Indiana Academic Standards. ILEARN test scores are reported with respect to four proficiency levels, demarcating the degree to which Indiana students have achieved the learning expectations defined by the Indiana Academic Standards. The cut score establishing the Proficiency level of performance is the most critical since it indicates that students are meeting the grade-level expectations to achieve the Indiana Academic Standards, that they are prepared to benefit from instruction at the next grade level, and that they are on track to pursue post-secondary education or enter the workforce. Procedures used to adopt performance standards for the ILEARN assessments are therefore central to the validity of test score interpretations.

Following the first operational administration of the ILEARN assessments in Spring 2019, a series of standard-setting workshops were conducted to recommend a set of performance standards for reporting student achievement of the Indiana Academic Standards to the Indiana State Board of Education. While serving as standard-setting panelists, Indiana educators followed a standardized and rigorous procedure to recommend performance-level cut scores. The workshops employed the Bookmark standard-setting procedure, a widely used method in which standard-setting panelists used their expert knowledge of the Indiana Academic Standards and student achievement to map the Achievement-Level

Descriptors (ALDs) adopted by Indiana onto an ordered-item booklet comprising an operational test form meeting all blueprint elements.

Panelists were also provided with contextual information to help inform their primarily content-driven cut score recommendations. Panelists recommending performance standards for the grades 3–8 ILEARN assessments were provided with the approximate location of relevant National Assessment of Educational Progress (NAEP) performance standards and the approximate location of the Smarter Balanced performance standards for ELA and Mathematics. Panelists were asked to consider the location of these benchmarks when making their content-based cut score recommendations. When panelists can use benchmark information to locate performance standards that converge across assessment systems, the validity of test score interpretations is bolstered.

Based on the adopted cut scores, Exhibit 2.1-4 shows the percentage of students meeting the ILEARN Proficiency level of achievement for the ELA, Mathematics, and Science assessments in Spring 2019. In addition, this exhibit shows the approximate percentage of Indiana students meeting the associated Smarter Balanced Proficient performance standards for ELA and Mathematics and the NAEP proficient standards at grades 4 and 8 (and as interpolated for the other grades). As Exhibit 2.1-4 indicates, the performance standards recommended and adopted for the ILEARN ELA and Mathematics assessments are generally consistent with relevant Smarter Balanced and NAEP Proficient benchmarks. Moreover, because the performance standards were vertically articulated, the proficiency rates across grade levels are generally consistent. Thus, the ILEARN proficiency performance standard converges with other assessment system indicators of college and career readiness.

Exhibit 2.1-4: Percentage of Students at or above the Proficiency Standard

Subject	Grade	Percentage of Students at or above Proficiency			
		ILEARN	Smarter Consortium	Smarter Indiana	NAEP Indiana*
ELA	3	46	46	59	41
	4	45	47	57	41
	5	47	51	61	40
	6	47	48	57	41
	7	49	50	62	40
	8	50	51	61	40
Math	3	58	48	57	51
	4	53	42	54	47
	5	47	36	45	45
	6	46	37	49	42
	7	41	36	43	37
	8	37	36	43	37
Science	4	46			42
	6	47			39
	Bio	39			35

*NAEP impacts for grades 3, 5, 6, and 7 are extrapolated/interpolated from grades 4 and 8 results.

2.2 (A.2) Ensuring that Assessments Are Reliable

Section 1.22 (3u) describes our approach for evaluating the reliability of the ILEARN, IREAD-3, and I AM assessments following each test administration. Here, we present evidence of reliability based on the Spring 2021 ILEARN administrations, but note that evidence for reliability is published for the ILEARN, IREAD-3, and I AM annually, in their respective technical reports.

Reliability refers to the consistency or precision of test scores and performance-level classifications and addresses the question of how likely a student would be to achieve the same score, or be classified in the same performance level, across multiple administrations of equivalently constructed and administered test forms. As part of each test administration, the reliability of test scores and performance classifications are evaluated from a variety of perspectives, using both classical and item response theory (IRT) indices of internal consistency, the precision of reported test scores, and decision accuracy and consistency of performance-level classifications. Reliability analyses is reported for subject-area test scores and performance levels, as well as subscale scores.

Exhibits 2.2–1 through 2.2–4 show the marginal reliability estimates for the Spring 2021 ILEARN English/Language Arts (ELA), Mathematics, Science, and Social Studies assessments, respectively, overall and by demographic subgroup. The marginal reliability is an index of internal consistency which can be interpreted as the likelihood that students would

receive similar test scores based on a similarly constructed assessment. Internal consistency estimates are uniformly high, both overall and across subgroups. Subgroups with somewhat lower internal consistency reliability estimates are also characterized by a restriction of range in their test score distributions, which serves to attenuate the observed reliability estimates.

Exhibit 2.2-1: ILEARN Marginal Reliability by Subgroup (ELA)

Grade	All Students	Accommodation	Male	Female	White	Black / African American	Asian	Hispanic	American Indian / Alaska Native	Native Hawaiian / Other Pacific Islander	Multiracial / Two or More Races	Special Education	Section 504 Plan	English Learner
3	0.89	0.77	0.89	0.89	0.89	0.83	0.90	0.86	0.88	0.89	0.89	0.85	0.86	0.83
4	0.90	0.80	0.90	0.90	0.89	0.86	0.91	0.88	0.89	0.88	0.90	0.86	0.87	0.85
5	0.89	0.77	0.89	0.89	0.88	0.86	0.90	0.87	0.89	0.89	0.88	0.85	0.87	0.81
6	0.89	0.73	0.89	0.89	0.88	0.85	0.90	0.87	0.85	0.86	0.88	0.83	0.86	0.80
7	0.89	0.73	0.89	0.89	0.88	0.86	0.90	0.87	0.89	0.90	0.89	0.82	0.87	0.80
8	0.90	0.74	0.90	0.90	0.90	0.88	0.91	0.89	0.88	0.89	0.90	0.84	0.89	0.80

Exhibit 2.2-2: ILEARN Marginal Reliability by Subgroup (Mathematics)

Grade	All Students	Accommodation	Male	Female	White	Black / African American	Asian	Hispanic	American Indian / Alaska Native	Native Hawaiian / Other Pacific Islander	Multiracial / Two or More Races	Special Education	Section 504 Plan	English Learner
3	0.96	0.93	0.96	0.96	0.96	0.95	0.96	0.95	0.96	0.97	0.96	0.96	0.95	0.95
4	0.96	0.92	0.96	0.95	0.95	0.94	0.96	0.95	0.96	0.96	0.95	0.95	0.95	0.94
5	0.95	0.92	0.95	0.95	0.95	0.92	0.96	0.94	0.95	0.95	0.95	0.93	0.94	0.91
6	0.95	0.92	0.95	0.95	0.95	0.92	0.96	0.93	0.93	0.94	0.95	0.92	0.93	0.90
7	0.94	0.92	0.95	0.94	0.95	0.90	0.96	0.92	0.94	0.95	0.94	0.90	0.93	0.86
8	0.94	0.92	0.95	0.94	0.94	0.89	0.96	0.92	0.92	0.95	0.94	0.89	0.93	0.86

Exhibit 2.2-3: ILEARN Marginal Reliability by Subgroup (Science)

Grade / Subject	All Students	Accommodation	Male	Female	White	Black / African American	Asian	Hispanic	American Indian / Alaska Native	Native Hawaiian / Other Pacific Islander	Multiracial / Two or More Races	Special Education	Section 504 Plan	English Learner
4	0.91	0.86	0.91	0.90	0.90	0.87	0.91	0.89	0.91	0.89	0.90	0.90	0.89	0.86
6	0.91	0.87	0.92	0.90	0.90	0.87	0.92	0.89	0.90	0.89	0.91	0.89	0.90	0.81
Bio.	0.92	0.86	0.93	0.91	0.92	0.88	0.94	0.89	0.92	0.93	0.92	0.89	0.91	0.83

Exhibit 2.2-4: ILEARN Marginal Reliability by Subgroup (Social Studies)

Grade / Subject	All Students	Accommodation	Male	Female	White	Black / African American	Asian	Hispanic	American Indian / Alaska Native	Native Hawaiian / Other Pacific Islander	Multiracial / Two or More Races	Special Education	Section 504 Plan	English Learner
5	0.86	0.85	0.87	0.86	0.86	0.78	0.87	0.82	0.87	0.87	0.85	0.83	0.85	0.69
U.S. Govt.	0.90	0.70	0.91	0.89	0.90	0.83	0.94	0.88	-	-	0.89	0.81	0.88	-

Within the IRT framework, measurement error varies across the range of ability. The amount of precision is indicated by the test information at any given point of a distribution. The inverse of the test information function represents the standard error of measurement (SEM). The SEM is equal to the inverse square root of information. The larger the measurement error, the less test information is being provided. The amount of test information provided is at its maximum for students toward the center of the distribution, as opposed to students with more extreme scores. We note that adaptive test administrations significantly improve measurement precision for low- and high-performing students, since test information is targeted near student ability rather than, for example, the proficient cut score or population mean. This means that standard errors for low- and high-performing students will be much smaller than can be obtained with fixed-form assessments, resulting in more stable ability estimates that yield better indicators of student growth over time. Exhibit 2.2-5 shows the mean SEMs for students classified in each of the ILEARN achievement levels.

Exhibit 2.2-5: ILEARN Performance Levels and Associated Conditional Standard Error of Measurement

ELA			Mathematics			Science			Social Studies	
Grade	Performance Level	Mean CSEM	Grade	Performance Level	Mean CSEM	Grade	Grade	Mean CSEM	Performance Level	Mean CSEM
3	1	27.0	3	1	17.4	4	1	15.8	1	19.3
	2	21.4		2	14.6		2	14.7	2	17.0
	3	21.2		3	14.8		3	14.7	3	17.7
	4	23.8		4	17.9		4	15.3	4	24.3
4	1	27.2	4	1	19.2	6	1	15.5	1	17.4
	2	23.2		2	16.2		2	14.3	2	15.7
	3	23.9		3	15.5		3	14.4	-	
	4	28.0		4	17.0		4	15.5	-	
5	1	28.4	5	1	22.5	Biology	1	13.5		
	2	25.0		2	17.0		2	12.7		
	3	25.4		3	16.2		3	12.4		
	4	28.4		4	17.0		4	12.6		
6	1	28.6	6	1	24.0					
	2	23.2		2	19.2					
	3	23.9		3	18.3					
	4	26.3		4	19.7					
7	1	31.0	7	1	26.2					
	2	25.0		2	19.9					
	3	25.3		3	18.7					
	4	29.2		4	17.9					
8	1	28.2	8	1	29.1					
	2	23.5		2	23.4					
	3	24.9		3	21.2					
	4	28.8		4	20.5					

When student performance is reported in terms of performance categories, a reliability index is computed in terms of the probabilities of consistent classification of students as specified in Standard 2.16 in the *Standards for Educational and Psychological Testing* (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014). This index considers the consistency of

classifications for the percentage of test takers who would, hypothetically, be classified in the same category on a second ILEARN administration, using either the same form or an alternate, equivalent form.

The classification index can be examined for *decision accuracy* and *decision consistency*. Decision accuracy refers to the agreement between the classifications based on the form actually taken and the classifications that would be made on the basis of the test takers' true scores, if their true scores could somehow be known. Decision consistency refers to the agreement between the classifications based on the form (adaptively administered items) actually taken and the classifications that would be made on the basis of an alternate, equivalently constructed test form or test administration (e.g., another set of adaptively administered items given the same ability)—that is, the percentages of students who are consistently classified in the same performance levels on two equivalent test administrations. Exhibits 2.2-6 through 2.2-8 show the classification accuracy and classification consistency estimates for classifications between each of the adjacent achievement levels.

Exhibit 2.2-6: ILEARN Classification Accuracy and Consistency (Cut 1 and Cut 2)

Grade	Accuracy	Consistency
ELA 3	0.918	0.885
ELA 4	0.922	0.891
ELA 5	0.918	0.885
ELA 6	0.918	0.884
ELA 7	0.922	0.890
ELA 8	0.932	0.903
Mathematics 3	0.950	0.931
Mathematics 4	0.945	0.923
Mathematics 5	0.943	0.919
Mathematics 6	0.937	0.913
Mathematics 7	0.932	0.905
Mathematics 8	0.933	0.906
Science 4	0.920	0.886
Science 6	0.926	0.897
Biology (Spring)	0.916	0.881
Biology (Fall)	0.924	0.894
Biology (Winter)	0.924	0.892
Social Studies 5	0.902	0.861

Exhibit 2.2-7: ILEARN Classification Accuracy and Consistency (Cut 2 and Cut 3)

Grade	Accuracy	Consistency
ELA 3	0.919	0.886
ELA 4	0.916	0.881
ELA 5	0.908	0.871
ELA 6	0.908	0.871
ELA 7	0.906	0.867
ELA 8	0.916	0.881
Mathematics 3	0.945	0.923
Mathematics 4	0.940	0.915
Mathematics 5	0.941	0.917
Mathematics 6	0.941	0.917
Mathematics 7	0.948	0.928
Mathematics 8	0.951	0.933
Science 4	0.914	0.879
Science 6	0.911	0.875
Biology (Spring)	0.920	0.888
Biology (Fall)	0.924	0.898
Biology (Winter)	0.923	0.893
Social Studies 5	0.911	0.874
U.S. Government	0.933	0.903

Exhibit 2.2-8: ILEARN Classification Accuracy and Consistency (Cut 3 and Cut 4)

Grade	Accuracy	Consistency
ELA 3	0.941	0.916
ELA 4	0.932	0.907
ELA 5	0.942	0.918
ELA 6	0.934	0.908
ELA 7	0.933	0.906
ELA 8	0.925	0.895
Mathematics 3	0.954	0.935
Mathematics 4	0.960	0.944
Mathematics 5	0.959	0.942
Mathematics 6	0.962	0.947
Mathematics 7	0.969	0.957
Mathematics 8	0.972	0.964
Science 4	0.936	0.91
Science 6	0.949	0.928
Biology (Spring)	0.964	0.948
Biology (Fall)	0.961	0.946
Biology (Winter)	0.957	0.939
Social Studies 5	0.941	0.917

2.2 (A.3) Ensuring that Assessments Are Designed and Implemented to Yield Valid and Consistent Test Score Interpretations Within and Across Years

For adaptive test administrations of ILEARN ELA, Mathematics, and Science, the adaptive algorithm is configured to administer tests adaptively under the constraint of blueprint match. Thus, the first priority of the adaptive algorithm is to meet all blueprint specifications, and then to select items that maximize test information for the student under the constraint of blueprint match. The results of the simulations used to configure the adaptive algorithm produce outputs that include, but are not limited to:

- Estimates of bias at the overall and reporting category levels
- Standard errors and distributions of standard errors
- Match to blueprint
- Number of unique benchmarks administered to each student
- Item exposure
- Number of item groups administered
- Item reuse across opportunities

These simulator outputs are used to configure the adaptive algorithm so that all test administrations meet blueprint specifications and result in test scores and performance-level classifications that are consistent across test administrations.

Fixed-form tests are constructed in our Fixed Form Builder, which enforces blueprint match requirements for all test forms, as well as generating test characteristic curves (TCC) and standard error of measurement curves (SEMC) to ensure that test information is distributed equivalently across all fixed-form assessments. TCCs and SEMCs for fixed-form assessments are published in the technical reports annually.

2.3 Assessment Forms Yield Consistent Score Meanings Over Time, Forms Within Year, Student Groups, and Delivery Mechanisms (e.g., paper, computer, including multiple computer platforms)

Equivalence Across Test Administrations. As we describe in Section 1.21 (3t), adaptive test administrations require pre-equated item parameter estimates to support the adaptive selection of test items, as well as immediate reporting of assessment results. Consistent with the approach we describe in Section 1.19 (3r), ILEARN item parameters are estimated based on student responses to field-test items embedded within summative test administrations. CAI's field-test engine

randomly samples items for administration to ensure representative samples for all items, and the item placement algorithm allows field-test items to be administered throughout the test administration, meaning that item position effects are averaged out. Thus, pre-equated item parameter estimates are highly precise and stable.

In an adaptive assessment system, each test administration represents a different form. As we describe in Section 1.13 (3l), before each test administration, CAI psychometricians use a simulation tool to adjust parameters in the adaptive algorithm to optimize it for use with a particular item pool. Psychometricians adjust configuration parameters to achieve the optimal mix of outcomes, including blueprint match, measurement precision, and item use and exposure.

The ILEARN technical report provides both the results of the simulation studies and the results of the summative assessments to verify that simulated and observed results match.

Equivalent Across Test Forms. The paper version of the ILEARN assessment is constructed using the same blueprint as the adaptive test and uses items from the same pool. Most items appear unmodified from the online form on the paper test. A subset of the items on the paper form require modification from their original format for paper administration. Currently, less than 1% of Indiana students are administered a paper accommodated test form. Should paper test administrations exceed 10% of the Indiana student population, CAI will conduct mode comparability studies to place the paper test scores on the ILEARN online scale.

Equivalence Across the Achievement Continuum. ILEARN explicitly directed item development to cover the full continuum of student performance and best leverage the measurement benefits of adaptive testing. Although summative test items are administered adaptively, item parameter estimates are based on student responses to field-test items embedded in summative test administrations. Random selection of field-test items ensures that items are calibrated on random and representative samples of student responses.

While the blueprints will influence the overall standard error of measurement, the robustness of the item pool is demonstrated by the current ILEARN assessments' ability to measure the full range of proficiency, as shown in Exhibit 2.2-5 in Section 2.2.

2.4 Score Scales Used to Facilitate Accurate and Meaningful Inferences About Test Performance

As we describe in Section 1.21 (3t), the Smarter Balanced assessments are calibrated using the 2PL/GPC model. The Smarter Balanced Assessment Consortium adopted this model after evaluating a variety of available item response theory (IRT) models *(Smarter Balanced 2014–2015 Technical Report,* chap. 5, pp. 2–3, Evidence #130b). The selection of the final model was based on consideration of model simplicity and model fit, among others factors. As described in Section 1.21 (3t), the 2PL model was selected because the 3PL did not significantly improve model fit.

The Consortium also implemented a vertical linking study. Thus, the IRT calibrations were conducted in two steps: first, calibrating and equating items within each grade and subject; and then, linking the item pools vertically to adjacent grades. The vertical scale was constructed to index the rate of student learning between grades.

With all subject-area items on a common theta metric across grades, maximum likelihood is used to estimate student ability. The resulting ability estimates are transformed from the theta metric to a scale score for reporting assessment results.

Because the ability of students who respond correctly or incorrectly to all test items cannot be estimated, such records are scored by either adding or subtracting 0.5 to/from an item score with the smallest a-parameter among the administered (responded and scored) operational items for a student.

Following the Spring 2019 administration of ILEARN, IDOE adopted the 2PL/GPC model for all of the ILEARN assessments. The I AM is calibrated using the Rasch model. The IREAD-3 is a legacy assessment with items calibrated using the 3PL/GPC model.

Although the ILEARN English/Language Arts (ELA) and Mathematics items are calibrated and equated to the Smarter Balanced scale, IDOE reports test results on an ILEARN reporting scale so that test score interpretations for ILEARN remain independent of those for Smarter Balanced, which is based on a distinct blueprint.

2.5 Providing Accessibility to All Students, Including English Learners and Students with Disabilities

CAI has led the field in both online testing and accessibility. Our system has supported screen readers, alternative input devices, and other supporting software since 2007. Rather than making changes to the items, we support assistive technology through item rendering. We begin by rendering items for optimal accessibility for all students, following universal design principles and Web Content Accessibility Guidelines (WCAG) 2.1, for which we have received AA certification. We offer *streamlined mode*, which eliminates many of the visual elements from the screen, delivering the test in a more linear format to reduce distraction and simplifying navigation for students who benefit from this support. We also offer *screen-reader mode*, which provides Accessible Rich Internet Application (ARIA) tags and other markups that allow blind students to navigate the system and interact with the items easily. We have designed our system to integrate with assistive technology from its inception, and we remain the only organization in the country delivering online adaptive braille tests. To facilitate the use of non-embedded supports, we provide *permissive mode* as an accommodation, which turns off selected security features that may interfere with some assistive technology.

Users with the appropriate permissions at the state and local level may modify accessibility and accommodations for a student's test-taking experience through the Test Information Distribution Engine (TIDE). The test settings are grouped into categories, such as designated features, accommodations, and special requests. According to Indiana's rules, each category can have access customized by user role and include both embedded and non-embedded accommodations. The assignment of specific categories of devices that a student typically uses during instruction can be managed and recorded through TIDE. These settings can be assigned differentially to test content areas for each student through TIDE (e.g., different calculator accommodations can be used for mathematics and science tests). Users can also produce reports that indicate which students will be using which non-embedded supports to facilitate set-up and security for testing sessions.

We put our system through a rigorous testing cycle to determine whether it can support an assistive technology device. The most significant risk of a third-party technology device is incompatibility with the critical, high-stakes requirements that the Test Delivery System (TDS) must always support, including security, secure browser functionality, and performance.

Exhibit 2.5-1 lists assistive technology devices and their compatibility with CAI's Secure Browser. This exhibit also discloses security concerns with a few devices, though these devices do comply with CAI's Secure Browser.

