



NWEA Response to the Nebraska Department of Education

Request for Proposal Number
RFP NDE.GA.ASMT.2016

Due: February 1, 2017

PROPRIETARY - ELECTRONIC COPY

List of Proprietary Information

The following information has been included in the Confidential and Proprietary Volume:

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- Tab 2: Section 3. g Contract Performance (page 24): Additional Contract Performance Information
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NWEA claims the contents of this volume as its proprietary material and may be withheld from public disclosure per Neb. Rev. Stat. §84-712.05

Section 3. b Financial Statements Table 3

Table 3: Fiscally Responsible Representative of Financial or Banking Organization

Bank Name	Key Bank
Account Number	379681088355
Name	Andria Sanchez
Address	1211 SW Fifth Ave, Suite 577 Portland, OR 97204
Telephone Number	(503) 790-7619
Email Address	andria_L_sanchez@keybank.com

Section 3. g Contract Performance

g. Contract Performance

If the bidder or any proposed subcontractor has had a contract terminated for default during the past five (5) years, all such instances must be described as required below. Termination for default is defined as a notice to stop performance delivery due to the bidder's non-performance or poor performance, and the issue was either not litigated due to inaction on the part of the bidder or litigated and such litigation determined the bidder to be in default.

It is mandatory that the bidder submit full details of all termination for default experienced during the past five (5) years, including the other party's name, address and telephone number. The response to this section must present the bidder's position on the matter. The State will evaluate the facts and will score the bidder's proposal accordingly. If no such termination for default has been experienced by the bidder in the past five (5) years, so declare.

Based on the information in our records, no such termination for default has been experienced by NWEA in the past five years. We have had no terminations of state-level contracts in the past five years.

If at any time during the past five (5) years, the bidder has had a contract terminated for convenience, non-performance, non-allocation of funds, or any other reason, describe fully all circumstances surrounding such termination, including the name and address of the other contracting party.

NWEA currently has over 8,700 partners and, because of this volume, does not track early terminations.

Among partners with 100,000 or more students, we have had one termination in the past five years, Clark County School District, 280 Clark Drive, Henderson, NV 89123. Clark County School District, the fifth-largest in the country, has opened a number of RFPs for a comprehensive assessment system since 2011. The awards for those contracts went to Discovery Education in 2012 which was displaced by a second RFP award to HMM in 2014 after Discovery Education's assessment was discontinued. In both cases, the RFP awards also displaced MAP usage in targeted Performance Zones and turnaround high schools (around 18,000 students). Despite various leadership changes and shifting priorities tied to assessment strategy in Clark County, MAP was selected in 2016 in a statewide bid to provide assessments to measure achievement and growth across all Nevada schools for 2016 as part of a statewide Read-by-Grade Three initiative. Washoe County (Reno), the second largest district in Nevada, has been using MAP for eight years so has been able to share its success with MAP for grades K – 10 with Clark County, as have other districts across the state that have years of longitudinal growth and achievement data to help inform their continuous improvement and instructional plans. We are pleased to be working with Clark County again to meet their needs for interim assessments.

Our continued growth is a testament to the value our partners find in our continued partnership. Our high level of retention further demonstrates the support and service we offer to large and complex partners.

Section 3.h Summary of Bidder’s Corporate Experience Table 8

Table 8: Summary Matrix of Similar Projects

Chicago Public Schools	
Time Period of the Project	2008 to Present
Scheduled and Actual Completion Dates	Scheduled and actual completion dates are the same. Most recently completed contract year: July 1, 2015 to June 30, 2016.
Contractor’s Responsibilities	<p>NWEA has been partnering with Chicago Public Schools since 2008, when 100 of the district’s autonomously managed schools utilized MAP assessments for informing instruction and monitoring growth. In 2012, Chicago Public Schools adopted MAP assessments district-wide for grades K – 8, for over 200,000 students in mathematics, reading, and science. Chicago Public Schools uses MAP data for various purposes, including instructional grouping; program placement; monitoring intervention effectiveness monitoring; as growth and status measurements; promotion to the next grade; teacher, principal, school quality ratings; and application for selective high schools and academic programs.</p> <p>In addition to using MAP assessments, Chicago Public Schools is implementing our progress monitoring assessment, Skills Navigator, this school year.</p> <p>Successful implementation of MAP assessments in the third largest district in the country involves an on-site NWEA team, which has been in place since 2012. In addition to the fully dedicated on-site account management team, NWEA supports Chicago Public Schools with the following staff:</p> <ul style="list-style-type: none"> ▪ On-site project management ▪ implementation specialists ▪ professional development consultants <p>NWEA also partners with a third-party consulting firm in Chicago to provide on-site technical support to all Chicago Public Schools.</p> <p>On-site account management strengthens our partnership with Chicago Public Schools, because we can efficiently and fully support Chicago Public Schools central office departments, including:</p> <ul style="list-style-type: none"> ▪ Office of Assessment ▪ School Quality Office ▪ Teaching and Learning ▪ Office of Access and Enrollment ▪ Office of Diverse Learners <p>This level of hands-on support ensures NWEA remains aligned with the district’s goals and initiatives.</p> <p>On-site project management ensures contractual obligations are met and any risks are mitigated. We provide ongoing project management around our responsibilities to Chicago Public Schools, including:</p> <p>Planning</p> <ul style="list-style-type: none"> ▪ Review the statement of work and contractual responsibilities of both parties with the Chicago Public Schools project manager.

Table 8: Summary Matrix of Similar Projects

Chicago Public Schools	
	<ul style="list-style-type: none"> ▪ Maintain project communications through the Chicago Public Schools project manager. ▪ Establish documentation and procedural standards for deliverables by providing templates. ▪ Prepare and maintain the schedule, which lists the activities, tasks, assignments, milestones and estimates. <p>Project Tracking and Reporting</p> <ul style="list-style-type: none"> ▪ Review project tasks, schedules, and resources and make changes or additions, as appropriate. ▪ Measure and evaluate progress against the project schedule with the Chicago Public Schools project manager. ▪ Working with the Chicago Public Schools project manager to address and resolve deviations from the schedule. ▪ Conducting regularly scheduled project status meetings and/or conference calls. ▪ Preparing and submitting bi-weekly status reports to the Chicago Public Schools project manager. ▪ Administering the Project Change Control Procedure with the Chicago Public Schools project manager. ▪ Coordinating and managing the activities of NWEA project personnel. <p>Implementation specialists work with every school in the district to help them understand the program and how to administer MAP assessments. CPS is also currently administering a pilot of our Skills Navigator product.</p> <p>NWEA professional development consultants are on the ground in Chicago Public Schools, fully dedicated to work with networks and schools to understand MAP reports, data, and application of the data. We provide a built-in on-site team of support from NWEA, which has led to a successful partnership for nine years.</p>
Contractor’s Responsibilities	<p>Name: Chicago Public Schools Contact Person: Kelly K. Mina, Assessment Specialist Telephone Number: (773) 553-1572 Facsimile Number: (773) 553-2421 Email Address: kmcbride@cps.edu</p>
Prime Contractor or Subcontractor	Prime Contractor
Originally Scheduled Completion Date and Budget	<p>Most recently completed contract year anticipated dates: July 1, 2015 to June 30, 2016</p> <p>Most recently completed contract year anticipated budget: \$2.7 million</p>
Actual (or currently planned) Completion Date and Actual (or currently planned) Budget	<p>Most recently completed contract year actual dates: July 1, 2015 to June 30, 2016</p> <p>Most recently completed contract year actual budget: \$2.7 million</p>

Table 8: Summary Matrix of Similar Projects

Chicago Public Schools	
Bureau of Indian Education	
Time Period of the Project	2009 to Present
Scheduled and Actual Completion Dates	Scheduled and actual completion dates are the same. Most recently completed contract year: September 29, 2015 to September 28, 2016.
NWEA Responsibilities	<p>NWEA is responsible for providing interim assessments in mathematics, reading, language usage, and science, plus related product support to all Bureau of Indian Education-funded schools who choose to participate in the contract/program.</p> <p>NWEA is responsible for providing full-day professional development services to Bureau of Indian Education (BIE) schools who request such services. The NWEA account manager and program manager maintain regular communication with BIE’s Contracting Officer’s Representative (COR) and BIE leadership. Our account manager maintains regular communication with individual BIE-funded schools in the form of webinars, emails, and phone calls, to promote full use of the contract’s offerings.</p> <p>NWEA provides standard reports to the BIE-funded schools; additionally, aggregate data files and a related report are made available to BIE leadership after each testing window. Initially, the contract included an Evaluation Study completed by the NWEA Research Department. Federal funding restraints resulted in that aspect eventually being removed from the contract.</p> <p>The contract is for five years, made up of a base year and four option years. At the end of each option year, we work through whether any money remains and the government de-obligates funds that remain. In May 2014, based on our 2009-2014 contract review with BIE, NWEA was given a grade of “Excellent” in the areas of Quality, Schedule, and Cost Control, and “Very Good” in the areas of Business Relations and Management of Key Personnel.</p>
Customer information	<p>Name: Bureau of Indian Education</p> <p>Contact Person: Jeffrey Hamley, Ed.D., Associate Deputy Director</p> <p>Telephone Number: (202) 208-2352</p> <p>Facsimile Number: (202) 273-0030</p> <p>Email Address: jeffrey.hamley@bie.edu</p>
Prime Contractor or Subcontractor	Prime contractor
Originally Scheduled Completion Date and Budget	<p>Most recently completed contract year anticipated dates: September 29, 2015 to September 28, 2016</p> <p>Most recently completed contract year anticipated budget: \$1.2 million</p>
Actual (or currently planned) Completion Date and Actual (or currently planned) Budget	<p>Most recently completed contract year actual dates: September 29, 2015 to September 28, 2016</p> <p>Most recently completed contract year actual budget: \$1.2 million</p>