Exhibit 2.5-1: Assistive Technology Devices

Product	Minimum Version/Model	Potential Provider	Compatible with Secure Browser?	Notes About Security
JAWS—Standard	V16,17,18	Freedom Scientific	Yes	
JAWS—Professional	V16,17,18	Freedom Scientific	Yes	
WYNN	Wizard	Freedom Scientific	Yes	
WYNN	Reader	Freedom Scientific	Yes	
MAGic (with Speech)	V12,13	Freedom Scientific	Yes	
NVDA	2014.3	NV Access	Yes	
Window-Eyes	7.2	Ai Squared (GW Micro)	Yes	
ZoomText Mac	1.2.0	Ai Squared	Yes	
ZoomText Magnifier	10.1	Ai Squared	Yes	
ZoomText Magnifier/ Reader	10.1	Ai Squared	Yes	
ZoomText Fusion	10.1	Ai Squared	Yes	
Kurzweil 3000 Windows	V13	Cambium Learning (Kurzweil)	Yes	This device allows a student to create text documents or audio recordings that are sent to a non-secure *cloud*.
Co:Writer	V7	Don Johnston	Yes	
Read:OutLoud	V6	Don Johnston	Yes	This device requires access to secure test content outside the TDS environment.
Switch Interface Pro	V6	Don Johnston	Yes	
Snap&Read Universal	2.0.0	Don Johnston	Yes	This device is an extension for Chrome and Safari. A potential security issue with open PDF files may lead us to suggest not supporting it.
KinderBoard	N/A	Chester Creek	Yes	

Product	Minimum Version/Model	Potential Provider	Compatible with Secure Browser?	Notes About Security
HeadMouse Extreme	Windows Bundle and Macintosh Keystrokes	Origin Instruments	Yes	This product could open the system context menu inside the test.
IntelliKeys (with Overlay Maker 3.5)	USB	AbleNet, Inc.	No	This device supports Firefox 7 and 8 only, but CAI's Secure Browser supports a more stable version (Firefox 10). It also enables a *personalized keyboard*, which allows anything to be written on it inside the test.
KinderBoard	N/A	AbleNet, Inc.	Yes	
BigKeys Keyboard	Various models	AbleNet, Inc.	Yes	
BIGTrack Trackball	N/A	AbleNet, Inc.	Yes	
Dwell Clicker 2	Windows	AbleNet, Inc.	Yes	
BigBlu VisionBoard	12000018	AbleNet, Inc.	Yes	
Blue 2	10000017	AbleNet, Inc.	Yes	
The Grid 2	25000008	AbleNet, Inc.	Yes	
The Grid 3	25000043	AbleNet, Inc.	Yes	
IntelliKeys USB Keyboard	139459	AbleNet, Inc.	Yes	This device enables a *personalized keyboard*, which could allow anything to be written on it inside the test.
Hitch Computer Switch Interface	10034100	AbleNet, Inc.	N/A	Hitch Computer Switch Interface is no longer available.
Keys-U-See Wireless Combo Keyboard and Mouse	10090401	AbleNet, Inc.	Yes	This product introduces a security threat because it is a wireless keyboard with large print keys that are easy to see, even in low light, and includes Internet, multimedia, energy-saver hot keys, and a wireless mouse.
LessonBoard Keyboard	12000029	AbleNet, Inc.	Yes	
LearningBoard Keyboard	12000028	AbleNet, Inc.	Yes	
myGaze Assistive 2	30000017	AbleNet, Inc.	Yes	
TrackerPro	12060100	AbleNet, Inc.	Yes	
VisionBoard Wireless Keyboard		AbleNet, Inc.	Yes	
Roller Plus Joystick	N/A	Traxsys	Yes	This robust device could be a security threat because it allows different shortcut controls, such as backspace and copy and paste.
Touch Screen	Various models	Traxsys	Yes	This capability constitutes a security threat because it may allow users to touch any area of the screen for full access to desktop applications, on-screen keyboards, and more.
CrossScanner	Windows	RJ Cooper & Associates	Yes	
REACH Interface Author	V6	Applied Human Factors	No	This device is incompatible with CAI's Secure Browser. It is also a security violation because a student can add content or even download applications within the CAI Secure Browser session.
WordQ 4 (Mac)	4.0.5	goQ Software	No	This device is incompatible with the CAI Secure Browser.
WordQ + speakQ	4.0.96	Ai Squared (GW Micro)	Yes	This program is on Windows only and stays active over the CAI Secure Browser. No extension can be used, and there is a secure feature called *exam mode* that eliminates most security vulnerabilities.
Read&Write for Windows	11.5	Texthelp	Yes	
Read&Write Gold for Mac	V6	Ai Squared	Yes	
Dragon Naturally Speaking	V 12, 13 for PC	Nuance Communications	Yes	
Maestro	N/A	DynaVox	N/A	This product has been discontinued.
Vmax+	N/A	DynaVox	N/A	This product has been discontinued.
Tobii CEye	N/A	Tobii	No	This product has been discontinued.
Accent 700, 800, 1000, and 1200	N/A	Prenthke Romich Company	No	The 700 and 1200 models have been discontinued. Devices are locked from computer access.
ECO2	N/A	Chester Creek	Yes	
Magic Touch	Various models	Key Tech, Inc.	Yes	

Product	Minimum Version/Model	Potential Provider	Compatible with Secure Browser?	Notes About Security
SwitchXS	Macintosh 2.5.4 and 2.5.1	AssistiveWare	No	This product supports only up to version 10.11 and has been discontinued.
BrailleSense U2	Various models	HIMS, Inc.	Yes	
Brailliant BI32	Various models	HumanWare	Yes	
BrailleNote Apex	Various models	HumanWare	Yes	
Mywe Fast Typer	Various	Mywe	No	This product has been discontinued.
Typing Assistant 2	1.0.0	SumitSoft	Yes	This product introduces a security threat in which test content can be added to this dictionary.
ChromeVox	OS supported	Google	Yes	
VarioUltra Braille Display	Various models	Baum, Inc.	Yes	

Process for Delivering Paper-Based Forms/Items as an Accommodation

CAI provides two distinct options for delivering paper- pencil accommodations to students. First, schools can order paper-pencil test forms for students with that approved accommodation. These tests are ordered through TIDE and shipped to schools before the test administration window begins. At the end of the test administration window, there is an established return period during which the paper-pencil tests must be shipped back to the Contractor. Second, CAI will also provide access for Indiana students who require paper-pencil test accommodation using the TDS's novel print-on-demand feature. This accommodation allows test administrators to use their workstation to print items as they are administered to a student. The student is given the paper-pencil version of the test item and may access whatever non-embedded supports they require to answer the question. Once the student has completed the test, his or her responses can then be entered in the TDS by the student or a scribe. Using this system, students receive the same adaptive test experience as students who do not require this accommodation. This feature is available for both visual print and braille.

2.6 Offering Appropriate Accommodations

A full list of all accessibility features, tools, supports, and accommodations currently provided within the test delivery system, and those anticipated with a defined timeline for availability, is provided in response to Section 1.11 (3j).

CAI offers support for English learners (ELs) through full glossaries in English on all tests. These glossaries will also be translated and provided in the languages specified by the State. Languages include Arabic, Burmese, Mandarin, Punjabi, and Spanish. The online English glossary tool is automatically provided to all students and enables them to click on pre-selected construct-irrelevant terms when taking Mathematics, English/Language Arts (ELA), Science, or Social Studies assessments. The glossaries and their translations will be available as online, printable files through the Secure Inbox for corporation test coordinators for students who need printed glossaries in order to access the assessment content.

Accessibility

Each ILEARN, I AM, and IREAD-3 test form, with or without accommodations, is based on the same item parameters and blueprints. All tests are scored using pre-equated item parameters on the same scale. Online accommodated and paper-and-pencil forms are built to have the same overall characteristics as either the online computer-adaptive test (CAT) pool or the online fixed form, as appropriate.

Accommodations are designed to remove construct-irrelevant barriers to accessing test content. These barriers pose a threat to the validity of test score interpretations because students are not able to demonstrate their true abilities. Each student's Individualized Education Program (IEP) team determines what accommodations or supports that student requires to access test content and instructions and then assigns accommodations consistent with a documented need in that student's IEP. State-approved accommodations do not compromise learning expectations, constructs, or grade-level standards.

CAI's assessments include an array of universal tools, designated supports, and accommodations, many of which are embedded within the Test Delivery System (TDS), to support valid assessment of grade-level constructs with the greatest possible level of access to students. Universal tools are access features of the system assessment that are either provided as digitally delivered components of the test administration system (embedded) or provided separately from the TDS (non-embedded). Universal tools are available to all students based on student preference and selection. Designated supports are embedded and non-embedded features that are available for use by any student for whom the need has been indicated by an educator or team of educators (along with the student and his or her parent or guardian) familiar with the student's instructional needs. Accommodations are changes in procedures or materials that increase equitable access during

assessments. Students receiving accommodations must have a need for those accommodations documented in an IEP or Section 504 Plan. Like universal tools and designated supports, accommodations may be either embedded or non-embedded.

The ILEARN ELA and Mathematics assessments are predominantly based on the Smarter Balanced item pools. Smarter Balanced ensured their summative assessments would be accessible to all students by establishing the foundation for inclusion at the beginning of the development process. Smarter Balanced formed the Test Administration and Student Access Work Group (the "work group") to gather and examine research-based lessons learned about universal design, accessibility resources, and accommodations. The work group used this information to create a conceptual model for the Smarter Balanced summative assessments that would best support inclusion of all students (Abedi & Ewers, 2013). The Consortium has general guidance regarding accessibility, as well as specific accessibility guidance for ELs (e.g., signing) and tactile representation. Accessibility guidance is built directly into the item specifications, as shown in Exhibit 2.6-1.

Exhibit 2.6-1: Example of Accessibility Guidance Embedded in Item Specifications

Grade 8 Mathematics Item Specification C1 TA

Materials:	numbers, explanations of processes, number lines (showing tenths or hundredths), square roots, cube roots, pi, repeating bar, repeating and terminating decimals
Construct-Relevant Vocabulary:	rational number, irrational number, repeating decimal, terminating decimal, square root, pi (π)
Allowable Tools:	None
Target-Specific Attributes:	Irrational numbers should be square roots, cube roots, or pi (π). Calculators are not allowed for this target.
Non-Targeted Constructs:	
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Note:	An item measuring the "explain" part of this target and standard may be assessed in Claim 3.

Tracking Accessibility and Accommodations Metadata

CAI's Item Tracking System (ITS) currently includes items used in the Indiana Assessments. These items have associated attributes (metadata) that track which items contain accessibility and accommodations such as text-to-speech, braille, American Sign Language (ASL), closed captioning, glossaries, Spanish translation, and paper content.

CAI's process for making modifications to online items for use on paper-and-pencil tests provides an example of how content changes necessary to support accommodations are managed and stored in ITS. Once an item is selected for use on a paper-and-pencil test, the content is recreated in ITS and a "Markup" attribute is updated to include "Paper." ITS users may produce initial drafts of paper response spaces and other renderings. These initial drafts provide insight into how the item will render on paper, but they are not finished, layout-complete renderings. Rather, the ITS-generated "sketches" of paper renderings are saved with the online version and provided to paper production staff for reference. The draft paper rendering of an item in ITS includes any changes to the text ("fill in the bubble" rather than "select"). These sketches are finalized for any item that is selected for inclusion on a paper-and-pencil operational test form.

The Test Information Distribution Engine (TIDE) is CAI's registration and enrollment system. In addition to the ability to edit student records, TIDE also provides robust search functionality that allows users to search for students based on different attributes, including accommodations and test eligibilities. Business rules exist to limit search function to certain user roles and restrict search results to the user's specific jurisdiction (a particular school or corporation). Users have the option of easily exporting the full list or a subset of student-record search results to a CSV or Microsoft Excel file.

The ability to manage student accommodations is controlled according to a user's role. IDOE can decide which roles are authorized to view and/or edit specific accommodations in TIDE and can choose to restrict certain accommodations to state assignment only. These decisions are captured during annual technical specifications review and finalization. Accommodations set in TIDE, whether through a file upload or through the web page (shown in Exhibit 2.6-2), are made available immediately to the integrated online assessment systems (Centralized Reporting System [CRS] and TDS).

Real-Time Reports to See Accessibility Features and Accommodations Selected

TIDE provides a user-friendly interface for viewing and creating real-time reports showing accommodation and accessibility features. The TIDE student search form and search results/reports table is highly configurable. If an accommodation is captured in TIDE, TIDE can be configured to allow users to search for students having that accommodation, and to include that accommodation in reports.

TIDE supports searching for students at the school, corporation, and state levels to provide reports on students' accommodation assignments. Users may search and generate accommodation reports within their jurisdiction. School-level users can produce schoolwide reports, corporation-level users can search across all schools in their corporation, and state users can search students across all corporations to view information about accommodation assignments.

Exhibit 2.6-2 shows an advanced search form with search criteria selected to retrieve all students with specific print-on-request accommodations.

Exhibit 2.6-2: Student Search Form with Accommodation Criteria Selected

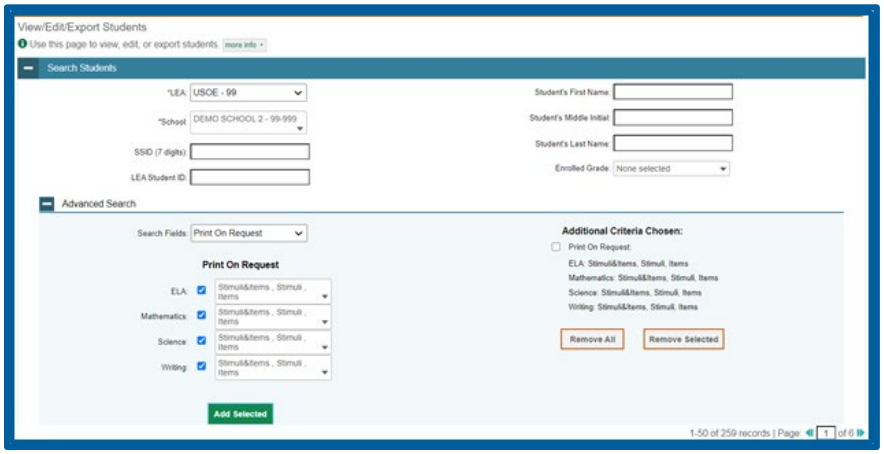
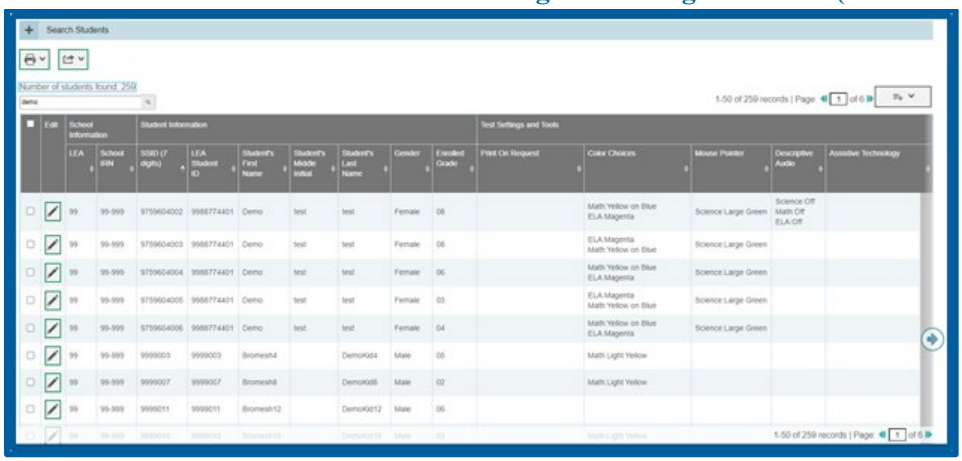


Exhibit 2.6-3 shows a sample search result for students, including test settings and tools assignments.

Exhibit 2.6-3: Student Search Results Showing Test Settings and Tools (Partial View)



In addition to highly detailed or comprehensive results and reports, TIDE provides a print-friendly Test Settings and Tools summary report summarizing accessibility features and accommodations set for students. This report is generated as a PDF file and may be saved or printed. Exhibit 2.6-4 shows a partial view of a Test Settings and Tools summary report.

Exhibit 2.6-4: Test Settings and Tools Summary Report (Partial View)

Administration: Utah RISE 2020-21 3/3/2021, 8:53:33 PM

Student Settings and Tools

Student Name	Student ID	Enrolled Grade	School	District	Test Settings and Tools
TEST, HANNAH P	2018660	05	DEMO SCHOOL 2 (99-999)	USOE (99)	**ELA** Color Choices:Blue Print Size:1.5X Braille:On Descriptive Audio:Off Braille Type:UEB Contracted Assistive Technology:On American Sign Language:On Scribe:Yes **Mathematics** Color Choices:Yellow on Blue Print Size:1.5X Braille:On Descriptive Audio:Off Braille Type:UEB Contracted with Nemeth Math Assistive Technology:On Scribe:Yes Student Benchmark Parental Exclusion:Yes **Science** Color Choices:Blue Print Size:2.5X Descriptive Audio:Off Assistive Technology:On Scribe:Yes Mouse Pointer:Large Green Student Benchmark Parental Exclusion:Yes **Writing** Assistive Technology:On

2.7 Assessments Produce Valid and Reliable Scores for English Learners

Introduction

The ILEARN assessments were designed to produce valid and reliable scores for all students, including English learners (ELs). Through the principles of universal design, item writers develop items and tests that measure the intended construct while minimizing construct-irrelevant barriers that may impact test performance.

Additionally, student accommodations are designed to remove construct-irrelevant barriers to accessing test content. These barriers pose a threat to the validity of test score interpretations because students are unable to demonstrate their true abilities. Each student's Individualized Education Program (IEP) team determines what accommodations or supports that student requires in order to access test content and instructions and then assigns accommodations consistent with a documented need in that student's IEP. State-approved accommodations do not compromise learning expectations, constructs, or grade-level standards.

Universal Design and Item Development

All Smarter Balanced and CAI item development is grounded in the principles of universal design. Universal design removes barriers to access for the widest range of students possible. According to Johnstone, Altman, and Thurlow (2006), "By making general education assessments accessible, we are more able to determine what students know and are able to do. Considerations for universally designed tests include

- intended constructs are measured;
- respect for the diversity of the assessment population;
- concise and readable text;
- clear format for test;
- clear visuals; and
- changes allowed to format without changing meaning or difficulty."

The ILEARN English/Language Arts (ELA) and Mathematics item pools are primarily formed by the Smarter Balanced items. Smarter Balanced developed detailed bias and sensitivity guidelines that serve as the basis for part of the training item writers attend before developing or reviewing items for Smarter Balanced. These guidelines can be found here: https://portal.smarterbalanced.org/library/en/bias-and-sensitivity-guidelines.pdf. In addition, teachers with knowledge regarding accessibility were explicitly recruited for item writing and the item review process. All item writers were required to complete a series of online training modules prior to beginning item development. Several of these modules were specific to fairness (bias and sensitivity) and accessibility.

Prospective Smarter Balanced item writers are required to qualify by developing a certification set of items prior to engaging in item writing. All item development activities are thoroughly documented. This includes a description of the item development process, including multiple reviews of item content, graphics, artwork, response processes, and stimuli, as well as bias and accessibility. Items are reviewed for both qualitative and quantitative characteristics after field testing.

Smarter Balanced drew upon the content expertise of contracted vendors to review items, and also employed an application process similar to that used to identify item writers to engage expert item reviewers from member states. Of the content reviewers, four members were special education teachers; of the accessibility and accommodations reviewers, 14 were special education teachers and five worked with ELs. Of the bias reviewers, 11 were special education teachers and two worked with ELs. Diversity of the review groups contributed significantly to ensuring fairness and accessibility in the assessments. Again, Smarter Balanced required participants to complete online training modules prior to reviewing items.

While qualitative reviews are important to developing fair, accessible items, quantitative data from pilot and field testing help to confirm the observations of well-trained, expert reviewers.

The aforementioned principles are shared by CAI, and we are committed to continued development of ILEARN assessments that produce valid and reliable scores for ELs.

Glossaries

CAI offers support for ELs through full glossaries in both English and other languages. The online English glossary tool is automatically provided to all students and enables them to click preselected construct-irrelevant terms when taking Mathematics, ELA, Science, or Social Studies assessments. Translated glossaries are available in Arabic, Burmese, Mandarin, Spanish, and Vietnamese. Large-scale randomized field trials provide strong evidence that glossaries created under CAI's process reduce barriers for ELs without affecting the underlying construct in ELA and Mathematics.

CAI recommends second-language glossaries with audio and written translation. The reason for this recommendation is twofold:

1. Many ELs do not read fluently in their native language, so it is more helpful to hear words spoken in their native language than to see them written. The glossaries provide this capability.
2. CAI recently completed two very large (statewide) randomized field trials of English and second-language glossaries with audio and found that, when implemented according to CAI's document rules, glossaries provide significant improvement for ELs without affecting non-ELs' performance.

The first study (Cohen, Tracy, & Cohen, 2017) found that glossaries proved a distraction to all students, impeding performance. These glossaries were implemented using standard glossing rules. The cross-grade study found one

exception—grade 7 ELA. Upon post-hoc comparison of that test with the others, CAI inferred that the difference resulted from the fact that the grade 7 ELA test glossed mostly culturally bound language, such as idioms and rare usages. Furthermore, standard glossary guidelines avoid glossing anything that is construct-relevant and therefore often gloss words that are not at all relevant to answering the item. (For example, in the question "Jon has three walruses, and Dale has two. How many walruses do they have together?" there is no need to know what a walrus is.)

In the second study (Cohen, Ballman, Rijmen, & Cohen, 2020), CAI revised the guidelines to (1) gloss only culturally bound language, excluding only grade-level vocabulary identified as a learning objective in the standards; (2) gloss only words with meanings necessary to answer the item; and (3) avoid glossing words for which the gloss would cue the answer.

Given the vast changes to the glossing guidelines, CAI documented the guidelines and procedures so that the entire process would be reproducible. The first unexpected result was the discovery that, following clear guidelines and a full week of training and practice, only about 10%–20% of the words identified by two independent glossers were shared. This revealed that even well-trained humans cannot reliably identify words according to the guidelines. Clearly, glossaries cannot be expected to help anyone if they do not reliably gloss the words.

We revised the procedures multiple times (even having two independent teams of three gloss each item) and arrived at a well-documented, reproducible process in which about 60% of words overlapped between teams (Cohen, et al., 2020). To reduce the cost of glossaries, CAI automated parts of this process.

The statewide randomized field trial across all grades in ELA and Mathematics found that, almost universally, the glossaries helped ELs. Similarly, the glossaries did not benefit non-ELs, which we took as evidence that the glossaries were not otherwise affecting the construct. In the lower grades, the glossaries proved a distraction to all students, but the language assistance outweighed the effects of distraction for ELs, suggesting that the glossaries (including English glossaries) in the lowest grades should be limited to students who need them.

These glossaries are offered as an option on all subject-area tests.

2.8 Assessments Produce Valid and Reliable Scores for Students with Disabilities

The item development principles from Section 2.7 also apply to students with disabilities. Additionally, both Smarter Balanced Assessment Consortium and CAI assessments ensure a fair and accessible assessment for all students by supporting assessment delivery systems that provide the necessary accessibility tools for students. They also provide administration guidelines that assist educators in selecting and implementing appropriate accessibility features and accommodations. Within the conceptual framework for accessibility and accommodations, specific accessibility features and tools were selected using a research-based decision algorithm developed by Jamal Abedi and Nancy Ewers from the University of California, Davis (Abedi & Ewers, 2013).

Smarter Balanced adopted accessibility features that met the decision criteria. Some were adopted as universal supports, while others became designated supports available to any students whose educators determined would benefit from their use. Finally, some features were identified as accommodations, which became available only to students for whom an Individualized Education Program (IEP) or Section 504 Plan specified the need for the accommodation.

2.9 Meeting All Requirements for Data Privacy and Ownership

Student Privacy Protection

CAI recognizes the crucial importance of protecting user and student data in all states, whether these data are being transmitted, stored, or converted. All of our systems protect individual privacy and confidentiality in a manner consistent with state privacy laws, the Family Educational Rights and Privacy Act (FERPA), and other federal laws.

Security and privacy are key design principles that we apply across our entire technology stack. These principles are part of our software development life cycle and are audited regularly for compliance. All student personally identifiable information (PII) is treated as secure assets in conformance with our ISO 27001 information security policies, FERPA, Children's Online Privacy Protection Act (COPPA), etc. All student PII is stored encrypted in our centralized registration database, and an anonymized identifier is used within our systems to link tests to students. Any system that needs access to PII must securely retrieve decryption keys from a key management service, decrypt the data strictly in memory for use, and dispose of the data when done. Similarly, all secure item content is stored encrypted on disk. Any system, such as the

Test Delivery System (TDS), that requires access to content, must decrypt the content strictly in memory using a key management system to securely access the keys required for this decryption. All data are transmitted strictly over secure encrypted channels, and all user-facing websites require HTTPS with Transport Layer Security (TLS) 1.2 or higher. Sensitive data are stored securely on database servers behind firewalls and are secured through an encrypted connection.

All student PII data are encrypted at rest. No sensitive personal information is written to unencrypted disk, and all sensitive PII data are encrypted on backups. CAI's practice is to de-identify sensitive data and encrypt the true identifiers. With this mode, sensitive data and test content are not disclosed even in situations such as a man-in-the-middle attack. CAI uses only cryptographic algorithms that are listed in Annex A of FIPS Pub 140-2. Use of any custom, non-standard cryptographic algorithm is not permitted.

Student PII data are separated, encrypted, and stored in a secure system. An arbitrary identifier is assigned, and this is used to identify the student throughout our systems. When PII (e.g., the student's name) must be reported, the application receives the encrypted data and must request the key from a separate system. Neither the key nor the decrypted data are written to disk. If users need to see the student's name (e.g., in reports), the decrypted name and ID are processed in the server's memory and re-encrypted with TLS for transmission to the user machine, where they are decrypted for presentation. Users' access to data is restricted by role and by jurisdiction.

All student PII are encrypted when they are persisted in our databases. Passphrases are used to trigger data encryption/decryption, and all PI is stored in our encrypted databases using this passphrase. The passphrases are stored securely in a separate database with tightly controlled access. Applications desiring to decrypt PII in memory for their needs must communicate with a secure webservice to retrieve the passphrase.

State Ownership of All Data

CAI processes personal data on behalf of the Controllers. The Controllers are State education boards, school districts, and schools. As a Processor, CAI processes personal data according to the directives of the Controller.

CAI's privacy policy provides the guiding set of privacy principles to help employees, teams, third parties, and business partners to understand their privacy obligations as they develop software and testing services, develop proposals for new business, work with vendors, and engage with clients and stakeholders.

All CAI employees are required to undergo mandatory Information Security and Privacy training that includes all contractual client requirements for data security, privacy, and information handling requirements. Acknowledgement of training completion is kept on record.

Verification, Forensic, and Security Analyses

CAI has an established Incident Management Process with clearly defined workflow, tasks, responsibilities, and functions for the activity of responding and managing information security incidents. The scope of this process is all information security events that are detected, communicated, and potentially require investigation.

Some examples of potential information security incidents include the following:

- Malware attack (virus, spam, Trojan, worm, etc.)
- Phishing attack
- Internal or external attacks on systems
- Unauthorized access to systems, facilities, or information
- Hardware or software failures that impact availability
- Improper resource usage
- Theft or intentional damage of assets
- Violation of the policies in place

To facilitate an effective response, incidents are classified according to type and priority. Whenever an investigation into an information security incident is necessary, a designated Security Manager will coordinate the investigation and report the results to all interested parties.

The Security Manager works closely with internal and external teams to manage information security incidents in accordance with ISO 27001 guidelines regarding what to communicate, when to communicate, with whom to communicate, who will communicate, and the processes used to communicate. Our Incident Communication and

Notification system enables us to communicate with our clients, regulators, and stakeholders in an effective manner to ensure that our obligations are properly met.

Managing Data Securely

When sharing data, CAI strictly abides by the privacy commitments made at the time of data collection in strict compliance with state, contractual, and legal obligations. CAI uses contracts to cover when and how personal data can be shared with external third parties and vendors. Contracts use appropriate language to ensure that third parties process the data they receive in a way that does not conflict with CAI's privacy and data security policies. Any sharing of data with third parties is performed for legitimate business reasons with the consent of the data owner.

CAI authorizes and controls access to applications, data, and systems through a formal process that includes

- requesting access;
- classifying and verifying user type;
- providing access;
- reviewing user access; and
- removing expired accounts.

Upon onboarding, users are granted access based on their role within the organization. User accounts and permissions are directly related to the user's role and responsibilities. The access privileges granted must guarantee that the user can access only those resources that have been explicitly authorized. All resource owners must formally authorize any user's access to sensitive and/or critical information systems and ensure that their ability to access and level of access are appropriate.

Role changes require a review of existing access and privileges, revocation where appropriate, and adding grants of access and privileges to the account as defined by the new role.

Terminations include the cancellation of existing user accounts and access privileges, both logical and physical, and the return of all organization assets that might be in the user's possession.

Resource owners review user access privileges at least annually, or whenever significant changes occur. For accounts with higher privileges that include administrator rights, the reviews occur more frequently.

CAI's public-facing applications define 'User Role' and specify access to each system and what role has access to which functions. Authentication information is stored in our Single Sign-on (SSO) system, against which all systems authenticate. Role information is managed by our Test Information Distribution Engine (TIDE) application, and authorization for each role is managed by each individual application. Each of the CAI systems is configured based on a roles matrix. User access is further restricted by their association with a school or corporation (e.g., a corporation user is restricted to managing just the users in that corporation or schools associated with that corporation). A user can have a single role or multiple roles, and they can have different roles in the different schools or corporations, if needed. Our systems ensure that data access is only within the authorized jurisdiction.

All secure data transmitted across the public Internet between IDOE and CAI will be encrypted using TLS, Advanced Encryption Standard (AES), or an Internet protocol security (IPsec) virtual private network (VPN). All secure web traffic uses HTTPS with webservers supporting TLS, and all REST application programming interfaces (APIs) and websites used for sensitive data exchange require HTTPS with TLS to secure the communication medium.

PART B: YIELD VALUABLE REPORTS ON STUDENT PROGRESS AND PERFORMANCE

2.10 Focusing on Student Achievement and Progress to Readiness

In Section 1.16 (3o) under *Results and Reports,* we provide a detailed description of the Centralized Reporting System (CRS), including all reports available, sample reports, and explanations of how the measures included in each report will provide actionable data to the end users. CAI has a mature online reporting system to report on all of Indiana's assessments.

All score reporting stems from test design. Indiana educators convened for a series of meetings to construct blueprints for the ILEARN assessments and to organize the Indiana Academic Standards into reporting categories. Item ranges for reporting categories ensure sufficient items in each category to support reporting of subscale performance classifications for each student. For computer-adaptive test administrations, even though on average, each individual student is administered only a small number of items measuring each standard, at each aggregate level, standards are assessed from

across a range of items measuring each standard in the pool. This allows the Department to report performance on individual standards at an aggregate level.

In this section, we summarize how CRS reports focus on student achievement and progress and meet each of the following criteria:

- Reported scores and subscores emphasize the most important content, skills, and processes for each grade or course.
- Explanations of results are instructionally valuable and easily understood by all audiences.
- Results are expressed in terms of performance standards, not just scale scores or percentiles.
- Progress is reported on the continuum toward college and career readiness.

For detailed reporting samples and explanations of how each report is valuable to end users, please refer to Section 1.16 (3o) under *Results and Reports*.

Scores and subscores are reported with emphasis on the most important content, skills, and processes for each grade or course. Providing educators with aggregated test results at the individual standards level ensures that teachers are empowered with fine-grain data that they can use to refine instruction. Our proposed test design combined with our CRS reporting capabilities allows us to ensure that Indiana educators and administrators have access to reports that emphasize the most important content, skills, and processes for each grade or course.

Specifically, the reporting category summary report provides detailed information on how students have performed on the Indiana teacher-defined subdomains of selected tests. For example, a teacher might notice that his or her students are performing well overall in English/Language Arts (ELA) but are struggling in the Reading for Literature area within ELA because their performance on that content is weaker than would be expected from students who are proficient. This report helps educators identify areas where students are struggling so they can provide greater instructional support in those areas.

Explanations of Results That Are Instructionally Valuable and Easily Understood by Essentially All Audiences

The language used to explain results provided in the CRS reports has been vetted in focus groups and by plain-language content reviews. We are committed to using reporting language that is understood by families and the general population.

Explanations in the family reports are written in plain language. The text explains the content standards assessed on each test and what students at each performance level classification know and are able to do with respect to standards assessed in the subject-area assessment. These explanations are intentionally written in plain language, and we recommend the same definitions be provided within all educator reports. Our family reports also include next-steps that parents and students might take at home to practice skills needed to master the standards.

Students performing in different score ranges receive advice appropriate to those score ranges. Written in parent-friendly language, this data-driven text provides a substantive explanation of what parents should understand from the data and what they can do as a result. Interpretations, recommendations, and other text are drafted by content specialists and reviewed by statisticians as well as our communications team. Focus group feedback confirms that parents find the next-steps text easy to understand and that the activity recommendations are considered the most valuable parts of the report. Many parents use this text as a starting point for conversations with their child's teacher about the instructional support their child requires.

The layout and measures of the individual student report have been updated over time to ensure that parents have access to both text and graphics in order to support accurate inferences from the data. For example, the student's longitudinal graph has been added, as well as the student's performance on writing dimensions. Visual representation of student performance on each reporting category has also been added. This allows parents to visually understand their child's performance over time and on each area of the test, including writing dimensions.

Results Expressed in Terms of Performance Standards (i.e., Proficiency Cut Scores), Not Just Scale Scores or Percentiles

We are committed to providing educators with reports that support accurate interpretations of students' test results, including results expressed in terms of performance standards. At the individual student level, subject-area test scores are classified into performance levels based on Indiana-adopted performance standards. Because subscale scores are inherently unreliable, student performance on reporting categories is classified with respect to *At Proficiency* performance

standards, taking into account the measurement error in the subscale score to reliably classify students as above or below the *At Proficiency* standard for each reporting category.

At each aggregate level, bar charts display the distribution of students' performance levels for overall subject area and reporting category achievement. Columns can be sorted within any table in the system to allow for easy comparison, and groups can be disaggregated to report by demographic subgroup (e.g., gender).

Additional indicators, such as the relative strength and weakness indicator for each reporting category and performance relative to proficiency, can be included in our reports. The relative strength and weakness indicator will display whether students are performing better or worse on the reporting category compared to their performance on the test overall. The performance relative to proficiency indicator shows whether performance on a particular reporting category is above, below, or near the performance-level cut score.

Progress on the Continuum Toward College and Career Readiness

In Section 2.1, we describe the process by which Indiana educators recommended performance standards for the ILEARN assessments that were adopted by the Indiana State Board of Education. As part of the standard-setting process, panelists were provided with benchmark information about the location of proficient performance standards for other important assessment systems, including the National Assessment of Educational Progress (NAEP) and the Smarter Balanced Assessment Consortium. While panelists were instructed to base their performance standard recommendations primarily on content, the benchmark data provided panelists with feedback about the neighborhood in which important performance standards likely reside. As shown in Exhibit 2.1-4 in Section 2.1, ILEARN *At Proficiency* performance standards are consistent with NAEP and Smarter Balanced performance standards, so that Indiana parents and educators can be confident that classification of student achievement as *At Proficiency* indicates that students are on track toward college and career readiness.

Evidence That the Reporting Structure Can Be Supported by the Assessment Design

In Section 2.1, we provide evidence for the internal structure of the ILEARN assessments, demonstrating that the reporting structure of its test design fits well with student responses to the assessments. In Section 2.3, we provide evidence for the reliability of ILEARN test scores and performance-level classifications. ILEARN test scores show uniformly high levels of internal consistency reliability, and the adaptive test administration of the ILEARN ELA, Mathematics, and Science assessments provides more precise measurement of student achievement across the range of abilities. ILEARN performance-level classifications are likewise highly consistent. As described, because subscale scores are inherently unreliable, we report subscale performance-level classifications at the individual student level, taking into account the measurement error of the subscale score, providing more consistent feedback about subscale performance, and minimizing the misclassification of students as above or below *At Proficiency* for each reporting category.

2.11 Providing Timely Data that Inform Instruction

Assessment Results

CAI will collaborate with IDOE to ensure that the online individual student reports (ISRs) are informative, construct relevant, and easy to understand for both school personnel and parents. CAI will perform a thorough end to end system testing using defined test case scenarios in the Centralized Reporting System (CRS) with internal reporting staff prior to the score release for a test administration in the CRS user acceptance testing (UAT) production environment.

The ILEARN assessment reports will be available in the CRS 12 business days after the completion of the test in the Test Delivery System and after state-required quality control (QC) measures have been completed prior to the score release. After the initial score release, ILEARN results will flow into the CRS based on when the student completes the test during the test window and after the test has gone through handscoring. The IREAD-3 and I AM assessments do not have handscored items, and results will be released in the CRS after all QC measures have been completed. Once the CRS is live for the test administration, the majority of students who complete the online version of the IREAD-3 and I AM assessments will see their results populate in the CRS within minutes or hours of submission. In the rare case that the record does not pass automated validation, the result may take longer to report. Students who complete the assessments earlier in the window will receive their results earlier than students who complete the assessments later in the window.

Utility of Reports for Intended Audiences

CAI knows that a report is not useful if it is not interpreted validly. The CRS' design, as well as the design of CAI's paper reports, layouts, graphical displays, and use of color have all been implemented based on rigorous focus groups conducted with educators, administrators, and parents. Navigation emphasizes the context of a student's performance by relating it to aggregate performance and trends over time. Colors associated with performance are used consistently throughout the report, and graphical displays are chosen carefully to maximize the amount of information conveyed. For example, bar charts can illustrate the percentage of a teacher's students at each performance level, but the relative positioning of each teacher's bar chart can also efficiently communicate which teachers have a higher performing group of students, even if there are differences by performance level.

Using Color as an Interpretive Aid

CAI's paper ISRs use color as a positional queue and interpretive aid. Substantial cognitive research suggests that appropriate use of color can facilitate accurate interpretations of statistical graphics in ways that black-and-white graphics cannot (Cohen & Cohen, 2006). We start by noting that people can absorb some information without any conscious attention at all. Cognitive scientists distinguish perceptions that are processed "preattentively," or without cognitive effort, from those that require effort and "focused attention" (Allport, Tipper, & Chmiel, 1985; Neisser, 1966; Treisman & Sato, 1990). Preattentive processing happens "naturally" without any cognitive effort.

The correct use of color can lead readers to compare information that should be compared and make inferences that should be made. Research demonstrates that the human eye perceives differences in color as boundaries between objects, and preattentively groups objects of the same color together (Callaghan, 1984, 1989; Kubovy & Cohen, 1991, 1992; Treisman & Sato, 1990).

Statistical graphics can signal the reader preattentively to compare objects (such as bars in a bar chart) by making them the same color.

CAI's full-color process provides complete freedom in report design, enabling us to use color to facilitate appropriate inferences and encourage readers to make connections preattentively. CAI's process goes well beyond the industry standard, resulting in much more easily interpretable (and therefore more valid) reports, as well as reports that are more attractive. The "industry standard" process for enhanced reporting begins with preprinted forms, in which all the color that will appear on a report appears in fixed locations and configurations. The only variable information printed on a report is printed in black ink. While this limited use of color may enhance the attractiveness of a report, it does not serve to aid the reader's interpretation of data.

Substantive Text Recommendations for Parents

CAI's paper ISRs include plain-language text for students and parents that explain the content areas assessed on each test and what students in each of the reporting category typically know and can do. We further suggest including advice about some next steps the parents and students might take at home to practice skills needed to master the standards. Students performing in different score ranges receive advice appropriate to those score ranges. Written in parent-friendly language, this data-driven text provides a substantive explanation of what parents should understand from the data and what they can do as a result of the data.

Interpretations, recommendations, and other texts are drafted by content specialists or statisticians. Data-driven text appearing on the paper reports will be developed within CAI's Item Authoring Tool, reviewed by content experts and editors, and submitted to IDOE for review and approval.

PART C: ADHERE TO BEST PRACTICES IN TEST ADMINISTRATION

2.12 Maintaining Necessary Standardization and Ensuring Test Security

Training for Personnel

CAI has an established and annually refreshed security awareness training program that incorporates up-to-date general security awareness and CAI-specific policies geared to our business needs and processes. Completion of our awareness program is required for all staff and contractors as part of our onboarding process and is an annual requirement for all our personnel.

The following elements ensure the success of our training program:

- Current general security awareness and best practices
- Business-specific training related to Family Educational Rights and Privacy Act (FERPA)
- Acknowledgment of all core CAI-specific policies (e.g., privacy, handling of confidential information, acceptable use)
- Reporting of compliance tracking metrics
- Direct engagement by executive management
- Annual auditing of program effectiveness

Secure Management of Assessments and Assessment Data

Clearly defined precautions are taken to ensure the protection and privacy of data. We protect data assets from intrusion through our technology stack, as well as through other human and automated controls during all phases of the project. CAI is ISO 27001:2013 certified to protect students' personally identifiable information (PII) and test data according to industry-standard security controls, and we are audited annually to demonstrate compliance with these controls. We are also certified for successful implementation of CIS top 20 controls. Our data privacy and security controls ensure that FERPA requirements for student data privacy and confidentiality are met.

A host of application-level security controls safeguard against unauthorized access to test items and student data. Across all systems, including our item bank and Test Delivery System (TDS), our applications are password protected; password complexity requirements are enforced, routinely audited, and periodically revised. Role-based and jurisdiction-based permissions restrict authorized users' access to functionality and data.

Each of our systems maintains access logs, so we can determine which accounts were used to access the system, at what time, and the data to which the account had access. All our networks are protected by firewalls, automated intrusion-detection systems, and extensive network monitoring. These safeguards protect against bad actors who might attempt to bypass our applications, hack into our systems, and steal data. All our systems—including servers, firewalls, and load balancers—are regularly updated with security patches.

Test Administration and Environment

The test administration environment is secured through the prevention of forbidden applications, the CAI Secure Browser, and built-in security features of the Test Administrator Interface and the Student Interface.

Detecting Testing Irregularities Before, During, and After Testing

Each of the CAI systems is built with extensive logging capabilities. The Test Information Distribution Engine (TIDE) tracks when a student was added, when the information was edited, which user performed edits, and stores both old values and new values for each change; likewise for user attributes and even details about schools, local education agencies, and classes. All the information is stored in a longitudinal database that can be tracked across years, with time stamps identifying when a value was active. Current data can be made available to IDOE and school users through respective system user interfaces. All the historical information is available to program managers through internal CAI administrative systems and can be made available to IDOE upon request through scheduled or *ad hoc* data extracts. CAI systems also conduct continuous monitoring on these data to check for any data anomalies.

Similarly, TDS tracks all testing activities. TDS keeps detailed logs of every action on a test, and our program managers can produce a complete audit log for any test opportunity. This capability proves helpful in troubleshooting, investigating irregularities, and accessing firm information that can sometimes be misrepresented by students.

Security Safeguards Tested and Validated for Computer-Based Tests and for Paper-and-Pencil Tests

All test content and student data are protected using techniques such as device-specific and device-appropriate security. Valid authentication information is necessary for test content to be viewed, and test content is displayed only while the student is taking the test. All transmissions of student data are secure, and any cached content is secured, managed, and purged.

At the desktop level, decrypted test content is protected through control of the desktop computer while students are testing. The CAI Secure Browser restricts and disables access to other applications while a test is being accessed. An authentication sign-on process between the authorized test administrator and the student is built into the application,

resulting in a test-taking environment that is secured through built-in security features of the teacher and student testing interfaces and the prevention of forbidden applications.

Our partner, Data Recognition Corporation (DRC), offers efficient solutions for paper-and-pencil assessments, from their in-house printing of scannable forms to highly secure and accurate packaging, distribution, and receipt of assessment materials. DRC has successfully processed millions of scannable test materials for large-scale statewide programs in several states. DRC's processing and scanning procedures hold ISO 9001 certification.

DRC understands that ensuring security is critical to maintaining the technical quality, perceived fairness, and integrity of any testing program. As a process-focused organization, DRC continually seeks improvement in all of their security practices. DRC regularly reviews security features, systems, and procedures to ensure compliance with all applicable federal laws. To assure clients of their commitment to information security, DRC's information security policies and procedures are based on the National Institute of Standards and Technology (NIST) criteria (NIST Standard 800-53). This is a nationally recognized standard for information security practices. In addition, DRC is ISO 27001 certified.

PART D: MEET STATE-SPECIFIC CRITERIA

2.13 Ensuring Item Interoperability

CAI's Item Tracking System (ITS) is a full-featured item development, test development, test management, and item banking system. A key design principle for ITS is ensuring that items developed within ITS conform to industry standards and support interoperability. All items authored in ITS conform to the IMS Question and Test Interoperability (QTI) 2.2/Accessible Portable Item Protocol (APIP) 1.0 item specification. In addition, our Item Authoring Tool (IAT) ensures that all items are developed with accessibility built in, using W3C standard Web Accessibility Initiative – Accessible Rich Internet Applications (WAI-ARIA) tags to ensure that all common screen readers and other accessibility tools can work with the content and support the needs of all students.

ITS can import items from a variety of different formats and has an extensible suite of custom import routines that allows us to quickly import even proprietary item formats. CAI works with many external partners on importing items in a variety of different formats. Exhibit 2.13-1 shows our extensive experience working with external vendors and assessment consortia in importing content into ITS.

IMS QTI 3.0 is an evolution of QTI 2.2 and was released in August 2020. CAI is actively working on adopting this version of the specification within ITS. We are also closely working with the Smarter Balanced Consortium and assisting them as they transition their items that are currently in SmarterApp Assessment Item Format Specification (SAAIF) format to QTI 3.0. ITS is on track to be fully QTI 3.0 compliant by early 2022. Any items exported from ITS will be fully IMS QTI compliant, and CAI will provide evidence that they validate against third-party validators. This includes any Indiana-owned items that CAI will export in the prevailing IMS QTI standard that ensures portability for all items.

Exhibit 2.13-1: Item Import Experience

Client/Consortium	Item Content Vendor	QTI Version	Includes Custom Classes	Includes Custom Interactions
Arizona	Pearson	2.1	Yes	Yes
California	ETS	2.2	Yes	Yes
College Board	ETS	2.2	Yes	Yes
ELPA21	Questar	2.1	Yes	Yes
Florida	Pearson	2.1	Yes	Yes
ICCR	DRC	2.1	Yes	No
Idaho	DRC	2.1	Yes	No
Indiana	Pearson/IStar	2.2, 2.1	Yes	Yes
NCSC Alternate	DRC	2.1	Yes	No
Smarter Balanced	CTB, DRC	2.1	Yes	Yes
Texas	ETS, Pearson	2.2	Yes	Yes
Utah	Measured Progress	2.1	Yes	No
Washington	ETS, Questar	2.2, 2.1	Yes	Yes
West Virginia	CTB, Questar	2.1	Yes	No
Wyoming	Questar	2.2	yes	No

3. IT Related Questions

3.1 Delivery Infrastructure

CAI's Test Delivery System (TDS) is infinitely scalable. We designed the architecture such that we need to provision only more hardware, given the expected usage and concurrency rates of a client or state. This architecture is currently used in delivering statewide assessments in several large states. In California, we test more than 99.99% of their 3.2 million grade-eligible students online with adaptive tests. States (other than Utah who is 100% testing online) such as Connecticut, Indiana, Ohio, Oregon, and Washington, among many others, test most of their students online using our platform.

Scalable Architecture

CAI's TDS is hosted at Amazon Web Services (AWS), which is the largest cloud hosting provider in the United States and worldwide. TDS' distribution model leverages an adaptive yet reliable architecture in AWS. AWS provides a combination of fixed and flexible resources, accounting for changing system loads and rapid recovery from system faults, even where entire hosting centers may fail.

TDS is designed for high availability and scalability. The architecture includes redundancy built into both the physical infrastructure (network devices, web and database servers, etc.) and logical components (redundant satellites, replicated databases, etc.). Proctors and students log in to the testing application through a dedicated login web cluster. For proctors logging in, the login cluster authenticates and assigns any one of the multiple satellite web clusters we use for testing. For students logging in and requesting access to a proctor's session, the login cluster authenticates the student and redirects him or her to the satellite web cluster to which that proctor session has been assigned. All testing activities occur at the assigned satellites. Our architecture allows us to scale to any size by merely adding more satellite web clusters to our system.

Architecture Components

The TDS architecture is designed to provide the redundancy, robustness, and reliability required by a large-scale, high-stakes testing program.

Student Machine

Student responses are conveyed to CAI's servers in real time as students respond to test items. Longer responses, such as essays, are automatically saved at configurable intervals, such that student work is not placed at risk during longer testing sessions. Responses are saved asynchronously, with a background process on the student machine waiting for confirmation of successfully stored data on the server. If confirmation is not received within the designated time (usually set to 30–90 seconds), the system will prevent the student from progressing until connectivity is fully restored. The student is offered the choice of asking the system to try again or pausing the test and returning at a later time.

Test Delivery Servers (Satellites)

The test delivery satellites communicate with the student machine, delivering items and receiving responses. Each satellite is a collection of web and database servers. Satellites are monitored and automatically removed from service in the event of a failure. Real-time student data are immediately recoverable from the satellite or hub, with backup copies remaining on the drive arrays of the disabled satellite.

If a satellite fails, students will exit the system. The automatic recovery system enables them to log back on without data loss. Communication between the student machine and the test delivery satellites is the primary scope of this performance test.

Demographic and History Servers (Shards)

The demographic and history servers store student data for the duration of a test administration window. They are clustered database servers, providing redundant capability to prevent data loss in the event of server or disk failure.

At the normal conclusion of a test, these servers receive completed tests from the test delivery satellites. Upon successful completion of data storage, these servers notify the hub and satellites that it is safe to remove the data.

Handling Significant Increases

Capacity Planning and Load Testing

CAI regularly conducts capacity planning to ensure that we have more than enough capacity to handle expected load from each state and across all of our states. Each year, we undertake sophisticated capacity planning, accounting for the number of tests to be delivered, individual testing windows, historic patterns of testing, and historic rates of change in order to predict peak loads and ensure adequate capacity. We take our most conservative prediction models (predicting the highest concurrency) and add at least 25% capacity.

CAI's system is designed to handle very large loads. Every function of our system can be scaled outward using our proprietary private cloud architecture. Supporting increased loads requires deploying more servers in the appropriate configuration.