Section 3.h Summary of Bidder's Corporate Experience Table 10

Table 10: Work Performed by CETE

Project	Time Period & Budget	Customer Contact
West Virginia State Alternate Assessment	04/15/15-07/30/17 \$1,070,341	West Virginia Department of Education Melissa Gholson, Assessment Coordinator Phone: (304) 558-2546 Fax: (304) 558-1613 F mgholson@k12.wv.us
Kansas State Alternate Assessment	06/06/14-12/31/17 \$1,282,590	Kansas State Department of Education Debbie Matthews, Educational Program Consultant Phone: (785) 296-0916 Fax: (785) 291-3791 dmatthews@ksde.org
Missouri State Alternate Assessment	08/01/15-06/30/17 \$2,407,784	Missouri Department of Elementary and Secondary Education Shaun Bates, Director of Assessment Phone: (573) 751-2857 Fax: (573) 526-0812 shaun.bates@dese.mo.gov

Section A 5.g. Data

g. Data

All assessments, including the interim system, must use the NDE Student ID as the link for demographic data in the Nebraska Student and Staff Record System (NSSRS) and assessment results. The NSSRS is the current official source of all student and staff information for the NDE and maintains the longitudinal data on all students and all assessments. NDE will provide a complete set of demographic data for each student at the point-of-time of assessment. The proposal should describe the process and security measures used for data transfer to and from NSSRS. The proposal should describe a process that can be used to link online assessments to the appropriate student information via the NDE Student ID. The NSSRS is scheduled for deprecation at the end of the 2017-18 year and will be replaced by the Ed Fi® based ADVISER data system.

In addition to our response to this requirement included in our Technical Proposal Volume, NWEA is considering a pilot to enable a deeper integration with SIS via Ed-Fi. The SIS will be integrated with Ed-Fi software, which, in turn, will expose REST APIs to propagate roster data into our platform. The intent is to leverage existing processes and interaction between the school administrators and the SIS for rostering. Figure 19 shows the proposed SIS integrated platform.

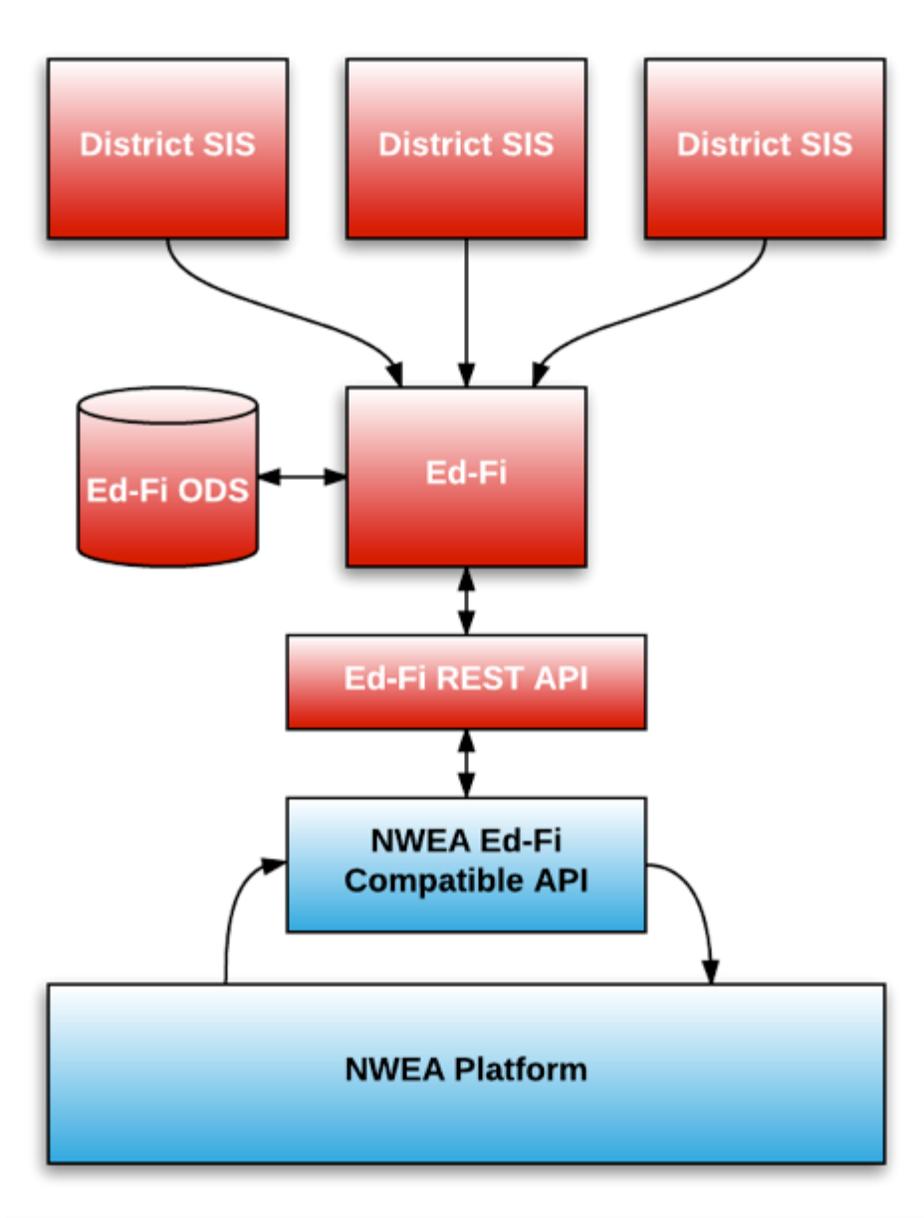


Figure 19: Proposed SIS Integrated Platform. NWEA is considering a pilot to enable a deeper integration with student information systems (SIS) via Ed-Fi. The SIS will be integrated with Ed-Fi software, which will expose REST APIs to propagate roster data into the platform

Section B. 2.b. Item Bank Access

b. The system must provide NDE electronic access to each item (text and graphics) as well as pertinent information for each item, including history (placement, item statistics for all administrations of the item, editing, and context). The proposal should describe the process for meeting these requirements.

The NWEA Item Management system will allow electronic web-based access when the Item Management system is available. This access will allow NDE rights-based access to view all item content, item interactions, scoring, metadata, alignments, and media associated to items.

The NWEA Item Management system provides an interface to view additional information about items including, but not limited to the following:

- History of item’s version – This includes easy access to view an item as it was at any point in its development cycle (see Figure 30)
- Item content and student preview (see Figures 31 and 32)
- Item statistics
- Item Metadata (see Figure 33)
- Where the items have been used and review status
- Any associated stimuli, including passages, audio, or images.

State	User	Notes	Date	Item Version	View
Content QC	[Redacted]		2015-07-01T11:15:01.453	34	View
Content QC Review	[Redacted]		2015-07-01T11:22:04.903	34	View
Content QC Review	[Redacted]		2015-07-30T13:50:49.173	35	View
Alt Tag Claimed	[Redacted]		2015-07-31T08:45:30.747	36	View
Alt Tag Review Unclaimed	[Redacted]		2015-09-08T10:44:26.937	36	View
Alt Tag Review Claimed	[Redacted]		2015-09-08T14:57:08.22	36	View
Browser Validation Claimed	[Redacted]		2015-09-08T14:58:12.123	36	View
Publishing Approved	[Redacted]	Item Metadata Modified	2015-10-11T10:30:24.313	37	View

1 - 9 of 9 It

Figure 30: Viewing Item History. Each stage of development is tracked by the system (1), along with the user who performed the action (2), any notes, and the time and date stamp (3). Each version of the item be opened and viewed using the “View” button.

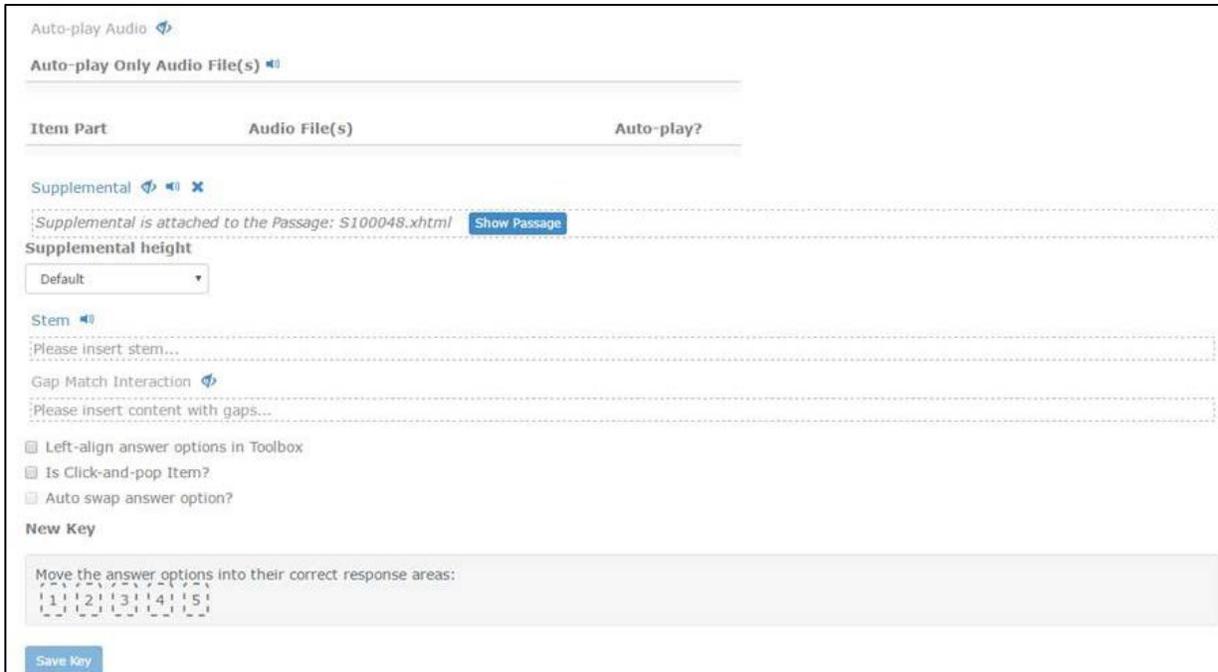


Figure 31: Editing and Viewing Item Content. The NWEA Item Editor provides a WYSIWYG (“what you see is what you get”) interface. This allows item writers to edit content, layout, and identify key(s) easily.