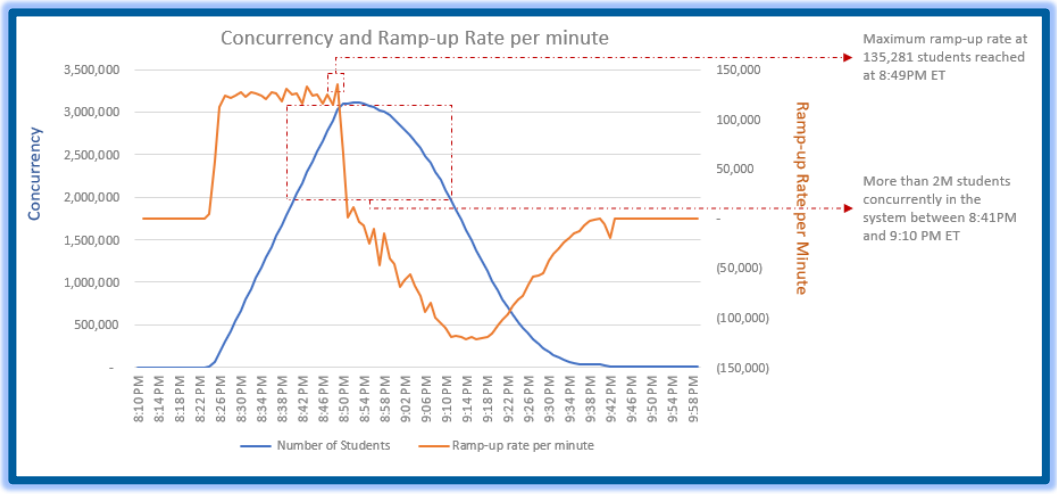
Need for Load Testing

Load testing proves that the system can handle the expected capacity based on the capacity planning CAI conducted. This bidirectional approach of capacity planning informing load testing provides the most realistic view on system performance for capacity planning. It mimics real-world performance and is used as a reliable predictor in more than 26 states. Other providers indicate their systems auto-scale but provide insufficient details regarding how they test capacity (in fact, AWS runs its virtualization servers and storage on physical servers). By contrast, CAI's approach offers a clear view of the testing scenario and its results.

Our load tests, since they mimic the real-world scenario, happen over a prolonged and sustained period. Exhibit 3.1-1 from a recent simulation testing 3.11 million concurrent test takers illustrates that over a 105-minute testing window, the following parameters were designed to exhibit sustained loads:

- Ramp-up rate of students logging in per minute reached a maximum of 135,281
- Two million students were concurrently taking tests in a 30-minute period

Exhibit 3.1-1: Simulation of 3.11 Million Simultaneous Test Takers



Built-in Solutions and Processes Towards Unanticipated Increases

In the event the unanticipated increase still occurs in spite of our capacity planning, CAI has designed two solutions to allow for quick resolution turnarounds; the first solution, throttling, is system-based; while the second solution, provisioning additional satellites, is process-based. Refer to Exhibit 3.1-2 for more information.

Exhibit 3.1-2: Solutions for Unanticipated Increases

Solution	Description of Solution	Manual or Automatic	Turnaround Time
Throttling	CAI's TDS login throttles the system to protect students currently in session. Throttling is initiated when system capacity exceeds a defined red-line threshold, preventing new test sessions from being created. The feature allows existing test sessions to continue uninterrupted and without impact to students. However, new proctors attempting to create a test session will receive a message alerting them to the overload condition, which asks them to reattempt session creation at a later time. In the meantime, users and students see no degradation in performance whatsoever.	Automatic	Immediate
Additional satellites	CAI has a dedicated Network Operations Center (NOC) team who monitors system performance and raises alerts immediately when red-line thresholds are exceeded. The NOC group raises the alert that max capacity is approaching, and the TDS team immediately activates protocols for provisioning additional satellites. Note that even though an authorized user needs to manually configure how many satellites are needed, deployment processes are highly automated, including verification and quality assurance tasks.	Manual	24 hours

3.2 Server Scalability Plan

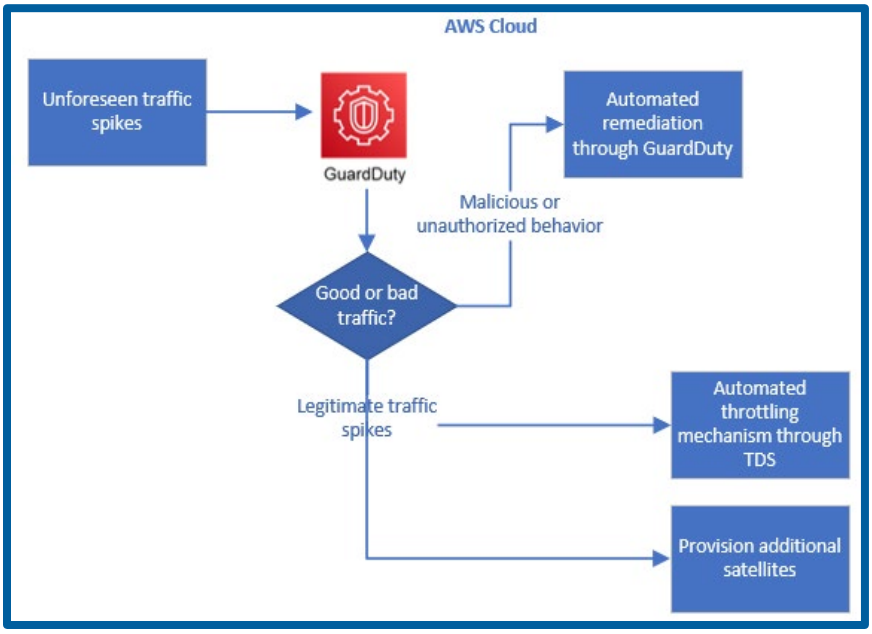
Infinite Scalability and Full Redundancy

As described in Section 3.1, we designed the Test Delivery System (TDS) architecture to be infinitely scalable and fully redundant. The maximum simultaneous load actually experienced in the field in Spring 2019 was 859,668 students testing. We maintain substantially more capacity than we will use in any given year. We have fully tested the capacity to support a combined simultaneous load approaching 3.11 million students.

Server Scalability Plan for Unforeseen Traffic Spikes

In the event that unforeseen traffic spikes, the system automatically protects students currently testing. In other words, users and students currently in test sessions see no degradation of performance. Exhibit 3.2-1 provides a process flow diagram indicating what protocols get activated based on the type of traffic received.

Exhibit 3.2-1: Process Flow Diagram Based on Traffic Spikes



Securing Additional Satellites

As part of our notification process, we have a Network Operations Center (NOC) team, consisting of dedicated staff that are monitoring the infrastructure and looking at aspects such as CPU, memory, network, and latencies. As part of their notification process, they will raise an alert so additional satellites can be provisioned (within 24 hours).

Securing Amazon Web Services Resources

Amazon Web Services (AWS) is the largest cloud hosting provider in the United States and worldwide. Its data centers host such large capacity that running out of resources is a highly unlikely event. CAI also has an enterprise support agreement and an account team with AWS. As part of this service, we have a strict service-level agreement (SLA) with AWS, including a 15-minute turnaround time for issues categorized as a "business-critical system down" severity.

3.3 Costs Associated with High Web Traffic

One of the benefits of our technology platform is the elastic scaling that we can offer. We can add additional satellite capacity to our cloud by spinning up additional instances quickly to augment our capacity should we encounter any unforeseen traffic surges. CAI will absorb any additional costs should this be needed. Our costs in this proposal reflect our commitment to provide IDOE with industry-leading service for the testing program described. If our estimates of the needed capacity are incorrect, we will meet our commitments by adding the extra capacity to our cloud without additional charges to Indiana. CAI capacity planning models incorporate the testing patterns observed through our many years of experience as the assessment provider in Indiana and we constantly refine these models to ensure that our systems are set up to handle your testing volumes.

3.4 Risk Assessments

Risk assessments of CAI's internal infrastructure systems are performed periodically to address changing threats and organizational priorities. Internal CAI risk management processes are based on well-established risk management policies (e.g., NIST SP 800-30 and 800-39). Internal technical risk assessments of CAI's IT network and systems are based on the Center for Internet Security's *Critical Security Controls for Effective Cyber Defense*. Threat and vulnerability assessments are performed as part of the risk management program to continually assess the effectiveness of CAI's internal IT management, operational, and technical controls. System audits are performed to verify how the system is being accessed, and unusual activity is investigated and addressed. Furthermore, CAI is an ISO-270001-certified organization, and our information security policies are regularly audited to ensure compliance.

CAI's internal infrastructure vulnerability scanning and associated remediation are performed by an enterprise-level vulnerability management platform designed to scan all information systems and networks at CAI at least weekly. CAI's Security Information and Event Management (SIEM) platform aggregates and continually analyzes events and logs from our network of devices and alerts our security operations center to any suspicious activity. In addition, we use third-party firms to conduct semi-annual penetration testing of our critical client-facing systems to ensure that our software systems and infrastructure are secure.

CAI has an internal website and annual staff security awareness trainings that communicate the policies and resources available to identify and respond to security risks. Risk assessment results feed into a risk treatment process.

An example of a recent risk treatment is the installation of advanced endpoint detection and response protection to mitigate the risk of malware attacks.

3.5 Internal/External Training to Mitigate Overall Risks

CAI has a security awareness training program that incorporates up-to-date security awareness principles and CAI-specific policies targeted toward our business needs and processes. Completion of our in-house security awareness program is required of all staff and contractors as part of our onboarding process and is an annual requirement for all CAI personnel.

The following elements ensure the success of CAI's internal training program:

- Current security awareness protocols and best-practices training
- Business-specific training related to FERPA

- Acknowledgment of all core CAI-specific policies (e.g., privacy, handling of confidential information, acceptable use)
- Reporting of compliance-tracking metrics
- Direct engagement by executive management
- Annual auditing of program effectiveness

Members of our IT and software development teams attend conferences and training sessions that focus on their areas of expertise. These events provide outside sources of new information and help to keep our staff up-to-date of current security concerns and apprised of new threats and vulnerabilities.

3.6 Third-Party Resources for Technology Assessments of IT Systems

The following industry-leading standards and resources are applied when assessments of CAI's IT systems are conducted.

ISO 27001 Certification

CAI maintains an active ISO 27001 certification that is independently audited annually for all 114 control areas within the standard.

If any non-conformities are discovered during the audit, the corrective actions taken are reviewed by independent auditors as part of the auditing cycle.

Privacy Policy Auditing

Our privacy policy is publicly available and audited to conform with the Family Educational Rights and Privacy Act (FERPA), Children's Online Privacy Protection Act (COPPA), and California Student Privacy Certification (CSPC) guidelines.

CIS 20 Controls Assessment

CAI's overall security practices are independently assessed annually by third-party security consultants in order to obtain objective analysis and guidance on our conformance to the Center for Internet Security's *Critical Security Controls for Effective Cyber Defense* (CIS 20) framework.

Areas of improvement are recorded, and any process improvement actions taken are reviewed by independent auditors as part of the auditing cycle.

Penetration Testing

To improve our overall security posture, CAI contracts with third-party security experts to conduct annual application penetration tests in order to identify vulnerabilities in our applications before deployment and remediate them.

All critical and high-severity findings are reported and retested by third parties to confirm that remediations were successful.

3.7 Measures to Detect and Remedy Situations Arising During Testing

CAI has implemented rigorous, proactive exception alerting; real-time monitoring; and extensive diagnostics systems, processes, and procedures designed to ensure the reliability, availability, and performance of our suite of online systems. We maintain industry-standard monitoring and alerting systems and processes, as well as industry-leading predictive monitoring tools that identify issues before they become problems.

Our hosting vendor, Amazon Web Services (AWS), conducts network and hardware-level monitoring, including monitoring with automatic alerting of all network devices, storage devices, and servers. Alerts are sent to an AWS operations center and to CAI's Network Operations Center (NOC). This oversight includes distributed denial of service (DDoS) attack detection and mitigation, as well as intrusion detection.

Proactive and Regular Monitoring by the CAI Team

CAI proactively monitors and resolves system issues before the field is impacted. Our monitoring is a combination of automated and manual means. We have various tools and protocols in place for monitoring our systems (both hardware and software) and responding to any issues that occur. We have a dedicated AWS team that works in concert with CAI's systems engineers on managing our infrastructure. We rely on automation for all our monitoring; mitigation is automatic

in some cases, but in others, we prefer a human review of the issue to trigger the mitigation. The following is a summary of some of the monitoring processes and mitigations (automatic or manual) we have in place:

- We use an Intrusion Detection System that constantly scans incoming traffic and looks for any triggers of malicious activity. Auto-mitigation policies that automatically drop all traffic from a source that looks malicious are configured, and an alert is sent to our monitoring team to review.
- Firewall rules are set to allow traffic only to specific ports, and these rules are regularly reviewed and updated. This actively blocks any access to ports not serving the assessment system.
- We use an auto-mitigation tool to automatically scrub potential DDoS attacks before they reach our systems.
- We use PRTG to monitor the health of all our client-facing systems. Any URL that does not respond immediately triggers an alert to our NOC. We also use PRTG to monitor CPU/memory/disk usage on servers to alert us to any thresholds that are being exceeded.
- We use IDERA for monitoring our SQL Server Database performance and health, including replication status for read copies.
- We use LogRhythm for log scanning to raise alerts about any malicious activity.
- All our client-facing websites use load balancers with multiple web servers behind them. The load balancer periodically checks the health of each web server and can take a server off rotation automatically if it does not respond within a prescribed interval. Our systems engineers will receive an alert and can investigate the server in the background while the site is still operational, using the other servers that are in the pool.
- We have our own custom dashboard that monitors our Test Delivery System (TDS). The dashboard collects CPU/memory/disk usage along with software metrics (database call latencies) from all components. A statistical model uses these data feeds to identify any components that are behaving differently from their peers or any components where absolute thresholds have been exceeded, and will alert our NOC personnel to investigate. On several occasions, this has proven to be integral in identifying hardware components that were failing slowly and has allowed CAI to respond by replacing components proactively before they become an issue.
- We have a separate custom dashboard that we use for monitoring the Test Information Distribution Engine (TIDE). The dashboard collects CPU/memory/disk usage information along with software metrics (back-end process monitoring with error reporting) from data exchange- and data upload-related back-end operations.
- We use automated functional testing (AFT) that runs every morning to test the readiness of our systems. The TDS AFT emulates demo proctors running test sessions and demo students taking tests to identify any issues well before testing begins. For Single Sign-on (SSO), the AFT tests login and password reset operations, while for TIDE, the AFT emulates common functions that users would perform once logged in.

Beyond Monitoring

CAI has robust processes in place to ensure that, in events when monitoring raises alerts, teams are on hand to immediately mitigate the issue. For example, in the rare event of a major system disruption, a member of the CAI Help Desk management team, the executive team, or the technology NOC team will send an automated Everbridge alert to our most senior CAI program managers and technical staff, instructing those notified to immediately call in to a conference call bridge. This immediate alert process ensures that key stakeholders can collaboratively diagnose the issue and agree on next steps to resolve it.

CAI uses an alert notification system (Everbridge) to coordinate prompt response to outages or potential outages. Upon detection of a system outage or any other problem potentially impacting student testing, CAI's incident response team joins a telephone call within one minute and works rapidly to understand the issue and apply a short-term fix.

As soon as Everbridge is triggered, the CAI program team contacts the client to provide information about the issue and a timeline for resolution. As part of the Everbridge discussion, if the incident response team determines that the issue resolution will take time, that interval is communicated to the client. With the client's permission, the field is notified through one or more of the following four channels:

1) Portal announcement
2) Targeted messaging sent to field users via email
3) CAI Help Desk notification
4) A temporary message posted on the screen where the issue is occurring

Once an issue is resolved, a report is created to communicate the timeline of events, the root cause, the short-term fix, and the long-term fix. The Event Report template in Exhibit 3.7-1 illustrates the information we provide on any critical testing issue.

Exhibit 3.7-1: Event Report Template

Event Report ID	Description
Title:	Impact:
Date Event Occurred:	Severity:
Time Event Occurred (Eastern Time [ET]):	Status:
Affected System(s):	Root Cause Classification:
Responsible Party:	Root Cause Statement:
Author of Report:	Root Cause Sequence of Events:
Report Due Date:	Immediate Corrective Actions:
Initial Client(s) Impacted:	Resolution: Improvement Type:
	Resolution: Process ImprovementDescription:

3.8 Improvements/Process Adjustments of Quality Assurance

At CAI, we are constantly improving our processes. These improvements can and do originate in any department. Some recent process improvements include the following examples:

- We revamped our Item Tracking System (ITS) to allow multiple/parallel review lanes so that activities such as tagging an item for text-to-speech (TTS), adding braille, generating American Sign Language (ASL) video files, etc., can all happen concurrently for a single item. Previously, items followed a serial development process that led to schedule pressures and increased risks. The new model mitigates those risks and eliminates bottlenecks by ensuring that all required reviews and approvals are done by subject-matter experts (SMEs) as and when each aspect of the item is ready for that step, without needing to wait on one another.
- We implemented changes in our Test Information Distribution Engine (TIDE) to improve frequently accessed reports, such as material order reports (more up-to date material order counts during an open order window, improved views of statewide data and order details), participation reports (additional info on remote vs. in-person testing, type of browser used, test completion rates by grade), etc. These changes allow us to provide even more fine-grained insights into a testing window for administrators to analyze and act on.
- We extended the capabilities of our automated regression testing tool, JARVIS, to allow us to conduct end-to-end testing on system configurations before production go-lives. For each execution, JARVIS will automatically provision demo students that cover the gamut of demographic and accommodation settings, use these demo students to run through tests in the Test Delivery System (TDS), and confirm the receipt of results in the downstream systems. At each point, JARVIS verifies that the expected conditions are being met and that the artifacts produced pass validation checks. For example, JARVIS allows us to automatically confirm that TIDE eligibility rules are working per specification, that TDS is delivering the correct forms to students, etc. JARVIS augments the quality assurance steps in our existing functional, performance, and user acceptance testing to ensure that any configuration issues are detected and resolved before the assessments are live in production.
- We added a psychometric dashboard to get a real-time view of the operational performance of our automated essay-scoring engines. This allows us to see how the engine is performing in real time, to monitor the percentage of responses being routed for human review [as part of our hybrid human–machine scoring process described in Section 1.29 (3ab)], and to generate various score and condition code frequency reports, etc. Our automated scoring group can thus ensure that our engines are performing in line with the validation data used during model calibration.

These examples are just a few of the many process improvements made over the past year. Our teams meet at least twice a year to identify opportunities for improvement, and we invest in the opportunities with the most merit every year. Our commitment to continuously improve and innovate will continue.

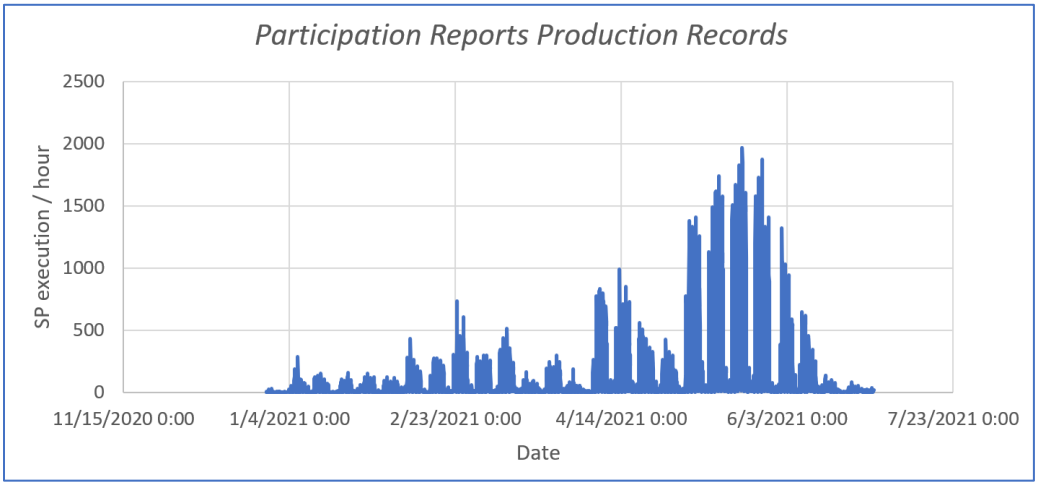
3.9 I/O (Input/Output) Performance Tuning

Our engineers are constantly monitoring system performance and have strict metrics around latencies for database and application server calls, server CPU and memory utilization, disk access etc. We continually look for and optimize heavily used or computationally intensive processes to improve overall system performance. Here is a small sampling of recent performance tuning updates completed.

- We refactored key stored procedures in our Centralized Reporting System (CRS) to ensure that large aggregates (state aggregates or aggregates on large districts) were optimized. These optimizations coupled with a more intelligent caching strategy not only reduced the latency for large aggregates but also allowed us to increase the capacity of each of our partitioned/sharded databases fourfold and reduce the number of database servers needed for the CRS.
- We have optimized TIDE, our integrated system for gathering and managing student and user (personnel) enrollment. We simulated peak load scenarios as recorded in our production environment, where users review participation reports in Plan and Manage Testing, looking at test completion information including filtering/searching by students. We optimized our multi-threaded architecture to minimize bottlenecks and maximize total execution rate. We refactored database stored procedures to run in parallel while also not exceeding hardware resource utilization limits like CPU, disk I/O, and the database connection pool. We verified that our system can meet our targeted concurrency rates with an order-of-magnitude reduction in latency. See Exhibits 3.9-1 and 3.9-2.
- We utilized Amazon FSx for storing item content on the server side of our Test Delivery System (TDS). Amazon FSx utilizes solid-state drive storage volumes, which allows it to support hundreds of thousands of input/output operations per second with consistent sub-millisecond latencies. This allows us to improve throughput while retrieving items and related item resources. Another optimization we made is predictive loading of the test configuration data into satellite databases in anticipation of test window opening. This has allowed us to prepare the system and precache all required data well before students start arriving at the satellites for testing.

Exhibit 3.9-1: Stored Procedure Execution Rate Optimization in Parallel Thread Architecture

Exhibit 3.9-2: Stored Procedure Peak Execution Rate as Recorded in Production



3.10 Physical Sites

CAI's Test Delivery System (TDS) is hosted by Amazon Web Services (AWS) on servers within the United States, while other CAI systems are hosted by Rackspace on servers located in its Chicago and Dallas/Fort Worth data centers.

3.11 Disaster Recovery Process

CAI maintains a full disaster recovery plan. We have built a comprehensive, holistic design of backup, replication, off-site storage, and recovery.

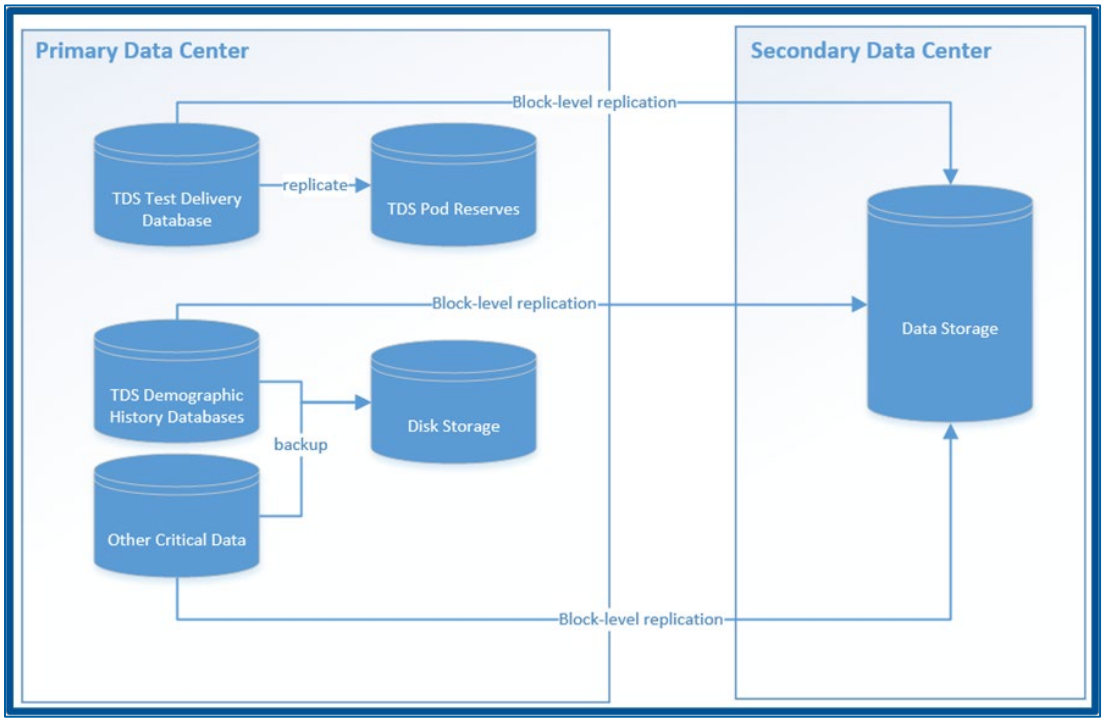
The disaster recovery plan describes the procedures for the backup and recovery of CAI's testing systems, as well as processes for alerting, escalating, and activating the required recovery procedures. This plan considers not only what needs to happen in response to a major catastrophic event (e.g., a data center goes down) but also how to respond when any system malfunctions occur, especially those with a greater likelihood of occurring than a major catastrophe.

Approach

Our approach is not just to anticipate the disaster scenarios that are most likely to happen. Instead, our plan targets all kinds of scenarios with a dual approach:

1. For any disaster recovery scenario that happens within the data center, we will restore from local backups and local SQL-level data replications.
2. For a disaster recovery scenario that involves the entire data center, where data are unrecoverable in that location, we will restore from off-site storage in another data center. Off-site storage is managed through block-level replication, where data are posted synchronously in real time as data changes in the source data center.

Exhibit 3.11-1: Dual Approach to Disaster Recovery



This dual approach covers all bases. If a local incident of data loss occurred, for example, the most efficient way to restore the data would be from the local backup. On the other hand, if a catastrophic failure caused an entire data center to go down, then we would recover the data from off-site storage in a different location. Because block-level replication posts data in real time, it plays a critical role in restoring data after a catastrophic failure, especially if that failure occurs during peak testing time. We can restore data from the time immediately before the incident occurred, minimizing the amount of data lost that day. Our business continuity plan in Appendix C presents a diagram of our dual approach to disaster recovery.

Objectives of the Disaster Recovery Plan

This document describes a plan that can be executed easily and effectively in case of emergency. This plan achieves the following goals:

- Minimizes disruption of normal operations and, specifically, the impacts on the client and the users and students being served by CAI systems
- Designs and maintain redundant technology systems (and the hardware they reside on)
- Maintain a high level of data integrity
- Keeps critical data redundant
- Recovers effectively from backed-up data
- Resumes operations as expeditiously as possible

Disaster Recovery Scenarios and Corresponding Procedures

This plan considers several scenarios that can cause malfunctions. Determining which disaster recovery procedures to execute may depend on the scenario that triggers the disruption. Exhibit 3.11-2 describes each scenario.

Exhibit 3.11-2: List of Disaster Recovery Scenarios and Corresponding Remediation

Scenario	Recoverable?	Procedures for Remediation
Single Sign-On Malfunction	Yes	1. Switch to Roster Tracking System (RTS) authentication. 2. Test administrators and other personnel can continue to log in.
Student Device Failure	Yes	System automatically enables student to rejoin session from another device.
Web-Server Crash	Yes	1. Take satellite that has the faulty web server out of rotation immediately. 2. System automatically transfers students to another satellite when student rejoins the session.
Database Server Crash	Yes	System automatically fails over to the passive database.
Satellite Failure	Yes	1. Take satellite out of rotation immediately. 2. System automatically transfers students to another satellite when students rejoin the session.
Pod Failure	Yes	1. Take satellites belonging to the pod out of rotation immediately. 2. System automatically transfers students to another satellite on another pod when students rejoin the session.
Data Loss or Data Corruption Due to Unforeseen Event	Yes	1. Immediately retrieve backup and restore impacted database. If a TDS satellite is impacted, restore from the TDS Pod Reserves. 2. Roll back to previous system version, if necessary.
Data Center Goes Down	Yes	If an entire data center goes down, all critical data are recoverable. Here are the remediation steps: 1. Amazon Web Services (AWS) will have hardware that represents smaller testing capacity on standby in another data center. 2. Deploy and provision systems to web and database servers. 3. Determine exact time/version of noncorrupted data right before the disaster occurred. Roll back to that version. 4. Restore from offsite storage of replicated data. 5. Test. 6. Go live.

Local Backups and Pod Reserves

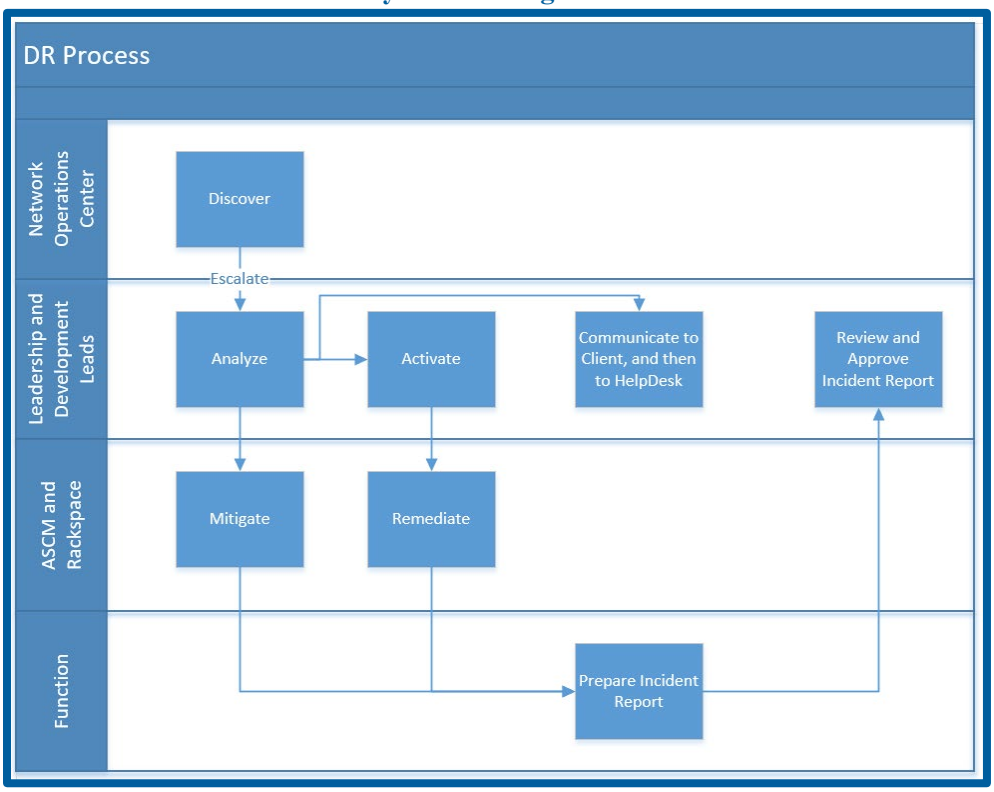
For any disaster recovery scenario that happens locally within the data center, we restore from local backups and, if relevant, from TDS Pod Reserves.

- **Local Backups**: We perform nightly incremental backups and full weekly backups. The systems are run with full transaction logging, enabling us to restore the system to its latest state from the most recent backup.
- **TDS Pod Reserves**: While the test is active, student test data are replicated to pod reserves (to back up the satellites) and stored in the shards as students pause or complete tests.

Recovery: Process of Emergency Alert, Escalation, and Activation

This section describes the processes and procedures that should be executed in the event of particular scenarios. Exhibit 3.11-3 provides a detailed disaster recovery process diagram.

Exhibit 3.11-3: Disaster Recovery Process Diagram



- **Discover** – The Network Operations Center (NOC) discovers that there is a malfunction. The NOC team immediately sends out an Everbridge alert, and a conference call with relevant responders is set up.
- **Analyze** – During the conference call, the team analyzes the scope of the malfunction and discusses the proper remediation. The team also proposes a short-term mitigation plan to minimize impact of the malfunction.
- **Mitigate** – Once the issue has been analyzed, the team determines what should be done to prevent the malfunction from causing more damage (e.g., taking a malfunctioning satellite offline).
- **Activate** – If necessary, the leadership team activates the relevant procedures.
- **Remediate** – The team implements the remediation plan determined by analysis.
- **Communicate** – The program team and the CAI Help Desk team continuously receive status updates and reports on the impact to current operations. The client is kept informed by the program team.
- **Report** – The team primarily involved with the incident prepares the incident report, including proper root-cause analysis as well as suggestions for system and process improvements to prevent the issue from recurring in the future. This team's report is reviewed by leadership and development leads.

Appendix A: Resumes

Table of Contents

Cambium Assessment, Inc. (CAI) Staff

Handscoring and Paper-Pencil Processing (Data Recognition Corporation [DRC])228

Caveon

Teresa Hall, B.S., PMP

Program Manager

Education

B.S. 1995, Secondary Education, Major in Mathematics,
Minors in Earth Science and General Science
University of Nevada, Reno, NV

Professional Credentials and Certifications

SAFe 5 Lean Portfolio Management, Scaled Agile, Inc., 2020
SAFe 5 Agilist, Scaled Agile, Inc., 2019
Project Management Professional (PMP), Project Management Institute, 2009

Present Position

Program Director, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2020–Present)
Responsible for the overall management of four Indiana large-scale testing programs: Indiana Learning Evaluation Assessment Readiness Network (ILEARN) 3–8 and ECAs, Indiana Reading and Evaluation Determination, Grade 3 (IREAD-3), Indiana's Alternate Measure (I AM), and Indiana Statewide Testing for Educational Progress-Plus (ISTEP+). Serves as the primary liaison with IDOE for all components of the project. Manages a project management team to oversee and coordinate the efforts of the Indiana programs and all related subcontractors. Works collaboratively across the IDOE and CAI teams to support all contractual and budgetary activities. Manages and contributes to other aspects of the programs, including the successful delivery of all online and accommodated test administrations, ancillary materials, and public-facing communications, and overall responsibility for the assessment registration, administration, and reporting systems and all technical, psychometrics, and content development deliverables. Oversees the cross-program schedule and leads weekly contract status meetings to ensure that deliverables are on track and risks and issues are identified and recorded.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Program Director, Cambium Assessment, Inc., Washington, D.C.
2015–2020 Senior Director, Content Program Management, ACT, Inc., Iowa City, IA
2002–2014 Senior Program Manager, CTB/McGraw-Hill, Monterey, CA
2000–2002 Education Program Specialist, Wisconsin Department of Public Instruction, Madison, WI
1999 Mathematics Instructor, Edgewood College, Madison, WI
1997–1998 Mathematics Lecturer, University of Nevada, Reno, NV
1996–1997 Mathematics Instructor, Truckee Meadows Community College, Reno, NV

Suzanne Huston, B.S., PMP

Project Manager

Education

B.S. 2003, Business/Merchandising, Apparel and Textiles
University of Kentucky, Lexington, KY

Professional Credentials and Certifications

Certificate in Project Management (PMP), Georgetown University, 2019

Present Position

Senior Program Manager, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2012–Present)
Serves as senior program manager on the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) and Indiana Reading and Evaluation Determination–3 (IREAD–3) large-scale testing programs. Works collaboratively across teams to support program contractual activities. Leads the planning, execution, and completion of all scoring and reporting deliverables as defined by the contract. Manages and contributes to all other aspects of the program as defined in the program schedule, including securing decisions on online system specifications; establishing system configuration timelines and completion dates; and scheduling administrative tasks and schedule milestones, including technical, psychometrics, and content development deliverables. Works collaboratively across other Indiana programs to support program leads, including the Indiana Statewide Testing of Educational Progress Plus (ISTEP+) and Indiana's Alternate Measure (I AM) assessments to ensure consistency in state program deliverables, tasks, ancillaries, and other support documents. Leads weekly status meetings that ensure that deliverables are on track and risks are identified and recorded in a risk register. Participates and contributes to monthly budget meetings to ensure that these projects continue to stay within budget and scope and that risks and scope changes are documented and tracked. Serves as an experienced assessment manual writer for computer program software and database users.

Project Experience at CAI

Senior Program Manager (2012–2019)
Served as senior program manager lead for the Washington Comprehensive Assessment Program (WCAP) state assessment program. Oversaw all aspects of the program, including leading the implementation and completion of all contractual activities in the master project schedule. These duties included scheduling system specifications meetings, system configuration execution, administrative tasks, including online system go-lives, scoring, reporting, and content and psychometric deliverables. Provided leadership oversight on the U.S. Virgin Islands Smarter Balanced testing program.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Senior Program Manager, Cambium Assessment, Inc., Washington, D.C.

2012–2019 Senior Program Manager, AIR Assessment, Washington, D.C.

2010–2012 Project Manager, Keystone Assessment, LLC, Lexington, KY

2008–2009 Client Relationship Manager, Phillips & Cohen Associates, Ltd., Wilmington, DE

2005–2008 Legislative Assistant; Legislative Correspondent/Aide; Staff Assistant, Office of United States Senator Jim Bunning, Washington, D.C.

Cherise Lesesne, B.A.

Project Manager

Education

B.A. 2011, English Language and Literature (Cum Laude)
Spelman College, Atlanta, GA

Present Position

Senior Program Manager, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2021–Present)

Serves as program lead on the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+). Retest Indiana's Alternate Measure (I AM) assessment. Collaborates across CAI's functional teams to include program management, content, systems and technical, psychometrics, and scoring and reporting to support both assessment program's contractual activities. Leads weekly status meetings, ensuring deliverables are on track and to identify potential risks. Builds and fosters partnerships with the Indiana Department of Education assessment program leads to meet the needs of state assessment, ensuring fidelity to the test administration and test security requirements.

Project Experience at Cambium Assessment

Program Manager (2020–2021)

Led the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+). Implemented and completed the Winter 2020/Spring 2021 Retest assessment administrations. Manages and contributes to all other aspects of the program as defined in the program schedule, including securing decisions on online system specifications; establishing system configuration timelines and completion dates; and scheduling administrative tasks and schedule milestones, including technical, psychometrics, and content development deliverables.

Senior Project Coordinator (2013–2016)

Led and managed assignments with the Smarter Balanced Assessment Consortium (SBAC) and the New Hampshire Department of Education's assessment department. Improved accessibility and equity initiatives with the education technology provider and Freedom Scientific. This resulted in an increase of digital availability of assessment content by integrating JAWS as a Braille and screen reading platform. Directed helpdesk escalation protocols, resulting in reduced response times to educators across 15-state assessment contracts.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present	Senior Program Manager, Cambium Assessment, Inc., Washington, DC
2019–2021	Operations Manager, Uncommon Schools, New York, NY
2016–2019	Program Manager, NYC Department of Education, New York, NY
2013–2016	Senior Project Coordinator, AIR Assessment, Washington, DC

Phil Robakiewicz, Ph. D.

Project Manager

Education

Ph.D.	Ecology and Evolutionary Biology University of Connecticut, Storrs, CT
M.A.	Educational Administration Kansas State University, Manhattan, KS
A.B.	Biology & Medicine Brown University, Providence, RI

Honors and Awards

Grant for General Medicine Education, Robert Wood Johnson Foundation, 2012
Trustee's Award for Outstanding Academic Advisor, Worcester Polytechnic Institute, 2006
President's Award for Excellence in Undergraduate Teaching, Worcester Polytechnic Institute, 2005
Teaching Technology Fellow Worcester Polytechnic Institute, 2003

Present Position

Senior Program Manager, Cambium Assessment, Inc. (CAI) (2021–Present)

Serves as program lead on the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) and Indiana Reading and Evaluation Determination–3 (IREAD–3) large-scale testing programs. Works collaboratively across teams to support contractual activities. Facilitates the planning, execution, and completion of all activities defined by the contract, including securing decisions on online system specifications; establishing system configuration timelines and completion dates; and scheduling administrative tasks and milestones, including technical, psychometrics, and content development deliverables. Works collaboratively across other Indiana programs to support program leads, including the Indiana Statewide Testing of Educational Progress Plus (ISTEP+) and Indiana's Alternate Measure (I AM) assessments to ensure consistency in state program deliverables, tasks, ancillaries, and other support documents. Leads weekly status meetings with the client to ensure that deliverables are on track and risks are identified and recorded in a risk register. Participates in and contributes to budget meetings to ensure that these projects stay within budget and scope and that risks and scope changes are documented and tracked. Serves as an experienced large-scale assessment subject matter expect for the client.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2021–Present	Senior Program Manager, Cambium Assessment, Inc., Washington, DC
2018–2021	Assistant Vice President, Salve Regina University, Newport, RI
2013–2018	Associate Dean of Students, Clark University, Worcester, MA
2007–2013	Director of Client Services, Measured Progress, Inc., Dover, NH
2002–2007	Director of Test Development, Massachusetts Department of Education, Malden, MA
1996–2002	Assistant Professor of Biology and Biotechnology, Worcester Polytechnic Institute, Worcester, MA

Erin Meyer, M.S.

Quality Assurance Specialist

Education

M.S. 2020, Information Technology Project Management
University of Maryland, Global Campus, Adelphi, MD

B.A. 2008, Psychology and History, (dual major)
University of Maryland, College Park, College Park, MD

Professional Credentials and Certifications

Certified Scrum Master, Scrum Alliance, 2019

Present Position

Business Process Management Lead, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2015–Present)

Produces documentation for standard operating procedures across departments within assessment. Maintains over 250 operational workflows along with supporting documentation using VISIO and IBM Blueworks. Assists in creating supporting documentation, such as work instructions, data flows, and templates. Identifies and implements process updates throughout each administration. Cultivates and maintains working relationships with subject matter experts and process owners.

Project Experience at CAI

Statistical Support Associate, Hawaii's Statewide Assessment, Hawaii Department of Education (2008–2013)

Assisted with psychometric activities for Hawaii's general education statewide assessment, as well as Hawaii-ALT, and Hawaii End-of-Course assessments.

Statistical Support Associate, Oregon's Statewide Assessment, Oregon Department of Education (2009–2013)

Assisted with psychometric activities for Oregon's statewide assessment.

Project Experience at Cambium Assessment

Business Process Management Associate, (2013–2015)

Produced process diagrams and supporting documentation for standard operating procedures for the assessment department. Gathered information and resources from subject matter experts. Facilitated review cycles and final approval of workflows. Maintained IBM Blueworks tool and functioned as administrator for access accounts.

Statistical Support Associate, (2008–2013)

Assisted with psychometric activities for operational clients: Hawaii and Oregon Departments of Education. Conducted quality control checks including simulation runs, false data, configuration files, and scoring data on reports. Assisted psychometricians in production of field test designs, technical reports, and scoring specifications.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Business Process Management Lead, Cambium Assessment, Inc., Washington, DC

2015–2019 Business Process Management Lead, AIR Assessment, Washington, DC

2013–2015 Business Process Management Associate, AIR Assessment, Washington, DC

2008–2013 Statistical Support Associate, AIR Assessment, Washington, DC

Katherine Mullahy, B.S.

Accommodations Specialist

Education

B.S. 2016, Elementary/Middle Education, Psychology
Marquette University, Milwaukee, WI

Professional Credentials and Certifications

Wisconsin Teaching License, Wisconsin Department of Public Instruction, 2016

Present Position

Project Coordinator, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2019–Present)
Serves as a project coordinator on Indiana's Alternate Measure (I AM) assessment. Collaborates with I AM program manager, Indiana program team, CAI staff, and Indiana's Department of Education (IDOE). Manages and supports I AM deliverables, training resources, user acceptance testing (UAT), CAI Help Desk queries, scheduling, portal updates, and other tasks. Supports cross-program tasks for the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) and Indiana Reading and Evaluation Determination-3 (IREAD-3) programs, which includes managing and supporting documentation, accessibility and accommodations ancillaries, and UATs.

Additional Professional Experience

Teacher, Milwaukee Public Schools (2018–2019)
Served as first-grade teacher at Hopkins Lloyd Community School. Prepared collaborative and individual lesson plans. Instructed small and whole groups, in blended, and individual learning settings. Differentiated instruction and management based on students' needs. Incorporated education technology into daily instruction. Collaborated on lessons and activities with teachers and instructional coaches and communicated regularly with students' parents/guardians. Administered, analyzed, and utilized informal and formal assessments to measure what students know and can do. Engaged in professional development sessions.

Teacher, Seton Catholic Schools (2016–2018)
Served as a first- and second-grade teacher at Saint Thomas Aquinas Academy, executing administrative and teacher responsibilities. Supported educators with formative and summative assessment preparation and administration. Facilitated network-wide professional development sessions on formative assessments. Served as a member of the teacher recruitment and hiring teams and mentored first-year educators in the Seton Teacher Academy. Developed, organized, and presented K–5 science units alongside network instruction coaches and leaders. Organized and supported 2nd grade math curriculum plans.

Prepared collaborative and individual lesson plans. Instructed small and whole groups in blended, and individual learning settings. Differentiated instruction and management based on students' needs. Incorporated education technology into daily instruction. Collaborated on lessons and activities with teachers, instructional coaches, and administrators and communicated regularly with students' parents/guardians. Administered, analyzed, and utilized informal and formal assessments to measure what students know and can do. Engaged in professional development sessions.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Project Coordinator, Cambium Assessment, Inc., Washington, DC
2019–2020 Project Coordinator, AIR Assessment, Washington, DC
2018–2019 Teacher, Milwaukee Public Schools, Milwaukee, WI
2016–2018 Teacher, Seton Catholic Schools, Milwaukee, WI

Rachelle Stein, B.S.

Ancillary Specialist

Education

B.S. 2019, History (summa cum laude)
Northeastern University, Boston, MA

Present Position

Project Coordinator, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2019–Present)

Manages ancillary development and refresh for the Indiana Learning Evaluation Assessment Readiness Network (ILEARN) and Indiana Reading and Evaluation Determination-3 (IREAD-3) large-scale testing programs. Serves as an editorial and content reviewer for major works across ILEARN, IREAD-3, the Indiana Statewide Testing for Educational Progress Plus (ISTEP+), and Indiana's Alternate Measure (I AM), including scripts, user guides, technical reports, and miscellaneous communications. Liaises with client and stakeholders to acquire accurate and updated information for both ancillaries and other documents under review, as necessary. Performs user acceptance testing (UAT) across all four programs to confirm errors, their resolution, and system readiness before and during testing windows. Collaboratively manages hotline alerts across all four Indiana assessment programs during their respective testing windows. Manages Indiana assessment portal and works collaboratively across teams and with the client to draft announcements. Handles the posting of both announcements and resources to the field on the Indiana assessment portal. Attends weekly status and schedule meetings for all Indiana programs. Manages live note-taking for multiple Indiana meetings.

Project Experience at Cambium Assessment

Quality-Control Editor, CAI (2019–Present)

Began working for Cambium Assessment in 2019 as a quality-control editor, working across all four of Indiana's assessment programs (ILEARN, IREAD-3, I AM, and ISTEP+) to ensure consistency and accuracy of Indiana content. Gained familiarity with Indiana programming through close reviews of a range of Indiana's deliverables, including both cross-program documentation (i.e., certification courses) and program-specific ancillaries (i.e., Test Administer Manuals [TAMs], read-aloud scripts). Assisted in the mark-up and management of ancillary documents for the 2019–2020 and 2020–2021 school years.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2019–Present Project Coordinator, Cambium Assessment, Inc., Washington, DC

2018–2019 Data Analyst, Forfeiture Support Associates at the U.S. Attorney's Office, Boston, MA

2017–2019 Writing Consultant, Northeastern University, Boston, MA

Victoria Anderson, B.S.

Customer Service Manager

Education

B.S. Management
Baker University, Baldwin City, KS

Professional Credentials and Certifications

Call Center Manager, Benchmark Portal
Project Management Essentials Certified (PMEC)™, Management and Strategy Institute
Lean Six Sigma White Belt Certified (LSSWB)™, Management and Strategy Institute

Present Position

Manager, Client Service Center, Cambium Assessment, Inc. (CAI) (2020–Present)

Manages CAI's Client Service Center knowledge bases, inquiry tracking systems, and telephone and electronic communications systems. Oversees full-day support across five time zones. Responsible for the recruitment, hiring, and daily activities of the CAI Client Service Center staff; trains, mentors, and coaches staff on all policies and procedures, including compliance with established service-level agreements. Provides direct oversight and management, using standard CAI Client Service Center metrics to manage workflow. Prepares customer service quality plans, surveys, and reports, and creates call-monitoring standards. Evaluates department performance and communicates daily operational activity to clients and staff. Provides a technology-based CAI Client Service Center that responds to nontechnical users of CAI's testing systems.

Additional Professional Experience

Customer Care Department Manager, Alliance Data (2016–2019)

Directed approximately 10 leaders of teams with each having 25–30 team members, influenced success, and drove performance results through clear principles of coaching and leadership development. Exceeded performance indicators (KPI), including customer satisfaction (CSAT), call efficiency, adherence, and other financial metrics. Created a strategic development plan for low performance that focused on the root cause, feedback implementation, and sustainability. Met performance expectations within 45 days, and maintained performance expectations month after month. Developed and facilitated leadership development to identify and improve gaps in leadership skills, enhanced relationship-building skills, coaching, and metrics management. Led a global project to create a defined step-by-step approach to leadership progression of learning from foundation to expertise. Collaborated with site leadership to create and implement supervisor coaching workshops globally. Managed a leadership development program for new leaders. Successfully upgraded supervisors' performance with additional global workshops. Managed on-site and off-site leadership events through the Women for Economic Leadership Development (WELD) and Association of Contact Center Professionals (ACCP) programs. Improved diversity and inclusion efforts as a committee member implementing and managing business resources groups at the corporate level and call center.