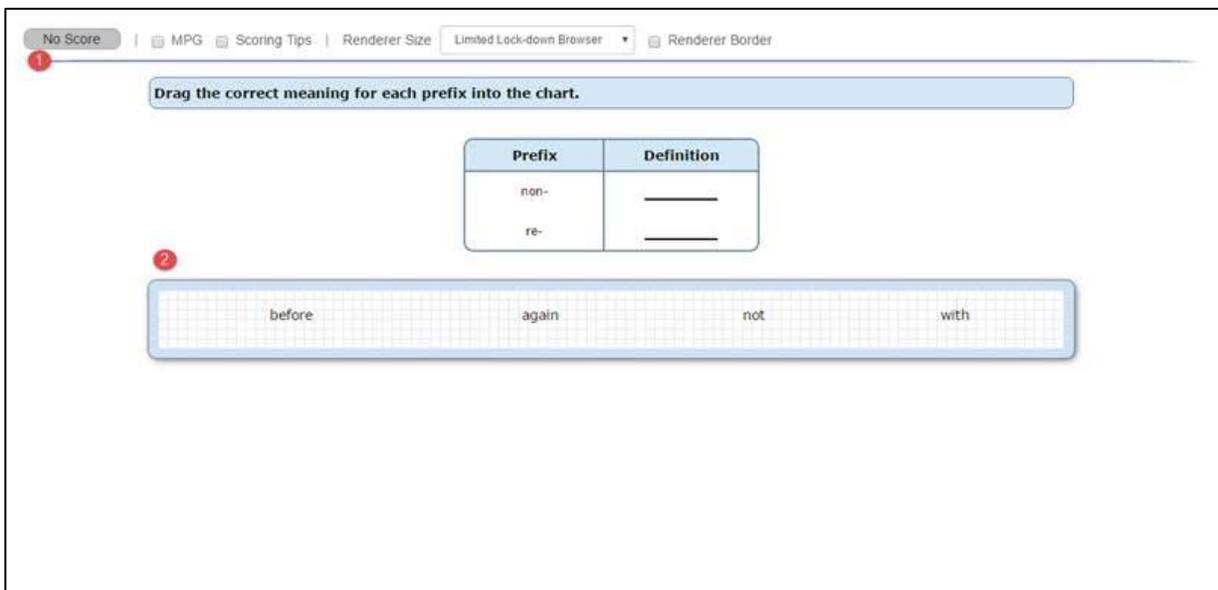


Figure 32: Viewing the Item. The student-facing rendered version of the item provides a way to identify whether the selected answer is correct (1) and a way to interact with the item and play any audio associated to the item (2).

Edit	Item Metadata	Element Metadata	Alignment	Order Spec	
	Item Code: 1022544	Vs: 0	Revision:		Content Developer:
	Item Status: Active				Item Owner: Not implemented
	Scale: Reading				Item Type: Select an item type...
	Content Area: Sel				Scored: No
	Grade: Grade 02				*Non-Scored Item Type: Select Non-Scored ...
	Blooms Cognitive Level: Understanding				Allowable Tools: Sel
	Preliminary Cognitive Level: Select Level...				Calculator: None
	Depth of Knowledge: 2				Product Use: Sample x
	Preliminary DOK: Select a depth of kn...				Excluded Market: None x
	RIT: 191				Reason: Sel
	Provisional RIT:				Included Market: None x
	Language: English				Reason: Sel
	Legal Ownership: NWEA Only				Cardinality: Dichotomous
	Unit of Measure: Sel				Test Grade Start: 2
	Permission Status:				Test Grade End: 5
	Braille Suitability: Select a Braille...				Stimulus Code: Select a stimulus co...
	Large Print Suitability: Select a Print...				Item Sequence:
	Item Description:				Item Size Exception: Not Approved

Figure 33: Item Metadata. This image shows only an excerpted sample of item metadata we track.

Subcontractors' Summary of Corporate Experience

In addition to the response that NWEA™ has supplied in our technical proposal, for ease of review, we are providing this information requested for our subcontractors in this appendix. These companies have been chosen based on the Nebraska Department of Education's (NDE's) requirements to augment the capabilities provided by NWEA technology and teams of psychometricians, project managers, content developers and support services.

To best meet Nebraska's needs, NWEA has included the subcontractors listed in Table 1 as part of our bid:

Table 1: NWEA Subcontractors for Nebraska Statewide Assessment Program

Name	Tasks
American Printing House for the Blind	Braille services and/or products.
Caveon, LLC	Data Forensics – Services to provide real time support through internet and social media monitoring (Web Patrol) to identify unauthorized disclosures and disclosers of sensitive test information. End-of-testing support includes monitoring test data for anomalies and response patterns that indicate test frauds.
Certica Solutions, Inc.	Provision of a commercially available formative assessment software solution (called TestWiz™) and a commercially available formative assessment item bank (called Navigate™).
Center for Educational Testing and Evaluation (CETE), on behalf of The University of Kansas Center for Research (KUCR)	<ul style="list-style-type: none"> ▪ Deliver Dynamic Learning Maps (DLM) Alternate Assessment System in English language arts, mathematics, and science ▪ Provide project management for NDE's alternate assessments ▪ Provide psychometric support via the NDE TAC and state assessment advisory committee. ▪ Conduct annual trainings for district staff ▪ Conduct on-site training for test administrators (Year One) ▪ Develop and deliver a training video on using and interpreting score reports ▪ Provide a dedicated toll-free service desk number for Nebraska educators ▪ Develop a customized individual student score report and a translated version of that report ▪ Conduct a standards validation study (summer 2018) ▪ Provide materials and support for an independent alignment study to be conducted by an organization hired by NDE ▪ Develop up to two assessment literacy modules specific to formative practices for students with significant cognitive disabilities ▪ Collaborate with NWEA to identify transition points between DLM maps and NWEA learning progressions
Educational Data Systems (EDS)	Paper and pencil assessment services

Table 1: NWEA Subcontractors for Nebraska Statewide Assessment Program

Name	Tasks
Education Strategy Consulting	Web-based interactive reporting of aggregated and interim assessment results
Responsive Translation Services	Translation services
Schlechty Center	Educational leadership training as a complement to NWEA professional development

American Print House for the Blind

The American Printing House offers Braille translation and proofreading services and production in all acceptable Braille formats in current use across the United States:

- English Braille, American Edition (EBAE) contracted
- English Braille, American Edition, uncontracted
- Unified English Braille (UEB), contracted
- Unified English Braille, uncontracted
- Unified English Braille with Nemeth, contracted
- Unified English Braille with Nemeth, uncontracted

We have translated and produced hardcopy Braille for the Nebraska State Accountability (NeSA) tests for Reading, Mathematics, and Science since 2009 as a subcontractor with DRC. The work is completed within eight to twelve weeks.

Data Recognition Corporation (DRC)
 John Born
 13490 Bass Lake Road
 Maple Grove, MN 55311
 (763) 268-2290

We regularly provide about 1,000 unique Braille tests every year for DRC, Pearson, ACT, College Board, Measured Progress, Questar, and ETS. We are also the primary Braille contractor for the Smarter Balanced Assessment Consortium (SBAC), providing Braille online translation for all formats listed above since 2014.

Please see Table 2 for American Printing House for the Blind’s references.

Table 2: American Printing House for the Blind References

Reference Name and Agency	Contact Information
Corey Fauble, Pearson	Address: 19500 Bulverde Road, Suite 201 San Antonio, TX 78529 Phone: (210) 339-5851
Jim McMann, Questar	Address: 14720 Energy Way Apple Valley, MN 55124

Table 2: American Printing House for the Blind References

Reference Name and Agency	Contact Information
Cindy Knoop, ACT	Address: 500 ACT Drive Iowa City, IA 52243 Phone: (319) 331-9481
Trisha Klein, SBAC	Phone: (802) 503-2347

Caveon

Caveon offers data forensics support, services to provide real time support through internet and social media monitoring (Web Patrol) to identify unauthorized disclosures and disclosers of sensitive test information. End-of-testing support includes monitoring test data for anomalies and response patterns that indicate test frauds.