Employment History

2020–Present Client Service Manager, Cambium Assessment, Inc., Washington, DC

2016–2019 Customer Care Department Manager, Alliance Data , Lenexa, Kansas

2014–2016 Interim Client Vendor Manager, Senior Operations Manager & Interim Director, Alorica, Topeka, Kansas

2004–2014 General Manager of Operations, Director of Operations/Operations Manager, Training Manager, NCO Group, Horsham, Pennsylvania

Shuqin Tao, Ph.D.

Lead Psychometrician, ILEARN and IREAD-3

Education

Ph.D.	2009, Educational Measurement and Statistics *Minor in Mathematical Statistics* University of Iowa, Iowa City, IA
M.A.	2002, Linguistics and Applied Linguistics *Minor in Language Testing* Guangdong University of Foreign Studies, Guangzhou, China
B.S.	1999, Accounting Huazhong University of Science and Technology, Wuhan, China
B.A.	1999, English of Science and Technology Huazhong University of Science and Technology, Wuhan, China

Honors and Awards

Chairman Club Award, Curriculum Associates, 2017
Distinction in Research, Curriculum Associates, 2016
Excellence in Teaching, Guangdong University of Foreign Studies, 2002
Graduate with Distinction, Huazhong University of Science and Technology, 1999

Present Position

Director of Psychometrics, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2019–Present)

Provides psychometric leadership for statewide assessments. Oversees psychometric activities including scoring, calibration, and equating. Uses various statistical programming tools to implement quality control procedures for test development and psychometric activities. Prepares technical materials and presents at Technical Advisory Committee (TAC) meetings.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present	Director of Psychometrics, Cambium Assessment, Inc., Chicago, IL
2019	Director of Psychometrics, AIR Assessment, Chicago, IL
2015–2019	Senior Psychometrician, Curriculum Associates, Chicago, IL
2014–2015	Psychometrician/Co-Manager, National Board of Osteopathic Medical Examiners, Chicago, IL
2008–2014	Senior Psychometrician/Psychometrician, Data Recognition Corporation, Maple Grove, MN
2007–2007	Psychometric and Research Intern, Minnesota Department of Education, Roseville, MN
2003–2007	Research Assistant, University of Iowa, Iowa City, IA
2002–2003	Assistant Professor, Guangdong University of Foreign Studies, Guangzhou, China

Hyesuk Jang, Ph.D.

Lead Psychometrician, I AM

Education

Ph.D.	2014, Measurement and Quantitative Methods Michigan State University, Lansing, MI
M.A.	2007, Quantitative Research Method, Measurement and Evaluation in Education Yonsei University, Seoul, Korea
B.S.	2004, Statistics Sungshin Women's University, Seoul, Korea

Present Position

Senior Psychometrician, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2018–Present)
Performs the psychometric and statistical activities for the statewide assessments and oversees the quality control procedures for deliverables. Prepares technical materials and presents at Technical Advisory Committee (TAC) meetings.

Project Experience at CAI

Consultant, Cambium Assessment Inc. (2020–Present)
Works on the full phases of psychometric activities for Indiana's Alternate Measure (I AM) and Ohio's Alternate Assessment for Students with Significant Cognitive Disabilities (AASCD). Plans, coordinates, and performs psychometric and statistical activities including calibrations, scoring, sampling, form evaluation, preparations for item data review and standard settings, and analysis for technical reports and special studies. Provides guidance and oversight to project staff on technical aspects of their work. Ensures quality control of deliverables. Develops and documents technical and operational procedures and statistical guidelines for assigned area.

Project Experience at AIR

Psychometrician, New Mexico Alternate Performance Assessment (NMAPA), New Mexico Department of Education (2017–2019)
Coordinated and performed the technical operations, including calibration, scoring, and analysis, for technical reports and form evaluations for the New Mexico statewide alternate assessment in ELA, mathematics, science, and social studies.

Psychometrician, Multiple statewide alternate assessments (2014–2018)
Worked with project staff for multiple statewide alternate assessments, including New Mexico Alternate Performance Assessment (NMAPA), Hawai'i State Alternate Assessments (HSA-Alt), South Carolina Alternate Assessment (SC-Alt), Wyoming's alternate assessment (WY-Alt) and Ohio's AASCD to support psychometric and statistical analysis.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2018–Present	Senior Psychometrician, Cambium Assessment, Inc., Washington, DC
2014–2018	Psychometrician, AIR Assessment, Washington, DC
2007–2008	Appointed Researcher, Korea Institute of Curriculum & Evaluation, Seoul, South Korea
2007	Research Assistant, *Korean Educational Development Institute*, Seoul, South Korea

Gabriel Martinez, M.S.

Overall Content Lead

Education

M.S. 2002, Wildlife and Fisheries Science
University of Arizona, Tucson, AZ

B.S. 1996, Biology
Northern Arizona University, Flagstaff, AZ

Present Position

Test Development Manager, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2018–Present)

Coordinates development and implementation of large-scale assessments that align with state content standards and item specifications. Facilitates client and educator committee meetings to gather feedback on assessment items and passages, including content and fairness, rubric validation, rangefinding, data review, and standard setting. Trains content development staff on item and test development processes and best practices. Collaborates with functional groups, such as Psychometrics, to ensure that assessments are valid and reliable measures of state standards.

Project Experience at Cambium Assessment

Overall Content Lead, Indiana ILEARN and I AM Assessments, (2018–Present)

Coordinates with test developers in the content development process, including item writing, item imports, client and educator reviews, form construction, and item pool management. Facilitates weekly client content call and documents decisions that impact test development. Serves as primary point of contact for all content deliverables.

Additional Professional Experience

Deputy Director of Assessment, New Mexico Public Education Department (2016–2018)

Managed contracts for all statewide assessment programs, including the New Mexico Standards-Based Assessments (SBA), the Partnership for Assessment of Readiness for College and Career (PARCC), the New Mexico Alternate Performance Assessment (NMAPA), and the Assessing Comprehension and Communication in English State-to-State (ACCESS) for English Language Learners. Represented New Mexico as PARCC State Lead, collaborating with consortium representatives from the states and the District of Columbia to plan and implement the PARCC assessments and four years of operational testing. Supervised assessment coordinators to provide training and support to New Mexico school districts before, during, and after statewide test windows. Reported status of assessments and related deliverables to senior leadership, including the secretary of education.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Test Development Manager, Cambium Assessment, Inc., Washington, DC

2018–2019 Test Development Manager, AIR Assessment, Washington, DC

2013–2018 Deputy Director of Assessment, New Mexico Public Education Department, Santa Fe, NM

2004–2013 CTB/McGraw-Hill, Monterey, CA

Alex Linville, M.A.

Content Lead, English Language Arts

Education

M.A. 2008, Social Sciences
University of Chicago, Chicago, IL

B.A. 2007, History
Elon University, Elon, NC

Professional Credentials and Certifications

Principal Certificate, Illinois Board of Education, 2017
Elementary Teaching Type 03, Illinois Board of Education, 2013

Present Position

Test Developer II, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2020–Present)
Manages a team of five test developers. Uses psychometric data to design and build English language arts (ELA) tests that meet customer-defined statistical parameters. Conducts senior reviews for multiple tasks, from newly written items to printed production materials. Hosts meetings to ensure that assessment content is sound, meets customer specifications, and follows industry best practices. Leads content review meetings with teachers. Trains teachers to write items suitable for large-scale assessments. Leads in the development, review, and maintenance of multi-year schedules from content creation through distribution.

Project Experience at CAI

Test Developer I, Cambium Assessment, Inc. (CAI) (2017–2019)
Oversaw the development cycle for ELA content for the Independent College and Career Readiness (ICCR) item bank, consisting of more than 1,800 items. Converted individual state blueprints into item development plans, managing and selecting those aligned to state standards. Conducted pool analysis and created corresponding item development plan(s). Collaborated with a team of more than 25 test developers to ensure that items were delivered on time. Facilitated item writer training and writing best practices for educator committees in Hawaii and West Virginia, and for the Smarter Balanced Assessment Consortium. Conducted training on how to enter multiple-choice, multi-select, equation, and table items into the item authoring tool. Facilitated several client-oriented meetings and trainings with 4–24 educator panelists including state-specific Achievement-Level Descriptor review, standard setting, item review, rubric validation, item writer training, and Content Advisory Committee (CAC). Built fixed-form tests using existing blueprints, psychometric restrictions, and available item pools for Arizona, Indiana, New Hampshire, North Dakota, West Virginia, Wyoming, and other client states. Created assessment content for various state clients. Assisted with scheduling, distribution, task delegation, and communication between clients and CAI teams.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Test Developer II, Cambium Assessment, Inc., Chicago, IL

2017–2019 Test Developer II, AIR Assessment, Chicago, IL

2013–2017 Middle School ELA/Social Studies Teacher, Chicago Public Schools, Chicago, IL

2010–2013 Director, American Institute of Studies Scholarship Program, Venice, FL

2009–2010 English Language Professor, The Far Eastern University, Chiang Mai, Thailand

Marie-Kristine Kramer, M.S.

Content Lead, Mathematics

Education

M.S. 2019, Educational Psychology (Assessment, Evaluation, and Testing)
George Mason University, Fairfax, VA

B.S. 2013, Mathematics
Virginia Polytechnic Institute and State University, Blacksburg, VA

Present Position

Math Test Developer II, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2016–Present)
Writes and independently reviews items ensuring proper standard alignment, content correctness, fairness, language clarity, and effective use of CAI's proprietary tools and software. Verifies that work performed by both CAI and vendors is correct, clear, and meets client specifications. Ensures that all client requests are resolved in a thorough and timely manner. Ensures that deliverables meet project content standards and follow CAI-approved processes. Communicates with client as appropriate regarding project needs. Writes blueprints and uses them to create item development plans. Interacts professionally at client meetings while assisting the facilitator. Communicates daily with colleagues about project requirements, deadlines, and other project-relevant information.

Project Experience at CAI

Mathematics Content Lead, Utah RISE Assessment (2019–Present)
Manages and leads item development for grades 3 through 8. Manages and participates in the writing and reviewing of items based on Utah's test specifications. Oversees the import process of teacher-written items for grades 3–8 mathematics. Collaborates with the client during the content review process, and edits items based on client feedback. Analyzes the item pool to recommend items to move to the interim pool. Creates new benchmark forms based on client feedback. Leads a variety of committee meetings such as content advisory committees, rubric validation, and item writing workshops.

End-Of-Course Grade-Band Lead, Florida Standards Assessment (2016–2019)
Managed and led item development for Algebra 1 and Geometry End-of-Course assessments. Participated in the development process by writing, reviewing (individually and in group reviews), and revising items based on Florida's test specifications. Co-facilitated with client during item review, rubric validation, and item writer trainings. Collaborated with client during test construction meetings to create operational test forms and embedded field-test forms.

Mathematics Grade-Level Lead (2013–2016)
Managed and led item development for grade 3. Participated in the internal development process by writing, reviewing (individually and in group reviews), and revising items. Coordinated with outside vendor in the development and revision process.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2021–Present Math Test Developer II, Cambium Assessment, Inc., Washington, DC
2020–2021 Math Test Developer I, Cambium Assessment, Inc., Washington, DC
2016–2020 Math Test Developer I, AIR Assessment, Washington, DC
2013–2016 Math Item Writer, AIR Assessment, Washington, DC

Michael Dlugos, Ph.D

Content Lead, Science

Education

Ph.D.	2008, Biology Binghamton University, Binghamton, NY
BS	2002, Biology (summa cum laude) Oswego State University, Oswego, NY

Present Position

NGSS Test Developer, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2019–Present)
Develops summative science items for state education agencies using the NGSS. Plans and develops rubrics and scoring logic. Reviews items written by in-house item writers for alignment, content, grade-level appropriateness, and editorial issues. Facilitates meetings to assess content, fairness, scoring, and student data trends with educators and state representatives. Developed items and facilitated committee and client meetings for Connecticut, Hawaii, Idaho, Indiana/ICCR, Montana, Oregon, Rhode Island, Utah, Vermont, and West Virginia.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present	Test Developer, Cambium Assessment, Inc., Washington, DC
2019	Test Developer, AIR Assessment, Washington, DC
2016–2019	Learning Content Specialist, Wisewire Inc., Tyson's Corner, VA
2011–2016	Senior Editor, Words and Numbers, Baltimore, MD
2008–2017	Adjunct Biology Professor, Binghamton University, NY; Broome Community College, NY; Montgomery College, MD; Anne Arundel Community College, MD; Northern Virginia Community College, VA

Publications

Dlugos, M. and Wilcox, R.S. (2011) Altitudinal differentiation of reproductive tactic plasticity despite close proximity of two Aquarius remigis populations. *Behaviour*, *148*: 265-282

Eldakar, O.T.; Dlugos, M.; Holt, G.P.; Wilson, D.S.; Pepper, J.W. (2010) Population structure influences sexual conflict in wild populations of water striders. *Behaviour*, *147*: 1615-1631

Eldakar, O.T.; Dlugos, M.; Pepper, J.W.; Wilson, D.S. (2009) Population structure mediates sexual conflict in water striders. *Science 326*: p.18

Eldakar, O.T.; Dlugos, M.; Wilcox, R.S.; Wilson, D.S. (2009) Aquarius remigis mating systems as a tragedy of the commons. *Behavioral Ecology and Sociobiology*, *64*:25-33

Weber, P.J.; Preston, S.; Dlugos, M.; Nelson, A.P. (2008) The effects of field mowing on adult butterfly assemblages in central New York State. *Natural Areas Journal*, *28*:130-143

Scott Koenig, M.A.

Content Lead, Social Studies

Education

M.A. 2007, Curriculum and Teaching
Michigan State University, East Lansing, MI

B.A. 2002, History Major/Group Social Studies Minor
Alma College, Alma, MI

Professional Credentials and Certifications

Professional Teaching Certification, Michigan Department of Education, 2017–2022

Present Position

Test Developer, Manager, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2019–Present)
Responsible for developing cross-curricular assessment materials that align with state curriculum and content standards and item specifications. Writes, reviews, and delivers traditional and technology-enhanced items for multiple states. Supports resolution processes for client and committee feedback on items and passages. Supports and assists the organization of Content and Fairness Committee meetings for multiple states. Facilitates a variety of meetings, including Content and Fairness, rubric validation, rangefinding, and standard setting. Assists in training new team staff on item writing and general assessment best practices.

Project Experience at CAI

Test Developer, Manager (2018– Present)
Serves as primary content lead for social studies item development supporting the Texas Education Agency (TEA). Serves as the overall content lead for the Indiana Statewide Testing of Educational Progress Plus (ISTEP+) program supporting the Indiana Department of Education (IDOE). This includes designing maps and supporting assessment development for multiple disciplines. Currently supports the organization and staffing for state fairness reviews. Supports item writing and development for the Ohio Department of Education (ODE) and assists item and assessment map reviews for their alternative and general education assessments. Supports item reviews for multiple other state programs as needed within the CAI teams. Supports English language arts (ELA) item and passage development for multiple states and the ClearSight Formative Project. Assists standards review for multiple states. This includes facilitation in partnership with South Carolina to establish new social studies prioritized standards. Collaborates with an internal team to create an established prioritized standards document for use by South Carolina educators.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Test Developer, Cambium Assessment, Inc., Washington, DC

2018–2019 Test Developer, AIR Assessment, Washington, DC

2015–2018 Social Studies Education Consultant, Michigan Department of Education, Lansing, MI

2002–2015 Social Studies Educator/Interim Elementary Administrator, Pine River Area Schools, Leroy, MI

Sonja Hubbard, M.S.

Information Technology Specialist

Education

M.S. 2012, Information Systems Technology
George Washington University, Washington, DC

B.A. 2002, Media Studies
Pomona College, Claremont, CA

Professional Credentials and Certifications

CIO Certificate in Federal Executive Competencies (2012)

Honors and Awards

Technical Leadership Award, AED, 2008
Innovation Award, AED, 2007
Staff Advisory Council Employee of the Year Award, AMIDEAST, 2004

Present Position

Software Project Manager, Student Registration, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2013–Present)

Develops requirements, budgets, and schedules for software development projects. Responsible for ensuring that projects are completed on time and within budget, and that all deliverables are of the highest quality. Facilitates requirements meetings and status meetings with clients and project team. Establishes milestones, identifies potential issues, and monitors adherence to project scope, requirements, design documents, and schedules, and to the Computer and Statistical Sciences Center (CSSC) software development process. Maintains client relations and communications including status reporting and informal conversations.

Project Experience at CAI

Test Information Distribution Engine (TIDE) (2013–Present)

Serves as the primary point of contact for four clients and oversees special development projects that affect multiple clients. Coordinates service requests across multiple CSSC teams. Provides product management support for open-source, single sign-on implementation. Researches escalated help desk cases by analyzing data, code, and application logs. Applies a user-centered approach to new-feature design decisions. Develops and manages the TIDE internal research and development schedule. Identifies and implements process improvements related to issue tracking and knowledge management.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Technical Project Manager, Cambium Assessment, Inc., Washington, DC
2013–2019 Technical Project Manager, AIR Assessment, Washington, DC
2010–2013 Technical Project Manager, Sonjara, Inc., Falls Church, VA
2005–2010 Technical Manager, AED, Washington, DC
2004–2005 Program Officer, AMIDEAST, Washington, DC
2002–2004 Senior Program Assistant, AMIDEAST, Washington, DC
1999–2002 Webmaster, Freelance, Claremont, CA

David Kravitz, B.S.

Software Project Manager, Student Registration System

Education

B.S. 2015, Information Systems Major
University of Maryland, College Park, MD

Present Position

Technical Project Coordinator, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2020–Present)

Manages the Test Information Distribution Engine (TIDE), which is the user and student registration system. Manages and coordinates the collaboration of data analysts, software developers, database administrators, network engineers, and quality assurance professionals to achieve project deployment deadlines. Monitors project performance, and continuously and successfully meets client expectations.

Project Experience at Cambium Assessment

Technical Project Coordinator (2020–Present)

Manages and implements all features of TIDE for the following clients: Arkansas, Indiana, Iowa, Louisiana, and Nebraska. Significant experience in handling the Orders module in TIDE.

Additional Professional Experience

Database Administrator, Decision Software, Inc. (2017–2020)

Designed and coded ETL process that tracks changes across loads for ease of historical audit and reporting. Implemented ETL processes for 20+ sub-clients. Developed quality assurance and other reports to ensure data accuracy and integrity. Documented technical details of key tables, including purpose, default values, update frequency, and update script file location for all fields.

IT Audit Associate, Williams, Adley & Company (2016–2017)

Evaluated the information security programs for federal agencies according to FISMA, FISCAM, and NIST. Analyzed client documentation to determine compliance and to test for operating effectiveness. Articulated analysis, audit findings, and recommendations to client management in written reports.

Full-Stack Web Developer, The Board and Brew (2015)

Developed customer-facing website with advanced search functionality and the ability to read/write reviews. Developed administrative web application for inventory- and database-management system. Designed and hand-coded front-end of web applications utilizing HTML5, CSS3, and JQuery. Programmed back-end of web applications utilizing PHP, Ajax, and MySQL.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present	Technical Project Coordinator, Cambium Assessment, Inc., Washington, DC
2017–2020	Database Administrator, Decision Software, Inc., Landover, MD
2016–2017	IT Audit Associate, Williams, Adley & Company, Washington, DC
2015	Full-Stack Web Developer, The Board and Brew, College Park, MD

Technical Skills

SQL, Java, Visual Basic, HTML, CSS, PHP, XML

John McDonald, B.S.

Software Project Manager, Test Delivery System

Education

B.S. 2011, Information Science and Systems Management
Radford University, Radford, VA

Present Position

Technical Project Manager, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2014–Present)

Manages multiple projects throughout the software development life cycle (SDLC) process, coordinating with various state departments of education to deliver CAI's online assessments to more than one million students. Liaises with clients to identify and understand project specifications and deliver assessments that meet client expectations. Manages entire process from user acceptance testing (UAT) through the implementation and post-implementation phases of assigned projects.

Additional Professional Experience

Information Systems Specialist, Miller's Office Products (2011–2014)

Provided technical solutions and support for business operations across departments. Developed dynamic results-driven SQL reports that facilitated daily business operations and enabled sales staff to track trends and performance. Developed quality assurance (QA) and data validation scripts to run on large dataset pricing imports. Optimized and developed SQL-stored procedures to automate business processes and streamline data efficiency. Performed data analysis on quarterly GSA pricing schedules within extremely narrow time constraints.

Research and Development Technology Coordinator, MedImmune, LLC (2008–2011)

Provided logistical and technical services for the Research and Development (R&D) department, installing and upgrading computer systems and applications. Provided on-site desktop and network support.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Technical Project Manager, Cambium Assessment, Inc., Washington, DC

2014–2019 Technical Project Manager, AIR Assessment, Washington, DC

2011–2014 Information Systems Specialist, Miller's Office Products, Lorton, VA

2008–2011 Technology Coordinator, MedImmune, LLC, Gaithersburg, MD

Technical Expertise

Databases: Oracle 11g, MySQL, MS SQL. **Programming Languages:** HTML, Java, JavaScript, JSP, Perl, SQL, T-SQL. **Software:** CRM, Fogbugz, JIRA, MS Dynamics, MS Office, MS Project, MS Vision, SAP.

MahendraMurthy Ramachandran, M.C.A.

Software Project Manager, Analysis Systems

Education

M.C.A. 2001, Computer Science
Dr. M.G.R Engineering College, University of Madras, Chennai, India

B.S. 1998, Computer Science
Vel's College of Science, University of Madras, Chennai, India

Honors and Awards

Certified Scrum Master (CSM), International Scrum Institute, 2012
Information Technology Infrastructure Library (ITIL) Certified, Adept Technology Pvt Ltd, 2014
Service Award, Cambium Assessment, Inc., 2021

Present Position

Technical Director, Computer and Statistical Sciences Center (CSSC), Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2021–Present)

Manages projects for the K–12 education assessment organization involving encryption and tokenization spanning systems such as the Test Information Distribution Engine (TIDE), which manages student information; the Test Delivery System (TDS), which delivers online testing; and scoring and reporting. Manages all aspects of project planning, schedule creation, change control and the execution of all aspects of the software development process from inception to final delivery. Responsible for project planning and allocation of resources between project teams, system engineers, engineering services (DevOps), database administrators, and other shared services throughout the project lifecycle. Established process excellence and unifies the IT lifecycle framework and delivery methodologies involving Agile, Scrum, and Kanban across product development and DevOps. Manages multiple high-stake project schedules, project status reports, team evaluations and performance, coaching and mentoring, and training. Proactively identifies and drives process improvement initiatives across the enterprise mitigating risks and ensuring a successful implementation. To date, no liquidity damages for the deliverables have been reported by any client.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2021–Present Technical Director, Cambium Assessment, Inc., Washington, DC

2020–2021 Senior Technical Project Manager, Cambium Assessment, Inc., Washington, DC

2015–2019 Senior Technical Project Manager, AIR Assessment, Washington, DC

2004–2014 Senior Project Manager, OriginWave, Chennai, India

2003–2004 Software Consultant, Future Focus InfoTech, Chennai, India

2002–2003 Software Developer, First Option Advisory, Chennai, India

2001–2002 Software Developer, Aptech/SSP Systems, Chennai, India

Technical Skills

Internet Technology: C#, ASP.NET, Web Services, HTML, CSS, JavaScript, VBA, Java, SQL SERVER, MS Access, MySQL.

Sirisha Nagabhairava, M.S.