Table 3 includes evidence of Caveon’s experience.

Table 3: Caveon Experience

Contractor or Subcontractor	Responsibilities	Completion Dates
Subcontractor to both NCS Pearson and Questar Assessment to the State of Mississippi	Data Forensics, Web Patrol, Incidence Response planning and management as well as other services to the Mississippi Department of Education since 2006. Under the current scope of work, as a subcontractor, Caveon provides data forensics analyses for grades 3-8 and high school ELA, math, and science testing during winter and spring administrations and web patrol services for English language arts, mathematics, and end-of-course testing during spring administrations.	Caveon has provided all deliverables for data forensics and web patrol within identified windows or dates for completion.
Subcontractor to NCS Pearson to the State of Maryland	Caveon has provided Data Forensics, Web Patrol, security audits, and handbooks to the Maryland State Department of Education since 2015. Under the current scope of work, as a subcontractor, Caveon provides data forensics analyses for grades 5 and 8 science and web patrol services for grades 5 and 8 science testing during spring administrations.	Caveon has provided all deliverables for data forensics and web patrol within identified windows or dates for completion.
Subcontractor to NCS Pearson to the State of Kentucky	Caveon has provided Data Forensics and a security audit to the Kentucky State Department of Education since 2013. Under the current scope of work, as a subcontractor, Caveon provides data forensics analyses for grades 5 and 8 science during spring administrations	Caveon has provided all deliverables for data forensics and web patrol within identified windows or dates for completion.

Caveon Reference Contact Information:

Mississippi:

Walt Drane, Ed.S., Executive Director, Assessment and Accountability
Division of Research and Development
Mississippi Department of Education
P.O. Box 771
Jackson, MS 39205-0771
Telephone: 601-359-3052
Fax: 601-359-2471
Email: WDrane@mdek12.org

Kentucky:

Roger W. Ervin
Kentucky Department of Education
Office of Assessment and Accountability
17th floor, Capital Plaza Tower
500 Mero Street
Frankfort, KY 40601
Telephone: 502-564-2256 ext. 4719
Fax: 502-564-7749
Email: roger.ervin@education.ky.gov

Maryland:

Dr. Tamara L. Lewis
Education Program Specialist/State Test Security Officer
Maryland State Department of Education
Assessment Branch
200 W. Baltimore Street
Baltimore, MD 21201-2595
Telephone: 410-767-0074
Fax: 410-333-0052
Email: tamara.lewis@maryland.gov

Certica

Certica Solutions provides the TestWiz solution to a large number of local education agencies and private K – 12 schools as a hosted Software-as-a-Service (SaaS) offering and a significant proportion of

those TestWiz customers also use the Navigate Item Bank as part of their formative/interim assessment program.

The TestWiz solution has been continuously provided in this SaaS manner for over a decade and most customers have been users of TestWiz and Navigate for at least three years and many customers have been users for upwards of seven to ten years.

Certica’s responsibilities and services associated with the TestWiz and Navigate SaaS offering to its many customers are almost identical to the needs identified in the RFP and the services being proposed herein with respect to the Interim Assessment System.

The profile of the TestWiz and Navigate customer base at Certica Solutions is very much in-line with the profile of districts in the state of Nebraska, with a large number of distinct customers where a significant proportion are smaller such as the smaller districts in Nebraska, but with a reasonable number of larger customers such as the large districts in Nebraska. Please see Table 4 for examples of larger customers of TestWiz and Navigate.

Table 4: Certica Experience

Agency	Project Description
Imagine Schools (Charter Management Organization) – approximately 35,000 students in 65 schools across 13 states	Uses TestWiz and Navigate for formative/interim assessment purposes and also loads standardized and state assessment results into TestWiz for multi-assessment and longitudinal analysis.
Lynn Public Schools – approximately 15,000 students in Massachusetts	Uses TestWiz and Navigate for a comprehensive formative assessment program.
Brockton Public Schools – approximately 17,000 students in Massachusetts	Uses TestWiz for formative assessment purposes and also loads standardized and state assessment results into TestWiz for multi-assessment and longitudinal analysis.

CETE (DLM Alternate Assessment)

The following describe the key responsibilities for all contracts performed by CETE as the provider of the Dynamic Learning Maps Alternate Assessment.

- Deliver year-end summative assessments.
- Provide a customized, state determined spring assessment window within a standard window.
- Deliver instructionally embedded (interim) assessments to support classroom instruction.
- Provide practice activities and released testlets to allow students and test administrators experience in KITE Client.
- Provide assessment administration resources including district and test administrator training and user manuals for role-based activities and the KITE system.
- Provide professional development modules to support instruction, in self-directed formats that are available 24 hours a day, 7 days per week to educators through an online portal accessed via the DLM website and in facilitated formats that are for use in face-to-face training or as part of local professional learning communities.

-
- Develop items for test pools for English language arts, mathematics, and science.
 - Conduct external reviews for content and bias on new items.
 - Analyze field test items to determine which ones can be added into test pools.
 - Calculate and report scores for English language arts, mathematics, and science.
 - Provide annual updates to the Technical Manual.
 - Provide access to reports and data extracts to support state-, district-, and building-level users manage data, student access, and classroom instruction.
 - Conduct annual meeting between DLM staff and customer staff to plan and respond to changes for the coming year.
 - Designate a primary point of contact for customer communications.
 - Provide an easy-to-use online interface for district and building staff to manage user and student data, including uploads and changes.
 - Provide a toll-free number and email address for state- and district-level staff to Tier I and Tier II Service Desk support.
 - Provide online access to allow educators to input information needed to allow personalized administration by provision of necessary accessibility tools and test accommodations and for determining appropriate initial placement of students with significant cognitive disabilities into the OLM Assessments.

Table 5 includes reference and experience information for CETE/DLM.

Table 5: CETE/DLM Experience and References

Agency and Project	Project Description	Time Period and Budget	Reference Contact Information
West Virginia State Alternate Assessment	All work was completed by CETE as the prime contractor. <ul style="list-style-type: none"> ▪ Deliver DLM Alternate Assessments in English language arts (ELA) and mathematics to approximately 2,500 students and 850 in science. 	04/15/15-07/30/17 \$1,070,341	West Virginia Department of Education Melissa Gholson, Assessment Coordinator Phone: (304) 558-2546 Fax: (304) 558-1613 F Email: mgholson@k12.wv.us
Kansas State Alternate Assessment	All work was completed by CETE as the prime contractor. <ul style="list-style-type: none"> ▪ Deliver DLM Alternate Assessments in English language arts and mathematics to approximately 2,900 students and 1,150 students in science. 	06/06/14-12/31/17 \$1,282,590	Kansas State Department of Education Debbie Matthews, Educational Program Consultant Phone: (785) 296-0916 Fax: (785) 291-3791 Email: dmatthews@ksde.org
Missouri State Alternate Assessment	All work was completed by CETE as the prime contractor. <ul style="list-style-type: none"> ▪ Deliver DLM Alternate Assessments in English language arts and mathematics to approximately 7,600 students and 4,600 students in science. ▪ Deliver instructionally embedded assessments to support classroom instruction. ▪ Provide full program management including monitoring timelines and deliverables. ▪ Provide full support for data management necessary to populate educator and student data in KITE Educator Portal. ▪ Provide a customized supplement to the DLM technical manual. 	08/01/15-06/30/17 \$2,407,784	Missouri Department of Elementary and Secondary Education Shaun Bates, Director of Assessment Phone: (573) 751-2857 Fax: (573) 526-0812 Email: shaun.bates@dese.mo.gov

Educational Data Systems

Educational Data Systems (EDS) will provide paper-and-pencil assessment services as part of this proposed project.

Table 6 provides a summary of Educational Data Systems' three previous projects similar to the Nebraska project in size, scope, and complexity.

Table 6: EDS Experience and References

Agency and Project	Project Description	Time Period and Budget	Reference Contact Information
<p>California English Language Development Test (CELDT) Assessment Management and Processing</p>	<p>California Department of Education (CDE)</p> <ul style="list-style-type: none"> ▪ Serve as primary contact with State Department personnel ▪ Manage, oversee, and approve the work and budgets of nine subcontractors ▪ Manage the detailed schedule and review and approval process for all deliverables ▪ Manage monthly, weekly and daily communication processes ▪ Prepare reports for and participate in technical advisory group meetings ▪ Manage test item development, review and field test processes ▪ Develop and manage online materials ordering system that meets state style-guide requirements ▪ Manage data file transfers to and from the state data management system ▪ Develop camera-ready test documents and ancillary materials that meet state style-guide requirements ▪ Manage printing of all color-coded (by grade span) student answer books, test administration manuals, and other ancillary materials, including Braille and large-print versions ▪ Ensure unique identification number is printed on all student answer documents ▪ Prepare pdf versions of test administration manuals and post on program Web site ▪ Produce CD-ROM with special versions of tests; prepare audio CD ▪ Print approximately 2 million regular color-coded test documents, with 10 percent special edition documents ▪ Ensure secure handling at all stages of test document preparation and shipping ▪ Package and ship all test document to required locations ▪ Arrange for pre-paid return shipping of test documents ▪ Create and execute secure receiving and check-in processes ▪ Cut and prepare test books for scanning ▪ Reconcile secure inventory ▪ Scan all scannable documents 	<p>Scheduled Time Period: February 5, 2012 through December 31, 2015</p> <p>Actual Time Period: February 5, 2012 through December 31, 2018 (Contract was extended through amendments.)</p> <p>Original Budget: \$29,306,168.25</p> <p>Actual Budget: \$50,435,430.23</p>	<p>California Department of Education (CDE)</p> <p>Contact Person: Traci M. Albee, Education Research & Evaluation Administrator I, English Language Proficiency and Spanish Assessments Office</p> <p>Phone: (916) 319-0569</p> <p>Fax: (916) 319-0967</p> <p>Email: talbee@cde.ca.gov</p>

Table 6: EDS Experience and References

Agency and Project	Project Description	Time Period and Budget	Reference Contact Information
	<ul style="list-style-type: none"> ▪ Scan all test documents capturing images as necessary ▪ Run multiple checks for validity of scanned data ▪ Manage the secure scoring process for constructed response items ▪ Edit and merge data files using unique student identifier as the merge key ▪ Maintain strict confidentiality of all student information ▪ Score all student records using a parallel-processing system to ensure accuracy ▪ Program and process student reports ▪ Program and process school, district and summary reports ▪ Print reports, including student reports ▪ Ship reports to LEAs ▪ Prepare electronic report files ▪ Prepare score data files in required format for website, and load the data files ▪ Pack test materials for long term storage at secure warehouse ▪ Manage a “re-score” process that includes retrieval of stored test documents ▪ Secure destruction of materials ▪ Prepare and print annual Technical Reports that summarize all test preparation, administration, scanning, scoring and reporting processes 		
<p>California High School Proficiency Examination (CHSPE) Test Processing</p>	<p>Serve as subcontractor to Sacramento County Office of Education (SCOE) for their contract with State Department of Education</p> <ul style="list-style-type: none"> ▪ Manage the detailed schedule and review process ▪ Create, manage and update Web site registration process ▪ Develop, manage, and update operations database ▪ Print pre-ID labels, test booklet labels, and test direction labels at EDS and ▪ Ship printed materials ▪ Arrange for pre-paid return shipping of test materials to EDS ▪ Create and execute secure receiving and check-in processes 	<p>Scheduled Time Period: July 1, 2014 through June 30, 2018 Actual Time Period: July 1, 2014 through June 30, 2018 (Contract was extended)</p>	<p>Client: Sacramento County Office of Education (SCOE) Contact Person: Rachel Perry, Director, Center for Student Assessment and Program Accountability Phone: (916) 228-2669 Fax: 916-228-2665 Email: rperry@scoe.net</p>

Table 6: EDS Experience and References

Agency and Project	Project Description	Time Period and Budget	Reference Contact Information
	<ul style="list-style-type: none"> ▪ Cut and prepare test books for scanning ▪ Reconcile secure inventory ▪ Scan all scannable documents ▪ Run multiple checks for validity of scanned data ▪ Edit and merge data files ▪ Maintain strict confidentiality of all student information ▪ Program and process student reports ▪ Print student reports ▪ Ship reports to SCOE ▪ Prepare score data files in required format for Web site ▪ Pack test materials for long term storage at secure warehouse ▪ Create a “re-score” process that includes retrieval of stored test documents ▪ Secure destruction of materials 	through amendments) Original Budget: \$738,365.88 Actual Budget: \$738,365.88	
Los Angeles Unified School District (LAUSD) Physical Fitness Test (PFT) Test Processing	Prime contractor to LAUSD <ul style="list-style-type: none"> ▪ Serve as primary contact with the district’s assessment department ▪ Develop student identification file layout for pre-printing documents ▪ Receive electronic student data file, check data for errors, edit data as necessary to correct errors ▪ Design a customized scannable student answer document that is color coded, contains the test year, and identifies the client ▪ Pre-print identification and demographic information on approximately 125,000 student answer documents ▪ Print school header documents ▪ Package test documents by school in clearly marked packages ▪ Ship test documents to designated location ▪ Receive and check in answer documents, reconciling any issues ▪ Scan all student and school header documents 	Time Period: Annual contract renewal through either district RFP or purchase order (renewal in progress) Original Budget: \$70,200.00 Actual Budget: \$69,684.98	Los Angeles Unified School District (LAUSD) Contact Person: Jim Overturf, Testing Operations Manager, Student Testing Branch Phone: (213) 241-8341 Fax:)213) 241-8461 Email: james.overturf@lausd.net

Table 6: EDS Experience and References

Agency and Project	Project Description	Time Period and Budget	Reference Contact Information
	<ul style="list-style-type: none">▪ Run multiple checks for validity of scanned data▪ Work with district to correct invalid data▪ Edit data files▪ Merge multiple data files into one fully “cleaned” data file to be used for reporting▪ Maintain strict confidentiality of all student information▪ Prepare and print custom student, school and district reports▪ Prepare a data file in the required format Submit data file to state		

Education Strategy Consulting (ESC)

Education Strategy Consulting (ESC) is an educational consulting firm that conducts data preparation, analysis, and visualization necessary for the meaningful measurement and exploration of student achievement. ESC works with K – 12 school districts and states to provide longitudinal performance analytics. Clients use ESC services to support their business intelligence needs by transforming data into practical and usable information. ESC’s web-based, interactive data displays transform otherwise unwieldy big data in accessible content for a wide range of users—state agencies, district administration, principals, teachers and parents. Current and past clients include the Los Angeles Unified School District, Newark Charter School Fund, the Walton Family Foundation (supporting work in Arizona, Memphis, Atlanta, Gwinnett, Cobb, Fulton, DeKalb), and the Elgin Foundation (supporting work in Kentucky using state summative and NWEA interim assessments).

ESC’s work with the Walton Family Foundation on the SQM project is of similar size and scope to the proposed work in Nebraska.

The SQM project was designed to assess school quality in two dimensions – academic value-added and absolute attainment. ESC provides student-level, value-added analyses for all schools, both charter and district, in Los Angeles, Newark, Memphis, Phoenix, and Atlanta. The SQM project presents school-level academic results in a four-quadrant, interactive graphic interface, which allows various comparisons of the relative academic quality of schools in a city. As an integral partner in the project, ESC is responsible for the programming and plotting of results for all of Walton Family Foundation (WFF) investment sites across the country. The information from the SQM project is used to inform the foundation staff, board, and other education reform partners as to the relative performance of schools in these cities. In some cases, this information is made publicly available through the district or state involved in the project. Table 7 details ESC’s work on this project, and provides reference contact information.

Table 7: ESC Experience: Walton Family Foundation

Project Description	Time Period and Budget	Reference Contact Information
<ul style="list-style-type: none"> ▪ The workflow for this project is conducted annually and includes the following steps, check-points, and deliverables: ▪ Data Pickup at Multiple Databases ▪ Identify and assess quality of available variables ▪ Develop protocol for data collection on an annual basis ▪ Adjust for different data layouts year to year ▪ Integrate datasets from different databases ▪ Validate data to ensure integrity after integration ▪ Check for and treat missing student IDs, missing or incorrect test scores, etc. ▪ Collect meta information on test strands, scales, and types ▪ Make recommendations for clients' future data collection priorities and policies ▪ Matrix Analysis ▪ Develop analysis agenda and strategies jointly with client 	<p>Timeline: ESC has engaged in a renewable contract for the project since 2009. The contract is renewed every three years and has been successfully renewed every three years.</p> <p>Budget: The annual for budget for this project is \$640,000.</p>	<p>Marc J. Holley, Ph.D., Evaluation Unit Director</p> <p>Phone: (479) 464-1589</p> <p>Email: mholley@wffmail.com</p>

Table 7: ESC Experience: Walton Family Foundation

Project Description	Time Period and Budget	Reference Contact Information
<ul style="list-style-type: none"> ▪ Run multiple model versions to fine-tune analysis strategy until it is fully relevant to the identified policy questions ▪ Analyze relevant state and formative tests ▪ Analyze scores in English, Mathematics, and Science ▪ Analyze scores for all available grades and end-of-course tests ▪ Analyze scores for all content strands (test item clusters) ▪ Analyze longitudinal data for up to 5 years ▪ Apply computation-intensive Gibbs sampling in presence of censored outcome variables ▪ Apply bootstrapping methods in presence of “small” number of schools to replace inappropriate asymptotic approximations of confidence metrics ▪ Review iteratively findings with designated client data analysts ▪ Populate ESC's online Matrix Modeller to open the model's black-box to designated client data analysts ▪ Provide five-page summary of methodology and findings ▪ Matrix Software Tool ▪ Develop communication and visualization strategy jointly with client ▪ Define stakeholder specific views of matrix data (up to 2 versions) ▪ Populate Matrix Tool versions with client ▪ Implement programming changes to customize the Matrix Tool ▪ Host Matrix Tool or deploy it in client's IT environment ▪ Provide technical support to designated client IT staff ▪ Provide training on the technical aspects of the Matrix Tool ▪ Provide printed and online training materials ▪ Planning and Professional Development ▪ Assist in and facilitate development of stakeholder specific communication plan ▪ Assist in and facilitate development of plan and schedule for district-wide matrix training ▪ Conduct three on-site workshops and facilitated cabinet or working-group discussions ▪ Conduct web-ex sessions or teleconferences throughout the project life by mutual agreement 		

Responsive Translation Services

Responsive Translation Services will provide translation services in partnership with NWEA for the Nebraska Statewide Assessments. Please see Table 8 for Responsive Translation’s experience and references.