Software Project Manager, Item Tracking System

Education

M.S. 2004, Computer Science
Fairleigh Dickinson University, Teaneck, NJ

B.S. 2002, Computer Science
Gokaraju Rangaraju Institute of Engineering and Technology, Hyderabad, India

Present Position

Technical Director, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*)
(2016–Present)

Responsible for developing and tracking requirements; schedules for software projects, including authoring requirements, gathering, analysis, etc.; facilitating requirements meetings through reviews and approvals; and supporting peer review sessions and status meetings with external software vendors. Develops and writes software specifications to support work performed by an external software vendor. Communicates with software engineering teams and external software vendor about status and progress regarding design, reliability, and maintenance. Leads integration analysis of requirements that impact several systems. Tracks progress toward milestones, anticipates issues, and monitors adherence to project scope, schedules, software development processes, and requirements and design documents. Monitors new work, identifying and escalating complex issues to senior management. Performs data mining on ad hoc data requests from the development team.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Technical Director, Cambium Assessment, Inc., Washington, DC

2016–2019 Technical Director, AIR Assessment, Washington, DC

2010–2016 Senior Manager, New Product Development, ATPCO, Dulles, VA

2005–2007 Technical Project Manager, New Product Development, Real Networks Inc., Reston, VA

2003–2005 Software Architect, Iron Mountain, Sterling, VA

Technical Skills

Internet Technology: Apache, Asana, Azendoo, Basecamp, Big Data, DB2, Evernote, HTML, Java J2EE, JBoss, JEE, Jira, Linux, OneNote, Oracle, Trello, Visio, WAS, XML. **Operating Systems and Server Administration and Networking:** Cloud computing, mobile computing (iPhone and Android), networks, Web Services, Windows Services. **Software:** Microsoft Project.

Jairo Vargas, B.S.

Software Project Manager, Reporting System

Education

B.S. 1996, Electrical Engineering
Rutgers University, New Brunswick, NJ

Present Position

Senior Technical Project Manager I, Cambium Assessment, Inc. (CAI) (Formerly AIR Assessment*) (2018–Present)

Manages, delegates, and implements upgrades to a high-visibility statewide K–12 assessment reporting platform. Collaborates on the development of deliverables for the departments of education in six client states. To date, all deliverables have been on budget, on target, and within a high degree of quality. Manages and negotiates priorities, dates, and resources in a dynamic team environment with myriad stakeholders. Plans and executes production deployments for new and updated reporting configurations. Supports new hires and other project managers when necessary.

Additional Professional Experience

Experienced Manager of Technical Projects, WeDo Technologies (2012–2017)

Worked as the lead software architect responsible for the successful, on-target migration of the company's core multimillion-dollar revenue-generating offering to the company's proprietary analytics reporting software. Designed and implemented high-performance, high-availability MySQL and Oracle data warehouse and data mart systems that served as the back end of key software-as-a-service offerings for several US-based Tier 1 and 2 wireless carriers. Managed, trained, and coached a diverse team ranging from new hires to senior specialists to successfully achieve key roadmap projects on budget and on target. Provided effective, clear technical support to the sales team during key high-profile contract negotiations. Cultivated point of contacts who led to new contracts.

Manager of Technical Projects, Connectiv Solutions (2010–2012)

Successfully led the technical effort to integrate a US-based Tier I wireless provider to work with the core offering of the company. Designed a high-resiliency, fully automated near real-time asynchronous transactional SSL XML/SOAP client to process and maintain a local database with all US porting records and new transactions.

Lead Linux Software Engineer, Connectiv Solutions (2007–2010)

Developed new algorithms, programs, and processes to automate operational tasks and optimize data processing performance, scalability, and reliability as part of a strong DevOps framework.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present	Senior Technical Project Manager I, Cambium Assessment, Inc., Washington, DC
2018–2019	Senior Technical Project Manager I, AIR Assessment., Washington, DC
2012–2017	Experienced Manager of Technical Projects, WeDo Technologies, Bethesda, MD
2010–2012	Manager of Technical Projects, Connectiv Solutions, Bethesda, MD
2007–2010	Lead Linux Software Engineer, Connectiv Solutions, Bethesda, MD

Anurag Kumar, M.S.

Score Reporting Lead

Education

M.S. 2010, Management Information Systems
University of Cincinnati, Cincinnati, OH

B.S. 2007, Production Engineering
G.B. Pant University of Agriculture & Technology, Pantnagar, India

Present Position

Score Reporting Project Manager I, Cambium Assessment, Inc. (CAI)
(Formerly AIR Assessment*) (2016–Present)

Has extensive experience in delivering multiple online and print product lines of online and paper score reports across seven state departments of education on 50 projects. Responsible for delivering more than 15 million pages of score reports annually. Develops and maintains a close working relationship with state department of education staff, collaborating with them to determine product requirements. Directs programmers and designers in the development of new features for online- and paper-based testing. Establishes and implements processes to effectively design, produce, and deliver print score reports under tight deadlines and resource constraints. Creates work plans and schedules for the development and production of all reports. Manages a team of graphic designers, application developers, statistical programmers, content specialists, and print specialists throughout the development and production cycles. Develops and implements quality control systems to ensure the accuracy, timeliness, and quality of reports, and supervises the team through quality assurance activities. Trains and mentors two full-time staff members and 20 temporary staff members and interns.

Employment History

**AIR Assessment was acquired by Cambium Learning on January 1, 2020.*

2020–Present Score Reporting Project Manager, Cambium Assessment, Inc., Washington, DC

2016–2019 Score Reporting Project Manager, AIR Assessment, Washington, DC

2012–2016 Data Analyst, Research for Action, Philadelphia, PA

2010–2012 MIS Analyst, Public/Private Ventures, Philadelphia, PA

Technical Skills

Data Analysis & Databases: STATA, SPSS, SAS, WPS, MS Access, MySQL, MS SQL Server. **Project Management**: MS Project, BPMN, Object Oriented approach (Use Cases, Sequence and Class Diagrams using UML). **Programming:** SQL, JAVA, VB.NET using Visual Studio 2008. **System Administration**: Salesforce, Social Solutions ETO, Igloo Software. **Survey Design & Implementation**: SNAP, Survey Monkey. **Application Software**: MS Excel (Advanced), MS Visio, MS PowerPoint, SharePoint, Adobe Photoshop. **Operating Systems**: Windows 7/Vista/XP/2000, Mac OSX. **Enterprise Resource Planning**: SAP ERP (QM, FI, CO, MM, SD, and PP modules), SAP Solution Manager.

KATHY KANOLIS

Handscoring Supervisor

Kathy Kanolis, Senior Project Manager, has over 20 years of assessment experience working with large-scale educational assessment programs, including serving as the Handscoring Program Manager for the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) from 2001–2015.

Ms. Kanolis possesses the experience and knowledge necessary for successful completion of all scoring related tasks. In her current role, she is responsible for all activities associated with the applied skills scoring of DRC's Test Assessing Secondary Completion (TASC), as well as alternate assessments in Alabama, Louisiana, Nevada, and Washington.

In addition to her work in educational assessment, Ms. Kanolis has two years of experience teaching an undergraduate educational psychology course required for all education majors at Purdue University, where she was nominated by undergraduate students for outstanding teaching. Ms. Kanolis has auditing experience from being a certified ISO Internal Auditor for CTB/McGraw-Hill.

PROFESSIONAL EXPERIENCE

Senior Project Manager, Performance Assessment Services, DRC, Indianapolis, Indiana: 2015–Present

Handscoring Program Manager, CTB/McGraw-Hill, Indianapolis, Indiana: 2001–2015

Handscoring Content Supervisor, Associate Handscoring Project Manager, CTB/McGraw-Hill, Indianapolis, Indiana: 1999–2001

Scorer, Team Leader, Content Supervisor, Kelly Services at CTB/McGraw-Hill, Indianapolis, Indiana: 1997–1999

Instructor for Educational Psychology, Purdue University, West Lafayette, Indiana: 1993–1995

EDUCATION

M.S. Educational Psychology
Purdue University
West Lafayette, Indiana

B.A. Psychology
Purdue University
West Lafayette, Indiana

DEE ANN JACOBS

Handscoring Advisor

Dee Ann Jacobs has more than 24 years of experience in Performance Scoring, including 10 years of experience working on the ISTEP+. As Director, Performance Scoring, Ms. Jacobs is responsible for the planning, implementation, and management oversight of Performance Scoring operations for DRC's Indianapolis scoring site and several remote sites. Ms. Jacobs has successfully managed the scoring of over 17 million items a year with continued excellence in quality.

In addition to her assessment experience, Ms. Jacobs has seven years of teaching experience. This experience includes serving as Associate Professor at Indiana University/Purdue University at Indianapolis where she was a Literature and Composition Instructor. She also taught composition classes at Eastern Kentucky University as a Graduate Assistant.

PROFESSIONAL EXPERIENCE

Director, Performance Scoring, DRC, Maple Grove, MN: 2015–Present

Regional Handscoring Manager, CTB/McGraw-Hill, Monterey, CA: 2010–2015

Associate Handscoring Manager, CTB/McGraw-Hill, Monterey, CA: 1999–2010

Associate Professor, Indiana University/Purdue University at Indianapolis (IUPUI), Indianapolis, IN: 1994–1999

Graduate Assistant, Eastern Kentucky University, Richmond, KY: 1992–1994

EDUCATION

B.A., Political Science
Eastern Kentucky University
Richmond, KY

DONG-IN KIM, PH.D.

Research Supervisor

Dong-In Kim, Ph.D., has more than 25 years of research experience, including 20 years of experience in the fields of statistics and measurement. As a Senior Research Scientist at DRC, Dr. Kim develops and applies advanced mathematical models and modern statistical theory to analyze achievement tests that involve multiple-choice and performance items.

Dr. Kim currently serves as the Psychometric Lead on the LEAP 2025 Math and English Language Arts Test Development for High School, Grades 3–8, Diagnostic, and Interim programs.

PROFESSIONAL EXPERIENCE

Senior Research Scientist, DRC, Maple Grove, MN: 2015–Present

Research Scientist III, CTB/McGraw-Hill, Monterey, CA: 2008–2015

Research Scientist II, CTB/McGraw-Hill, Monterey, CA: 2004–2008

Research Scientist I, CTB/McGraw-Hill, Monterey, CA: 2001–2004

Research Assistant—Iowa Testing Program, University of Iowa, Iowa City, IA: 1996–2000

Research Assistant, Yonsei University, Seoul, Korea: 1992–1994

EDUCATION

Ph.D., Educational Measurement and Statistics
University of Iowa
Iowa City, Iowa

M.A., Educational Measurement
Yonsei University Graduate College
Seoul, Korea

B.A., Education
Yonsei University Graduate College
Seoul, Korea

Walt Drane

Education: Mississippi College – Clinton, MS, 2006-2007|
Mississippi College – Clinton, MS, 2003-2006
Mississippi State University – Mississippi State, MS, 1998-2002
Pearl High School – Pearl, MS, 1994-1998

Degree & GPA: Education Specialist, 4.00/4.00
Master of Education, 4.00/4.00
Bachelor of Arts*, 3.00/4.00
*(Political Science with a focus on International Relations and a Certificate in Criminal Justice and Corrections)

Work Experience:

Caveon Test Security – Director of Education Services, 2018-present

- K-12 Subject Matter Expert in the area of large-scale assessment and test security
- Account Manager for multiple state and vendor clients across the United States
- National Sales Leader in the area of test security
- Engaged member and contributor to discussions at the Council of Chief State SchoolOfficers (CCSSO) Technical Issues in Large Scale Assessments (TILSA)
- Routine presenter on the topic of test security at national conferences

Mississippi Department of Education – Bureau Manager, 2016-2018
Executive Director of Assessment and Accountability
Office of Student Assessment

- Effectively supervise 11 direct report employees
  - State Assessment Director
  - Program Manager
  - Logistics Officer Division Director II
  - Test Security Director
  - Test Security Investigator(s)
  - MAAP ELA Program Coordinator
  - MAAP Math/Science Program Coordinator
  - NAEP/ACT Coordinator
  - MKAS2 Program Coordinator
  - Special Populations Coordinator (MAAP-A)
  - Administrative Assistant

Office of District and School Performance

- Effectively supervise 2 direct report employees
  - Bureau Director of Accountability
  - Bureau Director of Data Analytics

Jennifer Sterne Jensen

Employment History

Caveon, LLC, 6905 S 1300 E #468, Midvale, Utah 84047
Program Manager - June 2019 to Present
(Contractor) November 2014 – March 2018

Responsible for all aspects of project management for research and exam security projectsacross various service groups within the company.

Western Governors University, 4001 S. 700 E., Ste. 700, Salt Lake City, UT 84107
Assessment Program Manager, College of Business
January 2013 to December 2013

Managed exam development for WGU College of Business graduate programs; including examblueprint design and implementation, project scheduling, and resource allocation.
Provided quality oversight, including ongoing psychometric training, item analyses, and recommendations for new assessments, assessment revisions and redevelopment.

Jennifer Sterne Jensen
Self-Employed Exam Development Consultant
October 1999 to May 2001 and January 2006 to January 2008

Conducted job task analyses, provided item writing training, project management, and writingand editing services for contract exam development projects. Clients included Galton Technologies, Exam Solutions, HyCurve, Inc., Certiport, Inc. and the Utah State Office of Education.

Certiport, Inc., 1276 S. 820 E., Ste. 200, American Fork, UT 84003
Product Manager
May 2001 to September 2004

Managed exam development for Microsoft Office Specialist (MOS) certification and Internet and Computing Core Certification (IC3) programs. Developed and implemented exam blueprints; trained and managed exam writers; edited, analyzed, and validated exams.

NetVision, Inc., 752 E. 1180 S., Ste. 120, American Fork, UT 84003Marketing Communications Manager
July 1998 to October 1999

Developed and managed corporate identity; including core messaging, Web site design, publicrelations, marketing initiatives, and promotional materials.

Microsoft, One Microsoft Way, Redmond, WA 98052
Program Manager
June 1996 to June 1998

Managed exam development for the Microsoft Certified Professional (MCP) certification programs. Devised exam objectives; developed and implemented exam blueprints; trained and managed exam writers; edited, analyzed, and validated exams.

Christie Zervos

Academic Background

BA, Psychology and Sociology, University of Utah, Provo, UT

Professional Experience

Caveon, LLC, Salt Lake City, UT
Director of Operations – 2003-present

Manage systems development deployment and operations. Define and implement all infrastructures manage all internal and outsourced projects within approved budget.

- Supervise, train, and develop a workforce of 10 contractors.
- Implemented procedures that reduced operating cost, improved quality, productivity and increased profitability.
- Participated in the development of Web Patrol reports, and Data Forensics reports for customers.
- Developed and implemented policies, procedures, and processes

Novell Education, Provo, UT
Director of Skills Assessment – 2002-2003

Directed all functions for test development practical testing development with VMware and managed all aspects of promotions for Novell's certification program.

- Managed budget of $5 million, reduced departmental costs by 5%.
- Managed a group of 23 test developers, technical research, development team, and certification administrators to support the CNA, CNE, and MCNE certification programs
- Established and managed an onsite testing center for Novell employees. Maintained 95% capacity at all times.
- Resolved escalated customer issues. Customer service call volume decreased by 45% with test concerns.
- Improved test productivity 100% by finding easier, faster ways of creating test items.

Production Development Manager – 1996-2002

- Oversaw the development of Novell Education CNE and CDE certifications exams. (six CNE exams, 10 MCNE exams and 3 CDE exams), including staffing, interviewing, budget, and capital expenditures.
- Prioritized and scheduled the development, content, and actual delivery of user exams.
- Released 26 exams with revisions annually.
- Key contact between testing providers and Novell. (Prometric and VUE)
- Created scope of work for outsourcing model.
- Project managed the creation scenarios for Novell hands-on exams.
- Designed a QA checklist for quality control purposes. Checking for 20 different elements when releasing an exam.
- Managed 8 test item authors and was able to deliver exams on or before scheduled date.
- Implemented blueprints for exams, technical reviews, test editing, and test handoff.
- Improved customer satisfaction processes and policies within test development. Call volume on test concerns decreased by 63%.
- Helped design and manage development of student assessment tool.

Learning Resource Center Manager – 1990-1996

- Established and managed an on-site proctored testing center increased testing center from 0 to 13 worldwide.
- Created, designed, and planned the development of an internal learning resource center that served as a consultation and educational service for Novell employees worldwide.
- Evaluated software, computer-based training products, videos, manuals, books, and trade magazines.
- Instructed employees and customer regarding CNE and Master CNE certification program.

Cary Straw

Education

University of Utah — Computer Science

Professional Experience

Caveon Test Security, Midvale, UT — 2007-Present
Executive Web Patrol Manager

Guides day to day operations of Caveon's industry leading Web Patrol division that identifies, analyzes, and removes web-based threats to clients' intellectual property.
Created and designed original concepts for Caveon Core, Caveon's incident management software platform. Strategizes with clients in multiple industries to identify online trendsand minimize online risks to their testing programs.

Hyatt Vacation Club, Carmel, CA — 2004-2007
Sales and Media Production Team Leader

Top three sales executive team leaders nationwide with over $2,000,000 in personal sales.Designed, produced, edited, and directed interactive media projects.

Westgate Resorts, Park City, UT — 2001-2004
Director of Marketing

Directed marketing offices in Park City and Salt Lake City, Utah and 105 associated staff.Produced large media events in television, radio, newspaper, and online markets.

Fairfield Grand Desert, Las Vegas, NV — 1999-2001
Sales Director

Led staff to earnings of $27 million dollars by utilizing relational sales/management strategies.
Designed, produced, and directed the production of new collateral materialsand videos to enhance a new corporate resort directory.

Escapes Mediagroup, Salt Lake City, UT — 1996-1999
Founding Partner

As an original founding partner, guided and directed all facets of a successful advertising,branding and video production company.

Appendix B: Milestone Schedule

Task	Duration	Start Date	End Date
Testing Windows	205d	10/03/22	07/14/23
Released Items Repository (RIR) Test Windows	81d	10/03/22	01/23/23
IREAD-3: RIR Go Live	1d	10/03/22	10/03/22
I AM: RIR Go Live	1d	10/03/22	10/03/22
ILEARN: RIR Go Live	1d	01/23/23	01/23/23
Practice Test Windows	81d	10/03/22	01/23/23
ILEARN Biology: Practice Test Go Live	1d	10/03/22	10/03/22
IREAD-3: Practice Test Go Live	1d	10/03/22	10/03/22
ILEARN Grades 3-8: Practice Test Go Live	1d	01/23/23	01/23/23
ILEARN U.S. Government: Practice Test Go Live	1d	01/23/23	01/23/23
Online Test Windows	165d	11/28/22	07/14/23
Fall ILEARN Biology ECA: Online Testing Window	14d	11/28/22	12/15/22
Winter ILEARN Biology ECA: Online Testing Window	14d	02/06/23	02/23/23
Spring IREAD-3: Online Testing Window	10d	03/06/23	03/17/23
I AM: Learner's Characteristics Inventory (LCI) Go Live	1d	03/13/23	03/13/23
I AM: Online Testing Window	30d	04/03/23	05/12/23
Spring ILEARN Grades 3-8: Online Testing Window	20d	04/17/23	05/12/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: Online Testing Window	25d	04/17/23	05/19/23
Summer IREAD-3: Online Testing Window	40d	05/22/23	07/14/23
Paper Test Windows	160d	11/28/22	07/07/23
Fall ILEARN Biology ECA: Paper Testing Window	9d	11/28/22	12/08/22
Winter ILEARN Biology ECA: Paper Testing Window	9d	02/06/23	02/16/23
Spring IREAD-3: Paper Testing Window	10d	03/06/23	03/17/23
I AM: Paper Testing Window	30d	04/03/23	05/12/23
Spring ILEARN Grades 3-8: Paper Testing Window	15d	04/17/23	05/05/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: Paper Testing Window	20d	04/17/23	05/12/23
Summer IREAD-3: Paper Testing Window	35d	05/22/23	07/07/23
Paper Logistics	179d	11/14/22	07/20/23
Read-Aloud Scripts Delivered to Secure Inbox	126d	11/14/22	05/08/23
Fall ILEARN Biology ECA: CAI to post RA scripts to Secure Inbox	1d	11/14/22	11/14/22
Winter ILEARN Biology ECA: CAI to post RA scripts to Secure Inbox	1d	01/23/23	01/23/23
Spring IREAD-3: CAI to post RA scripts to Secure Inbox	1d	02/20/23	02/20/23
I AM: CAI to post Scripts (Standard and Low Vision) to Secure Inbox	1d	03/20/23	03/20/23

Task	Duration	Start Date	End Date
Spring ILEARN: CAI to post RA scripts to Secure Inbox	1d	04/03/23	04/03/23
Summer IREAD-3: CAI to post RA scripts to Secure Inbox	1d	05/08/23	05/08/23
Additional Orders (AO)	166d	11/15/22	07/04/23
Fall ILEARN Biology ECA: AO Window	13d	11/15/22	12/01/22
Winter ILEARN Biology ECA: AO Window	13d	01/24/23	02/09/23
Spring IREAD-3: AO Window	8d	02/21/23	03/02/23
I AM: AO Window	28d	03/27/23	05/03/23
Spring ILEARN Grades 3-8: AO Window	18d	04/04/23	04/27/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: AO Window	23d	04/04/23	05/04/23
Summer IREAD-3: AO Window	40d	05/10/23	07/04/23
Initial Orders (IO)	91d	11/28/22	04/03/23
Order Extract	43d	11/28/22	01/25/23
I AM: Initial Order (IO) Window	14d	11/28/22	12/15/22
Spring IREAD-3: IO Extract	1d	01/02/23	01/02/23
Spring ILEARN 3-8: IO Extract	1d	01/25/23	01/25/23
Due in Districts	30d	02/21/23	04/03/23
Spring IREAD-3: Materials due in district	1d	02/21/23	02/21/23
I AM: Materials due in district	1d	03/24/23	03/24/23
Spring ILEARN 3-8: Materials due in district	1d	04/03/23	04/03/23
Paper-Pencil Cutoff Dates	155d	12/16/22	07/20/23
Fall ILEARN Biology ECA: Paper-Pencil Cutoff	1d	12/16/22	12/16/22
Winter ILEARN Biology ECA: Paper-Pencil Cutoff	1d	02/24/23	02/24/23
Spring IREAD-3: Paper-Pencil Cutoff	1d	03/23/23	03/23/23
Spring ILEARN Grades 3-8: Paper-Pencil Cutoff	1d	05/12/23	05/12/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: Paper-Pencil Cutoff	1d	05/19/23	05/19/23
Summer IREAD-3: Paper-Pencil Cutoff	1d	07/20/23	07/20/23
Program Management and Contract Deliverables	279d	01/10/22	02/02/23
Cross-Program Schedule Delivered to IDOE	1d	07/01/22	07/01/22
Planning Meetings	279d	01/10/22	02/02/23
Contract Kick-off Meeting - ILEARN/IREAD-3/I AM (Planning Meeting 1)	1d	01/10/22	01/10/22
ILEARN/IREAD-3/I AM Planning Meeting 2	1d	07/13/22	07/13/22
ILEARN/IREAD-3/I AM Planning Meeting 3	1d	10/13/22	10/13/22
ILEARN/IREAD-3/I AM Planning Meeting 4	1d	02/02/23	02/02/23

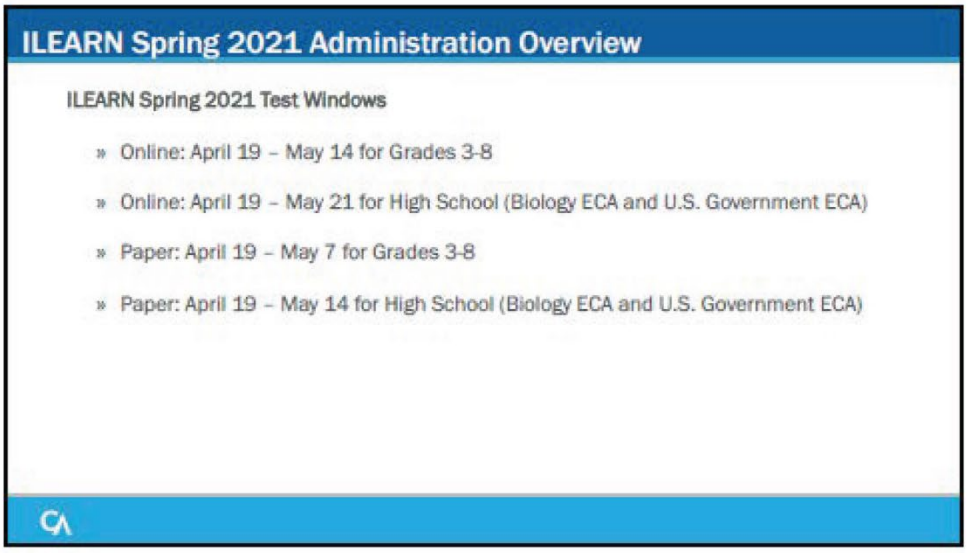
Task	Duration	Start Date	End Date
Systems Configuration and Deployment	244d	07/07/22	06/13/23
TDS UATs	204d	08/11/22	05/23/23
System Readiness Test: TDS UAT	191d	08/11/22	05/04/23
Practice Test (PT) and Released Items Repository (RIR): TDS UAT	118d	08/13/22	01/24/23
I AM RIR: TDS UAT	25d	08/31/22	10/04/22
ILEARN Biology PT: TDS UAT	33d	08/19/22	10/04/22
ILEARN Biology RIR: TDS UAT	48d	11/19/22	01/24/23
IREAD-3 PT: TDS UAT	33d	08/19/22	10/04/22
IREAD-3 RIR: TDS UAT	38d	08/13/22	10/04/22
ILEARN 3-8 PT: TDS UAT	36d	12/06/22	01/24/23
ILEARN 3-8 RIR: TDS UAT	36d	12/06/22	01/24/23
ILEARN US Government PT: TDS UAT	48d	11/18/22	01/24/23
ILEARN US Government RIR: TDS UAT	29d	12/15/22	01/24/23
Operational Assessments: TDS UAT	181d	09/13/22	05/23/23
Fall ILEARN Biology ECA: TDS UAT	56d	09/13/22	11/29/22
Spring ILEARN Biology ECA: TDS UAT	115d	11/09/22	04/18/23
Spring ILEARN U.S. Government ECA: TDS UAT U.S. Govt	113d	11/12/22	04/18/23
Spring ILEARN Math: TDS UAT	115d	11/09/22	04/18/23
Spring ILEARN Science Grades 4 & 6: TDS UAT	79d	12/29/22	04/18/23
Spring ILEARN Social Studies (SS) Grade 5: TDS UAT	89d	12/15/22	04/18/23
Spring ILEARN ELA: TDS UAT	99d	12/01/22	04/18/23
Winter ILEARN Biology ECA: TDS UAT	31d	12/27/22	02/07/23
Spring IREAD-3: TDS UAT	50d	12/28/22	03/07/23
I AM Operational: TDS UAT	61d	01/06/23	03/31/23
Summer IREAD-3: TDS UAT	36d	04/04/23	05/23/23
CRS UATs	156d	11/08/22	06/13/23
I AM: CRS UAT & Deployment	107d	01/12/23	06/09/23
ILEARN: CRS UAT & Deployment	136d	11/08/22	05/16/23
IREAD-3: CRS UAT & Deployment	86d	02/14/23	06/13/23
Additional UATs	201d	07/07/22	04/13/23
Secure Browser UAT & Deployment	22d	07/07/22	08/05/22
TIDE UAT Review	26d	08/06/22	09/09/22
TIDE Go Live	13d	09/03/22	09/20/22

Task	Duration	Start Date	End Date
ILEARN Biology: Rescore IDOE UAT	23d	11/08/22	12/08/22
ILEARN Grades 3-8: Rescore IDOE UAT	8d	04/04/23	04/13/23
Psychometrics	153d	06/29/22	01/27/23
Technical Advisory Committees (TAC) - 3 Annually [IDOE and CAI to determine final dates]	153d	06/29/22	01/27/23
I AM	88d	06/29/22	10/28/22
ILEARN and IREAD-3	84d	10/04/22	01/27/23
Annual Technical Reports	99d	07/22/22	12/07/22
I AM: Annual Technical Reports	99d	07/22/22	12/07/22
ILEARN: Annual Technical Reports	30d	08/15/22	09/23/22
Online Test Development and Review	342d	01/13/22	05/05/23
Test Map Construction	58d	07/08/22	09/27/22
I AM: Test Map Construction	39d	07/08/22	08/31/22
ILEARN: Test Map Construction	53d	07/15/22	09/27/22
Practice and Released Items Test Configuration Development	108d	07/23/22	12/20/22
System Readiness Test (SRT): Config Development - Operational Environment	23d	07/23/22	08/23/22
ILEARN Biology ECA and IREAD-3: Practice and Released Items Test Configuration Development	34d	07/23/22	09/07/22
ILEARN: Practice and Released Items Test Configuration Development	108d	07/23/22	12/20/22
I AM: Released Items Repository (RIR) - Configuration Development	14d	08/09/22	08/26/22
Configuration Development and Simulations	342d	01/13/22	05/05/23
I AM: Operational - Configuration Development	105d	08/13/22	01/05/23
Fall and Winter ILEARN Biology ECA: Configuration Development	51d	08/13/22	10/21/22
Spring IREAD-3: Configuration Development	54d	12/06/22	02/17/23
Spring ILEARN Grades 3-8: Configuration Development	285d	01/13/22	02/15/23
Summer IREAD-3: Configuration Development	34d	03/21/23	05/05/23
Scoring and Reporting	194d	11/29/22	08/25/23
Discrepancy Resolution Systems (DRS) and Test Invalidation Windows	174d	11/29/22	07/28/23
Fall ILEARN Biology ECA: DRS and Test Invalidation	24d	11/29/22	12/30/22
Winter ILEARN Biology ECA: DRS and Test Invalidation	24d	02/07/23	03/10/23
Spring IREAD-3: DRS and Test Invalidation	19d	03/07/23	03/31/23
I AM: DRS and Test Invalidation	39d	04/03/23	05/25/23
Spring ILEARN Grades 3-8: DRS and Test Invalidation	29d	04/18/23	05/26/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: DRS and Test Invalidation	34d	04/18/23	06/02/23
Summer IREAD-3: DRS and Test Invalidation	49d	05/23/23	07/28/23

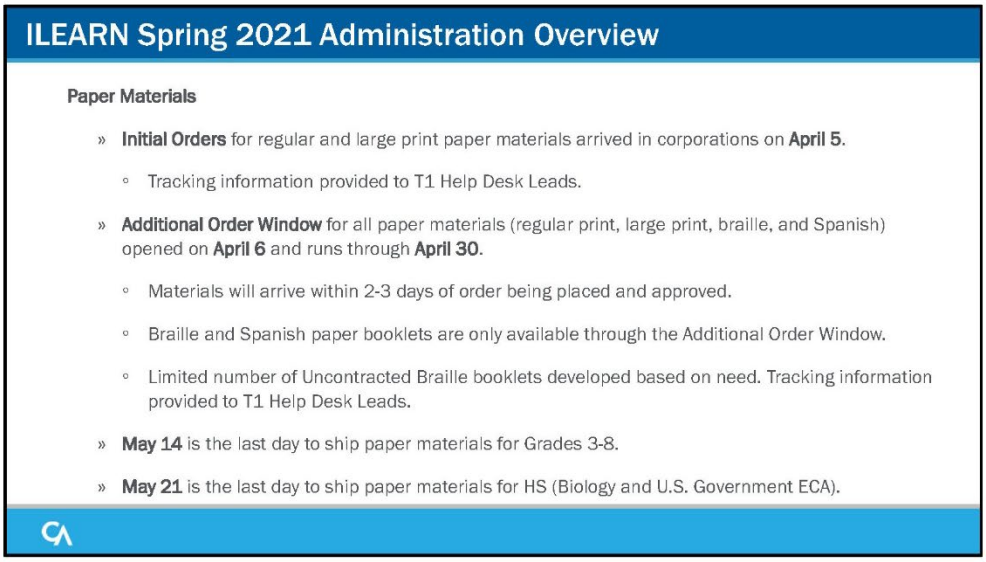
Task	Duration	Start Date	End Date
Handscoring Dates	137d	12/01/22	06/09/23
Fall ILEARN Biology ECA: Handscoring	20d	12/01/22	12/28/22
Winter ILEARN Biology ECA: Handscoring	25d	02/08/23	03/14/23
Spring ILEARN Grades 3-8: Handscoring	38d	04/19/23	06/09/23
Spring ILEARN Biology ECA: Handscoring	33d	04/19/23	06/02/23
Preliminary Student Data File (SDF) Deliveries to IDOE	101d	01/14/23	06/03/23
Fall ILEARN Biology ECA: CAI to post preliminary SDF	1d	01/14/23	01/14/23
Winter ILEARN Biology ECA: CAI to post preliminary SDF	1d	03/23/23	03/23/23
Spring IREAD-3: CAI to post preliminary SDF	1d	03/16/23	03/16/23
Spring ILEARN: CAI to post preliminary SDF	3d	05/09/23	05/11/23
Spring ILEARN Biology and U.S. Government ECA: CAI to post preliminary SDF	3d	05/09/23	05/11/23
Summer IREAD-3: CAI to post preliminary SDF	1d	06/03/23	06/03/23
Final Student Data File (SDF) Deliveries to IDOE	119d	02/28/23	08/11/23
Fall ILEARN Biology ECA: CAI to post final SDF	1d	02/28/23	02/28/23
Spring IREAD-3: CAI to post final SDF	1d	04/17/23	04/17/23
Winter ILEARN Biology ECA: CAI to post final SDF	1d	05/09/23	05/09/23
I AM: CAI to post final SDF	1d	06/02/23	06/02/23
Spring ILEARN Grades 3-8: CAI to post final SDF	5d	06/16/23	06/22/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: CAI to post final SDF	5d	06/16/23	06/22/23
Summer IREAD-3: CAI to post final SDF	1d	08/11/23	08/11/23
Rescore Windows	94d	01/23/23	06/01/23
Fall ILEARN Biology ECA: Rescore Windows	9d	01/23/23	02/02/23
Winter ILEARN Biology ECA: Rescore Windows	9d	04/03/23	04/13/23
Spring ILEARN Grades 3-8: Rescore Windows	14d	05/15/23	06/01/23
Spring ILEARN Biology ECA: Rescore Windows	14d	05/15/23	06/01/23
CRS Scores Go-Live	145d	01/23/23	08/11/23
Preliminary CRS Results	101d	01/23/23	06/12/23
Fall ILEARN Biology ECA: Preliminary CRS Results	1d	01/23/23	01/23/23
Spring IREAD-3: Preliminary CRS Results	1d	03/20/23	03/20/23
Winter ILEARN Biology ECA: Preliminary CRS Results	1d	04/03/23	04/03/23
Spring ILEARN Grades 3-8: Preliminary CRS Results	1d	05/15/23	05/15/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: Preliminary CRS Results	1d	05/15/23	05/15/23
I AM: Preliminary CRS Results	1d	06/08/23	06/08/23

Task	Duration	Start Date	End Date
Summer IREAD-3: Preliminary CRS Results	1d	06/12/23	06/12/23
Final CRS Results	114d	03/07/23	08/11/23
Fall ILEARN Biology ECA: Final CRS Results	1d	03/07/23	03/07/23
Spring IREAD-3: Final CRS Results	1d	04/14/23	04/14/23
Winter ILEARN Biology ECA: Final CRS Results	1d	05/16/23	05/16/23
Spring ILEARN Grades 3-8: Final CRS Results	1d	07/01/23	07/01/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: Final CRS Results	1d	07/01/23	07/01/23
I AM: Final CRS Results (If Applicable)	1d	07/01/23	07/01/23
Summer IREAD-3: Final CRS Results	1d	08/11/23	08/11/23
Data Forensics	118d	03/15/23	08/25/23
Fall ILEARN Biology ECA: CAI to provide data forensics SDFs	1d	03/15/23	03/15/23
Spring IREAD-3: CAI to provide data forensics SDFs	1d	05/02/23	05/02/23
Winter ILEARN Biology ECA: CAI to provide data forensics SDFs	1d	05/24/23	05/24/23
I AM: CAI to provide data forensics SDFs	1d	06/16/23	06/16/23
Spring ILEARN Grades 3-8: CAI to provide data forensics SDFs	5d	06/30/23	07/06/23
Spring ILEARN Biology ECA and Optional U.S. Government ECA: CAI to provide data forensics SDFs	5d	06/30/23	07/06/23
Summer IREAD-3: CAI to provide data forensics SDFs	1d	08/25/23	08/25/23

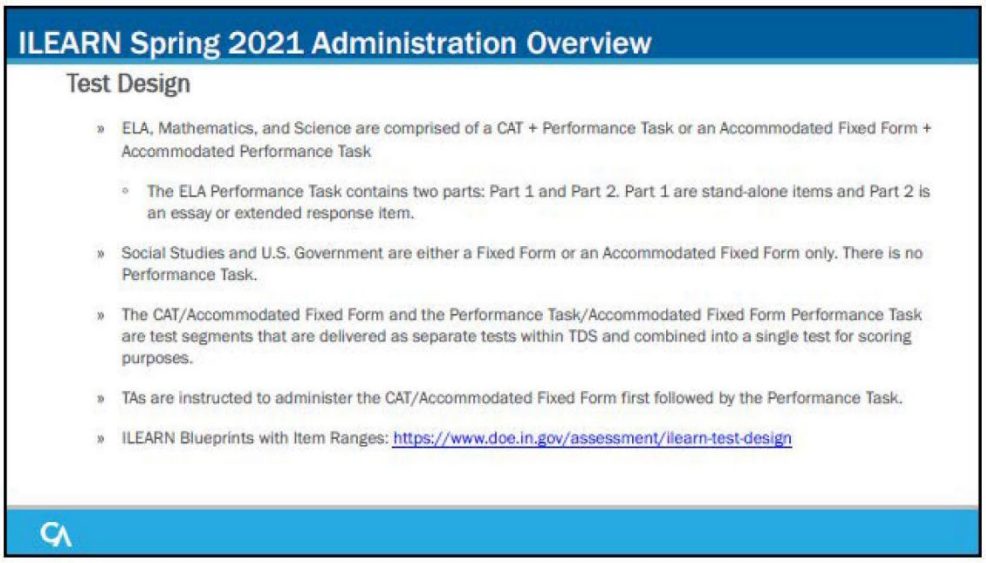
Appendix C: Sample Help Desk Training



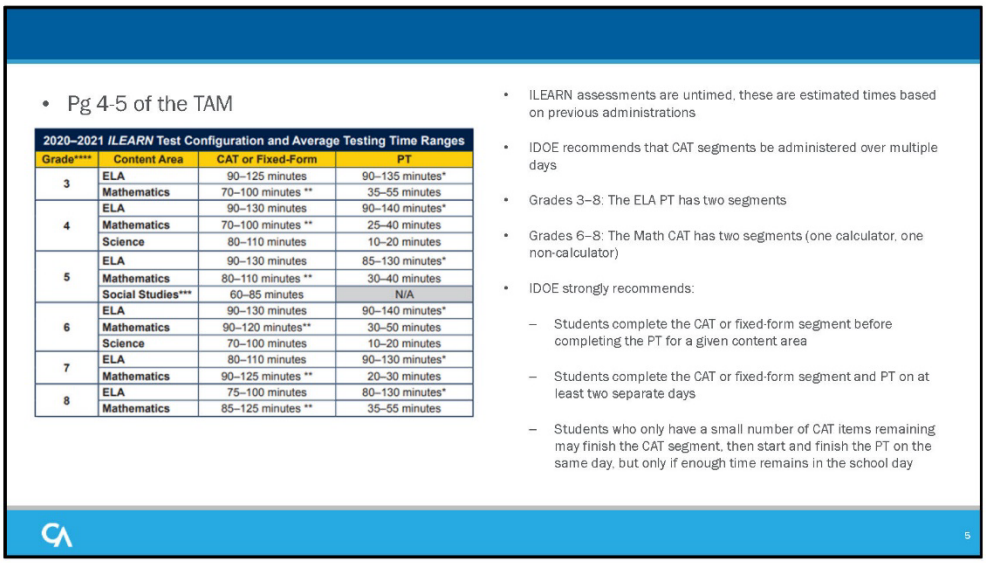
Note that the paper testing windows end one week earlier – grades 3–8 ILEARN is one week shorter than Biology/US Gov't.



Returning materials: They cannot drop materials off with a 3rd party delivery site (ex. CVS) for security reasons.



As an adaptive test there will be a different number of questions for different students when taking the CAT – the Blueprints will show the possible item ranges for students.



- Pg 4-5 of the TAM

2020–2021 *ILEARN* Test Configuration and Average Testing Time Ranges			
Grade****	Content Area	CAT or Fixed-Form	PT
3	ELA	90–125 minutes	90–135 minutes*
	Mathematics	70–100 minutes **	35–55 minutes
4	ELA	90–130 minutes	90–140 minutes*
	Mathematics	70–100 minutes **	25–40 minutes
	Science	80–110 minutes	10–20 minutes
5	ELA	90–130 minutes	85–130 minutes*
	Mathematics	80–110 minutes **	30–40 minutes
	Social Studies***	60–85 minutes	N/A
6	ELA	90–130 minutes	90–140 minutes*
	Mathematics	90–120 minutes**	30–50 minutes
	Science	70–100 minutes	10–20 minutes
7	ELA	80–110 minutes	90–130 minutes*
	Mathematics	90–125 minutes **	20–30 minutes
8	ELA	75–100 minutes	80–130 minutes*
	Mathematics	85–125 minutes **	35–55 minutes

- ILEARN assessments are untimed, these are estimated times based on previous administrations
- IDOE recommends that CAT segments be administered over multiple days
- Grades 3–8: The ELA PT has two segments
- Grades 6–8: The Math CAT has two segments (one calculator, one non-calculator)
- IDOE strongly recommends:
  - Students complete the CAT or fixed-form segment before completing the PT for a given content area
  - Students complete the CAT or fixed-form segment and PT on at least two separate days
  - Students who only have a small number of CAT items remaining may finish the CAT segment, then start and finish the PT on the same day, but only if enough time remains in the school day

5

The only information we can provide on scheduling the ILEARN is this from the TAM. Additional questions (including how many days between tests) should go to IDOE.

Requests to revisit previous segments are irregularities.

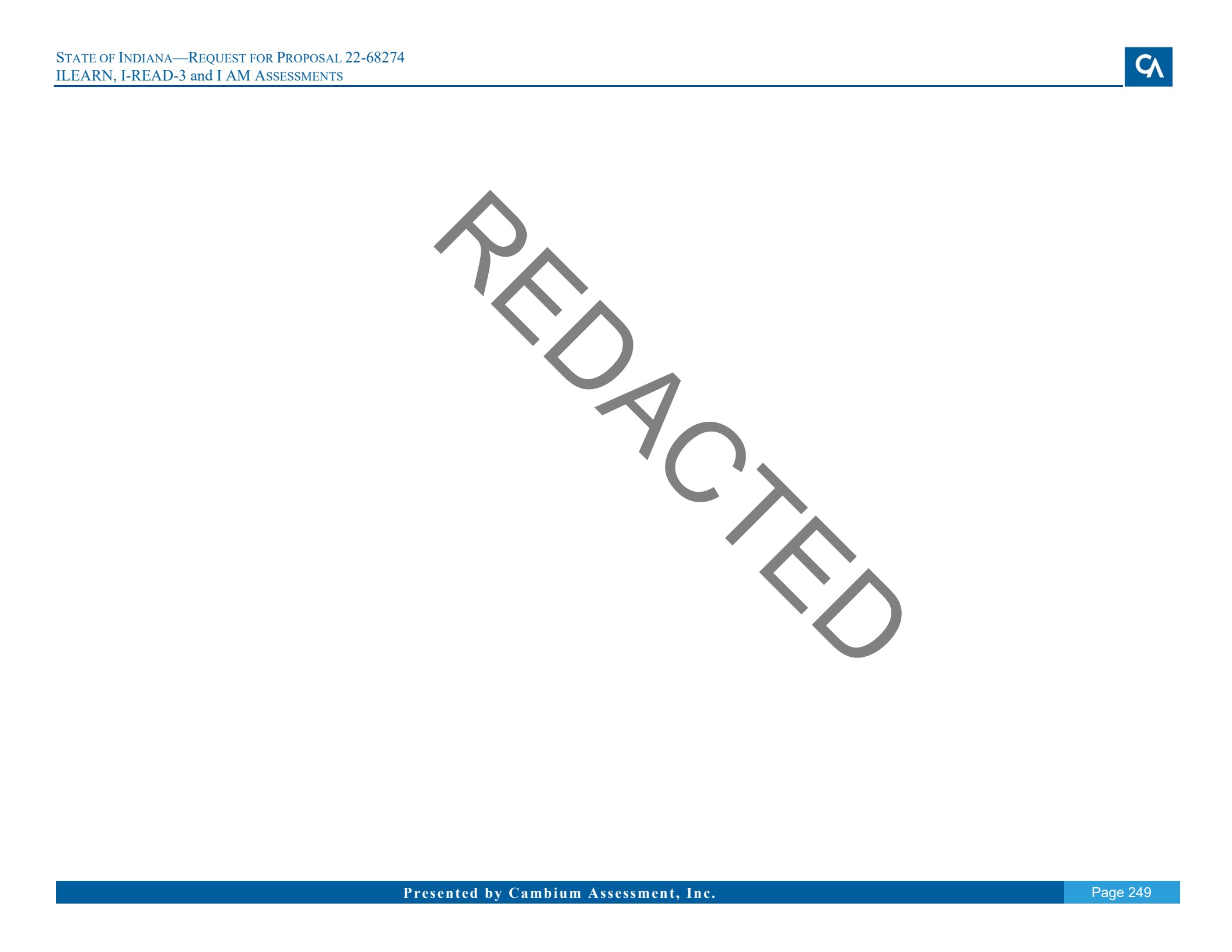
Irregularities: Refer to the Testing Irregularity Report Form in the TAM (pg. 22) and refer to IDOE – Users *must* talk with IDOE *before* they file anything in TIDE.

Appendix D: List of Issues and Outages

REDACTED

REDACTED

REDACTED


REDACTED

Appendix E: Sample Risk Register

Risk ID	Date Entered	Risk	Risk Owner	Description	Functional Area	Likelihood	Impact	Risk Score	Priority	Status	Notes
		Cross-Program									
RSK-CP-XX		IDENTIFIED RISKS - 1		BRIEF DESCRIPTION		RISK LIKELIHOOD	RISK IMPACT	RISK SCORE (Likelihood X Impact) (this section will auto--populate results)	PRIORITY (this section will auto--populate)		MITIGATIONS / WARNINGS / REMEDIES / NOTES
RSK-CP-2								0	LOW		
RSK-CP-3								0	LOW		
RSK-CP-4								0	LOW		
RSK-CP-5								0	LOW		
		ILEARN									
RSK-ILRN-XX		IDENTIFIED RISKS - 0		BRIEF DESCRIPTION		RISK LIKELIHOOD	RISK IMPACT	RISK SCORE (Likelihood X Impact) (this section will auto--populate results)	PRIORITY (this section will auto--populate)		MITIGATIONS / WARNINGS / REMEDIES / NOTES
RSK-ILRN-1								0	LOW		
RSK-ILRN-2								0	LOW		
RSK-ILRN-3								0	LOW		
RSK-ILRN-4								0	LOW		
RSK-ILRN-5								0	LOW		
		IREAD-3									
RSK-IRD-XX		IDENTIFIED RISKS - 0		BRIEF DESCRIPTION		RISK LIKELIHOOD	RISK IMPACT	RISK SCORE (Likelihood X Impact) (this section will auto--populate results)	PRIORITY (this section will auto--populate)		
RSK-IRD-1								0	LOW		
RSK-IRD-2								0	LOW		
RSK-IRD-3								0	LOW		
RSK-IRD-4								0	LOW		
RSK-IRD-5								0	LOW		
RSK-IRD-6								0	LOW		
		IAM									
RSK-IM-XX		IDENTIFIED RISKS - 0		BRIEF DESCRIPTION		RISK LIKELIHOOD	RISK IMPACT	RISK SCORE (Likelihood X Impact) (this section will auto--populate results)	PRIORITY (this section will auto--populate)		
RSK-IM-1								0	LOW		
RSK-IM-2								0	LOW		
RSK-IM-3								0	LOW		
RSK-IM-4								0	LOW		
RSK-IM-5								0	LOW		
RSK-IM-6								0	LOW		
		ISTEP+									
RSK-ISTP-XX		IDENTIFIED RISKS - 0		BRIEF DESCRIPTION		RISK LIKELIHOOD	RISK IMPACT	RISK SCORE (Likelihood X Impact) (this section will auto--populate results)	PRIORITY (this section will auto--populate)		
RSK-ISTP-1								0	LOW		
RSK-ISTP-2								0	LOW		
RSK-ISTP-3								0	LOW		
RSK-ISTP-4								0	LOW		
RSK-ISTP-5								0	LOW		
RSK-ISTP-6								0	LOW		