Table 8: Responsive Translation Experience and References

Agency and Project	Project Description	Time Period	Reference Contact Information
Pearson Project Title: PEARSON-150512-1 Minnesota G5 Audio Recording	Subcontractor Responsibilities: Recording and layback of English audio files.	Kickoff: May 12, 2015, completed on schedule May 25, 2015	Pamela Parmer. pam.parmer@pearson.com
Pearson Project Title: PEARSON-131201 Colorado Aspire Translation and Audio File Validation	Subcontractor Responsibilities: Translate video scripts to Spanish and Haitian Creole; record and layback to file; and functional QC on files within instrument.	Kickoff: May 12, 2015, completed on schedule March 27, 2013	John Croscheck Measurement Development Project Specialist Test Measurement and Research Services, Pearson Phone: (319) 354-9200, extension 21-6170 Email: John.Crosched@pearson.com
Pearson Project: Consult for Pearson on New York State Department of Education Translation Error	Subcontractor Responsibilities: Responsive Translation conducted a third- party audit of translation system and process at Pearson related to translation errors associated with delivery of 2012 NYS DOE Regents Summative Tests.	Kickoff June 4, 2012, completed on schedule June 28, 2012	Jim Harmon, SVP & CQO Assessment & Information, Pearson Mr. Harmon is no longer with Pearson, but can be reached at: Phone: (816) 258-2643 Email: jrhummer1@gmail.com
NWEA Project Title: NWEA- 160229-1 Translation of 200 items for Spanish Reading Assessment Test State of Texas MAP	Subcontractor Responsibilities: Triage English language arts items for translation, adaptation, or rejection for Spanish language arts testing use in the State of Texas. Cognitive and linguistic analysis by bilingual subject matter experts to adapt/translate items for Spanish language arts.	Kickoff June 30, 2016, quarterly translation/adaptation project running 20 days per cycle to completion, completing on schedule	Mark Kessler, Product Manager, Assessments Phone: (503) 616-6246 Email: Mark.Kessler@nwea.org

Table 8: Responsive Translation Experience and References

Agency and Project	Project Description	Time Period	Reference Contact Information
NWEA Project Title: NWEA-160408-1 Internationalization Planning Consultation	Subcontractor Responsibilities: Integrate internationalization/translation with NWEA systems; finalize methodology and workflows for achieving internationalization/adaptation with NWEA; and develop cost projections and delivery schedule for upcoming project(s).	Kickoff May 25, 2016, completing on schedule May 28, 2016	Mark Kessler, Product Manager, Assessments Phone: (503) 616-6246 Email: Mark.Kessler@nwea.org

Schlechty Center

The Schlechty Center will collaborate with NWEA and NDE to provide educational leadership training as part of a broad professional development program for the Nebraska Statewide Assessments. Table 9 includes reference information for the Schlechty Center.

Table 9: American Printing House for the Blind References

Agency	Project Description	Time Period and Budget	Contact Name and Information
<p>Dalton Public Schools</p>	<p>Dalton (DPS) is a city school system located 36 miles from Chattanooga in Northwest Georgia. Since 1998, Schlechty Center has supported district efforts to increase student achievement by focusing on enhancing student and staff engagement. This includes facilitation using Schlechty Center Frameworks for Analysis, Dialogue and Strategic Action to assess district capacity to support and sustain changes needed. In October of 2016, Schlechty Center used the Framework with 48 members of the District Design Team. This work resulted in revision and adoption of school district goals and high leverage strategies to accomplish these goals. In December 2016, Schlechty Center used Redefining the Role of School Board as Leaders and Community Builders with the Dalton Board of Education as a frame to help them create and adopt operating principles, or what they have chosen to call norms. Schlechty Center is the contractor for this work. The Center continues to provide training, consultation and technical assistance to the district.</p>	<p>Scheduled and actual project dates: July 1, 1998 – ongoing Scheduled and actual budget: \$60,000 - \$120,000 per year</p>	<p>Jim Hawkins, Superintendent Address: 300 West Waugh Street PO Box 1408 Dalton, GA 30722 Phone: (706) 876-4000 Fax: (706) 226-4583 Email: jim.hawkins@dalton.k12.ga.us</p>

Table 9: American Printing House for the Blind References

Agency	Project Description	Time Period and Budget	Contact Name and Information
<p>Alvin Independent School District</p>	<p>Alvin ISD is a rapidly growing school district outside Houston, Texas. Since 2012, Schlechty Center has supported district efforts to increase student achievement by focusing on enhancing student and staff engagement. This included facilitation using Schlechty Center Frameworks for Analysis, Dialogue and Strategic Action to assess district capacity to support and sustain changes needed. In September 2016, Schlechty Center used the Frameworks with 60 members of the District Design Team. The purpose of the assessment was to help the superintendent and other district leaders determine what should be the focus of the design team going forward. This resulted in increased clarity about the importance of student voice. The Center also facilitated two school board leadership development experiences, one in January 2016, the other in January 2017. In both cases Redefining the Role of School Board as Leaders and Community Builders was adapted for use. In the first workshop the focus was on creating a new mental image of the district as a learning organization; in the second the focus was on developing an understanding of the challenges, problems and opportunities confronting public education and their school district. Schlechty Center is the contractor for this work. The Center continues to provide training, consultation and technical assistance to the district.</p>	<p>Scheduled and actual project dates: July 1, 2012 – ongoing Scheduled and actual budget: \$180,000 per year</p>	<p>Dr. Buck Gilcrease, Superintendent Address: 301 E. House Street Alvin, TX 77511 Phone: (281) 388-1130 Fax: (281) 388-2719 Email: bgilcrease@alvinisd.net</p>

Table 9: American Printing House for the Blind References

Agency	Project Description	Time Period and Budget	Contact Name and Information
<p>Mountain Brook Schools</p>	<p>Mountain Brook Schools is a city school system, in Birmingham, Alabama. Schlechty Center has provided facilitation and technical assistance for district efforts to revise its strategic plan. This included facilitation using Schlechty Center Frameworks for Analysis, Dialogue and Strategic Action to determine which essential elements of the strategic plan were in need of revision. In April 2016, Schlechty Center used the Frameworks with 65 members of what the district called a Discovery Team which included internal and external audiences and included students. This resulted in four district goals with the most important having to do with amplifying student voice. The Center has also used Redefining the Role of School Board as Leaders and Community Builders in work with the board of education. This tool has been useful in helping the board understand its role in supporting district goals. The Schlechty Center is the contractor for this work which is ending with the last meeting of the Discovery Team being January 23, 2017.</p>	<p>Scheduled and actual project dates: February 1, 2016 – January 23, 2017 Scheduled and actual budget: \$16,500</p>	<p>Dr. Dicky Barlow, Superintendent Address: 32 Vine Street Mountain Brook, AL 35213 Phone: (205) 414-4022 Email: barlowd@mtnbrook.k12.al.us</p>

Sample Items

Grade	Passage ID	Passage Title
3	03_SP1	The White-crowned Sparrow
Genre	Word Count	Lexile
Informational	331	680L

The White-crowned Sparrow

Sparrows are small, common birds. They live in most parts of North America. There are many kinds of sparrows. These birds live in many different places, or habitats. Sparrows can live in the city or the country. The white-crowned sparrow is one kind of sparrow.

What They Look Like

The white-crowned sparrows look like they are plain gray from far away. However, these birds actually have black and white stripes on their heads. They also have small, pale pink or yellow bills. Their chests are pale gray, and they have white bars on their wings. Their backs are soft brown, and they have long tails.

Where They Live

White-crowned sparrows live in brushy areas. They prefer woodlands and thickets, which are areas with lots of trees and bushes. They use the nearby open areas to look for food.

What They Eat

White-crowned sparrows eat many kinds of seeds, including sunflower seeds. They like grasses and grains, too. They also like blackberries. Sometimes these birds will make short flights to catch an insect to eat.

How They Nest and Raise Their Young

These birds make nests in shrubs. They build them up to 10 feet high. The female makes the nest with twigs. Then, she lines the nest with soft grass and feathers. The female lays 3-7 light blue-green eggs. The eggs have brownish spots. It takes the eggs 11-14 days to hatch.

After the eggs hatch, the female bird stays on the nest for 7-12 days. Both the males and females feed the young birds. After 12 days, the male sparrow keeps feeding the baby birds. Then, the female starts to build another nest where she will lay more eggs.

It is fun to watch for white-crowned sparrows. These birds are so common that they may live close by. Their white and black heads make them easy to identify. Listen for their song. It sounds like a whistle. When you hear "Poor-wet-wetter-chee-zee," a white-crowned sparrow may be nearby.

Grade	Item Type	Key	Associated Passage
3	Multiple Choice	Rubric	The White-crowned Sparrow
Standard	Item sub-type	DOK	Associated Passage ID
LA 3.1.6.g	N/A	2	03_SP1
Indicator Text	Apply knowledge of text features to locate information and gain meaning from a text (e.g., table of contents, maps, charts, illustrations, headings, captions, font/format styles)		

Which sentence tells how the subheadings help the reader?

- A. The subheadings make it easier to find information.
- B. The subheadings are bigger, so it is easier to read the words.
- C. The subheadings make the story more interesting to read.
- D. The subheadings tell the correct order of the story.

Grade	Item Type	Key	Associated Passage
3	Multiple Choice	B	The White-crowned Sparrow
Standard	Item sub-type	DOK	Associated Passage ID
LA 3.1.6.e	N/A	2	03_SP1
Indicator Text	Retell and summarize the main idea from informational text using supporting details		

Which list contains the main details of the story?

- Ⓐ. The white-crowned sparrows
 - live in wooded areas
 - make their nests with sunflower seeds
 - lay 7-10 eggs

- Ⓑ. The white-crowned sparrows
 - are common birds
 - eat many kinds of seeds, grains, and grasses
 - build their nests in shrubs

- Ⓒ. The white-crowned sparrows
 - are hard to find
 - live high in trees
 - feed their babies for 7-10 days

- Ⓓ. The white-crowned sparrows
 - sound like poor wet birds
 - lay brown eggs with blue spots
 - have long tails

Grade	Item Type	Key	Associated Passage
4	TEI	Rubric	N/A
Standard	Item sub-type	DOK	Associated Passage ID
LA 4.1.5.a	Gap Match	1	N/A
Indicator Text	Apply knowledge of word structure elements, known words, and word patterns to determine meaning (e.g., parts of speech, plurals, possessives, suffixes, prefixes, base and root words)		

Drag the correct meaning for each prefix into the chart.

Prefix	Definition
non-	_____
re-	_____

before again not with

Sample Correct Response	Non: not Re: again
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Grade	Passage ID	Passage Title
8	08_SP1	Impressions of an Indian Childhood
Genre	Word Count	Lexile
Informational	740	1090L

Zitkala-Sa (1876–1938) was a Yankton Sioux Indian and one of the first American Indian women to write about her culture. She became a leading spokesperson for American Indian concerns. In this passage, she tells about her life on an Indian reservation in South Dakota where she lived until the age of eight. She has just received a lesson from her mother in the art of beadwork.

from **Impressions of an Indian Childhood**

Always after these confining lessons I was wild with surplus spirits, and found joyous relief in running loose in the open again. Many a summer afternoon a party of four or five of my playmates roamed over the hills with me. We each carried a light sharpened rod about four feet long, with which we pried up certain sweet roots. When we had eaten all the choice roots we chanced upon, we shouldered our rods and strayed off into patches of a stalky plant under whose yellow blossoms we found little crystal drops of gum. Drop by drop we gathered this nature's rock-candy, until each of us could boast of a lump the size of a small bird's egg. Soon satiated¹ with its woody flavor, we tossed away our gum, to return again to the sweet roots.

I remember well how we used to exchange our necklaces, beaded belts, and sometimes even our moccasins. We pretended to offer them as gifts to one another. We delighted in impersonating our own mothers. We talked of things we had heard them say in their conversations. We imitated their various manners, even to the inflection of their voices. In the lap of the prairie we seated ourselves upon our feet, and leaning our painted cheeks in the palms of our hands, we rested our elbows on our knees, and bent forward as old women were most accustomed to do.

While one was telling of some heroic deed recently done by a near relative, the rest of us listened attentively, and exclaimed in undertones, "Han! han!" (yes! yes!) whenever the speaker paused for breath, or sometimes for our sympathy. As the discourse² became more thrilling, according to our ideas, we raised our voices in these interjections. In these impersonations our parents were led to say only those things that were in common favor.

No matter how exciting a tale we might be rehearsing, the mere shifting of a cloud shadow in the landscape nearby was sufficient to change our impulses; and soon we were all chasing the great shadows that played among the hills. We shouted and whooped in the chase; laughing and calling to one another, we were like little sportive nymphs on that Dakota sea of rolling green.

On one occasion I forgot the cloud shadow in a strange notion to catch up with my own

shadow. Standing straight and still, I began to glide after it, putting out one foot cautiously. When, with the greatest care, I set my foot in advance of myself, my shadow crept onward too. Then again I tried it; this time with the other foot. Still again my shadow escaped me. I began to run; and away flew my shadow, always just a step beyond me. Faster and faster I ran, setting my teeth and clenching my fists, determined to overtake my own fleet shadow. But ever swifter it glided before me, while I was growing breathless and hot. Slackening my speed, I was greatly vexed³ that my shadow should check its pace also. Daring it to the utmost, as I thought, I sat down upon a rock imbedded in the hillside.

So! my shadow had the impudence to sit down beside me!

Now my comrades caught up with me, and began to ask why I was running away so fast.

"Oh, I was chasing my shadow! Didn't you ever do that?" I inquired, surprised that they should not understand.

They planted their moccasined feet firmly upon my shadow to stay it, and I arose. Again my shadow slipped away, and moved as often as I did. Then we gave up trying to catch my shadow.

Before this peculiar experience I have no distinct memory of having recognized any vital bond between myself and my own shadow. I never gave it an afterthought.

Returning our borrowed belts and trinkets, we rambled homeward. That evening, as on other evenings, I went to sleep over my legends.

¹**satiated** satisfied

²**discourse** conversation

³**vexed** annoyed

Grade	Item Type	Key	Associated Passage
8	EBSR	A/C	Impressions of an Indian Childhood
Standard	Item sub-type	DOK	Associated Passage ID
LA 8.1.6.a	N/A	3	08_SP1
Indicator Text	Analyze the meaning, reliability, and validity of the text considering author's purpose, perspective, and information from additional sources		

This question has two parts. Answer Part A, then answer Part B.

Part A

Based on information in the passage, how would the author MOST LIKELY describe her childhood?

- A. Carefree
- B. Comical
- C. Unpredictable
- D. Unremarkable

Part B

Which sentence from the passage BEST supports your answer in Part A?

- A. I remember well how we used to exchange our necklaces, beaded belts, and sometimes even our moccasins.
- B. While one was telling of some heroic deed recently done by a near relative, the rest of us listened attentively, and exclaimed in undertones, "Han! han!" (yes! yes!) whenever the speaker paused for breath, or sometimes for our sympathy.
- C. We shouted and whooped in the chase; laughing and calling to one another, we were like little sportive nymphs on that Dakota sea of rolling green.
- D. Slackening my speed, I was greatly vexed that my shadow should check its pace also.

Grade	Item Type	Key	Associated Passage
8	Multiple Choice	A	Impressions of an Indian Childhood
Standard	Item sub-type	DOK	Associated Passage ID
LA 8.1.6.c	N/A	3	08_SP1
Indicator Text	Analyze author's use of literary devices (e.g., foreshadowing, personification, idiom, oxymoron, hyperbole, flashback, suspense, symbolism, irony, transitional devices)		

How does the author's use of the phrase "lap of the prairie" in paragraph 2 impact meaning and tone?

1. It suggests that the landscape was a comforting presence in the lives of the author and her friends.
2. It indicates that the author and her friends sought privacy from adult relatives by hiding in a grassy area.
3. It reveals to readers that the landscape in which the author and her friends played was remote and untamed.
4. It allows readers to visualize the plant life of the region and understand its usefulness to the author and her friends.

Grade	Item Type	Key	Associated Passage
8	Multiple Choice	C	Impressions of an Indian Childhood
Standard	Item sub-type	DOK	Associated Passage ID
LA 8.1.6.d	N/A	2	08_SP1
Indicator Text	Summarize, analyze, and synthesize informational text using main idea and supporting details		

What idea does the author develop by describing the events in paragraphs 2 and 3?

1. The author and her friends are puzzled by adult behavior and find it funny to pretend to be adults.
2. Despite being children, the author and her friends feel pressure to learn to act, speak, and dress like adults.
3. Despite being children, the author and her friends are very aware of the adult world and have a natural curiosity about it.
4. The author and her friends resent being controlled by adults and imitating the adults in their life gives them a way to feel more independent.

Nebraska College and Career Ready Sample Items

Mathematics

Grade	Item Type	Key	Calculator
3	TEI	Rubric	No
Standard	Item sub-type	DOK	Mathematical Process
MA 3.1.1.f	Hotspot	2	1
Indicator Text	Show and identify equivalent fractions using visual representations including pictures, manipulatives, and number lines.		

A fraction of Figure 1 is shaded.

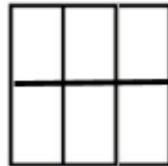
Figure 1



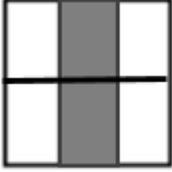
Shade Figure 2 to represent a fraction equivalent to the fraction shaded in Figure 1.

Select a part of the figure to shade that part.

Figure 2



Rubric

Score	Details
1 point	Student shades any two parts of the figure. Ex: 
0 points	Student response is incorrect.

Nebraska College and Career Ready Sample Items

Grade	Item Type	Key	Calculator
4	TEI	Rubric	Neutral
Standard	Item sub-type	DOK	Mathematical Process
MA 4.4.1.a	Gap match	2	1
Indicator Text	Represent data using line plots where the horizontal scale is marked off in appropriate units (e.g., whole numbers, halves, quarters, or eighths).		

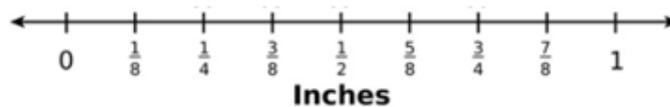
The owner of a store counted how many beads of different lengths were sold in one week. The information is shown in the table.

Length of Beads (inches)	Number of Beads Sold
$\frac{1}{4}$	2
$\frac{3}{8}$	3
$\frac{1}{2}$	2
$\frac{5}{8}$	0
$\frac{3}{4}$	2

Complete a line plot to represent this data.

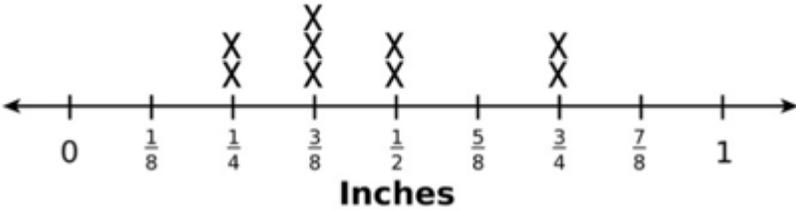
Select and move an X to the correct location on the line plot. The X can be used more than once.

Bead Lengths



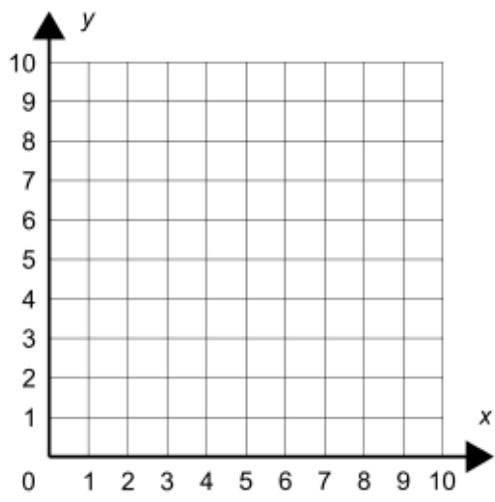
X

Rubric

Score	Details
1 point	<p>Student completes the line plot correctly.</p> <p style="text-align: center;">Bead Lengths</p>  <p style="text-align: center;">Inches</p>
0 points	Student response is incorrect.

Grade	Item Type	Key	Calculator
5	TEI	Rubric	Neutral
Standard	Item sub-type	DOK	Mathematical Process
MA 5.3.2.b	Graph	1	1
Indicator Text	Graph and name points in the first quadrant of the coordinate plane using ordered pairs of whole numbers.		

Plot the point (4, 6) on the coordinate plane.



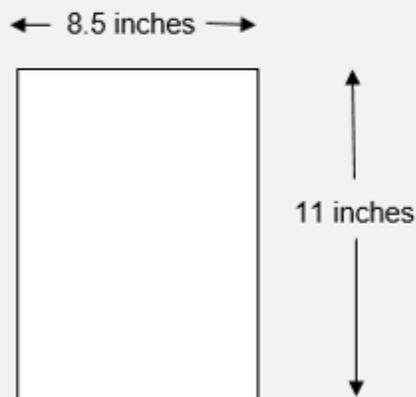
Rubric

Score	Details
1 point	<p>Student plots the point at (4, 6).</p>
0 points	Student response is incorrect.

Grade	Item Type	Key	Calculator
6	TEI	Rubric	No
Standard	Item sub-type	DOK	Mathematical Process
MA 6.2.3.b	Text entry	2	4
Indicator Text	Solve real-world problems involving nonnegative rational numbers.		

A student is making paper rings for an art project. Each ring requires a piece of paper 11 inches long and $\frac{1}{4}$ inch wide.

A sheet of paper has the dimensions shown.



What is the greatest number of paper rings that can be made from 1 sheet of paper?

Enter the answer in the space provided.

Type your answer here...

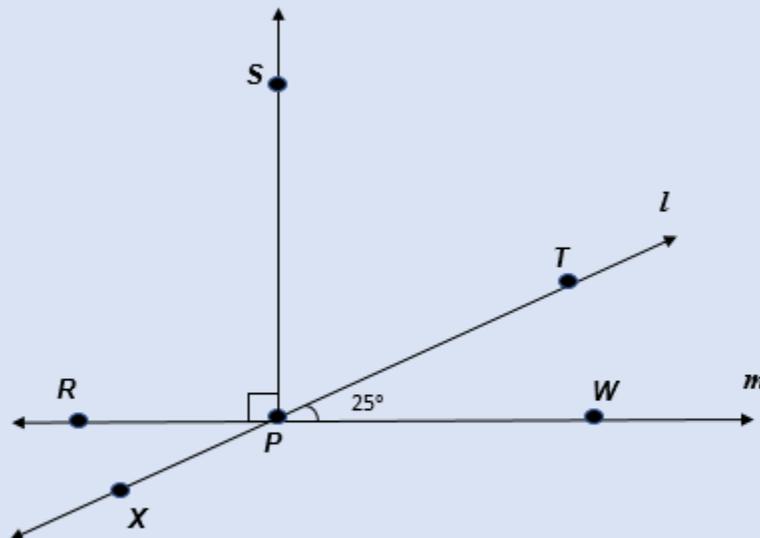
paper ring(s)

Rubric

Score	Details
1 point	34 paper rings $\frac{8.5}{\frac{1}{4}} = \frac{\frac{17}{2}}{\frac{1}{4}} = \frac{17}{2} \times \frac{4}{1} = 17 \times 2$
0 points	Student response is incorrect.

Grade	Item Type	Key	Calculator
7	MS	A,C,F	Neutral
Standard	Item sub-type	DOK	Mathematical Process
MA 7.3.1.a	NA	1	1
Indicator Text	Apply and use properties of adjacent, complementary, supplementary, and vertical angles to find missing angle measures.		

In the diagram, lines l and m intersect at point P .



Which statements about angles in the diagram are correct? Choose all that apply.

- A. $\angle XPW$ and $\angle WPT$ are adjacent.
- B. $\angle SPT$ and $\angle XPR$ are vertical.
- C. $\angle SPT$ and $\angle TPW$ are complimentary.
- D. $\angle RPS$ and $\angle XPR$ are supplementary.
- E. The measure of $\angle XPR$ is 90° .
- F. The measure of $\angle WPX$ is 155° .

Grade	Item Type	Key	Calculator
8	MC	A	Yes
Standard	Item sub-type	DOK	Mathematical Process
MA 8.2.1.b	NA	2	2
Indicator Text	Determine and describe the rate of change for given situations through the use of tables and graphs.		

Joe goes to the amusement park. He pays an admission fee, and also buys game tickets. The table shows the total cost of going to the amusement park depending on the number of game tickets bought.

Number of Game Tickets Bought	Total Cost (\$)
5	10.00
10	12.50
15	15.00
20	17.50

Based on the table, what is the cost of 1 game ticket?

- A. \$0.50
- B. \$2.00
- C. \$2.50
- D. \$7.50

Sample 3-5 and 6-8 MAP Science Items

Test Purpose:

The MAP® Science is a growth measure as students build understanding of both multidimensional and non-multidimensional science standards. The tests do not provide a summative or diagnostic measure of a student's proficiency in the standards or their dimensions. The results can be used as a growth measure of overall student understanding of science standards with an overall score, as well as scores in the disciplinary instructional areas of the test. Taking this interim adaptive test allows students to gauge their growth throughout the school year and from year to year.

Items, Alignment, Learning Statements, and the Learning Continuum:

The MAP Science tests are aligned to partners' state standards with appropriate multidimensional items that align to the dimensions: Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs). Some items assess all dimensions of appropriate standards, and others assess different combinations of the dimensions. All provide measures of growth toward students' understanding of the DCIs, SEPs, and CCCs.

All existing items were rated for their alignment to the DCIs, SEPs, and CCCs as described in *A Framework for K-12 Science Education* (2012 NRC). This process included writing multidimensional Learning Statements before hand-aligning items to multidimensional standards.

The NWEA Learning Statements are used in the Learning Continuum reports for newer tests. These statements give teachers information about how students are performing in the dimensions. These sample items include the Learning Statements that teachers will see in the reports. For example, this is a part of the Life Sciences Instructional Area, From Molecules to Organisms Sub-area, Photosynthesis and Respiration Topic in three RIT bands:

Life Science		
From Molecules to Organisms: Structures and Processes		
191-200	201-210	211-220
Reinforce these skills & concepts	Develop these skills & concepts	Introduce these skills & concepts
<ul style="list-style-type: none">Identifies the source of energy for photosynthesisRecognizes models of photosynthesisRecognizes that the stored energy in foods comes from sunlight	<p>Photosynthesis and Respiration</p> <ul style="list-style-type: none">Describes how carbon dioxide cycles between cellular respiration and photosynthesis in plantsDescribes photosynthesis as the conversion of light energy into chemical energyDetermines variables and controls in investigations about the effects of light on photosynthesisIdentifies the source of energy for photosynthesisMakes claims based on evidence about the needs of plants	<ul style="list-style-type: none">Applies scientific ideas to explain observations related to leaves releasing gasesDescribes photosynthesis as the conversion of light energy into chemical energyIdentifies the source of energy for photosynthesisMakes a claim based on evidence about photosynthesisRecognizes that the stored energy in foods comes from sunlight

Test Blueprint:

The blueprints for both the 3-5 and 6-8 MAP Science tests have 3 Instructional Areas: Life Sciences, Physical Sciences, and Earth and Space Sciences—all with embedded Engineering Design. The Sub-areas are derived from the DCIs.

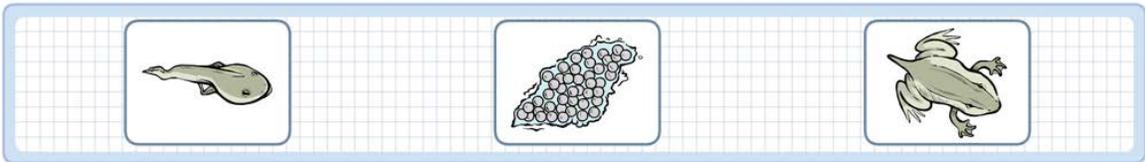
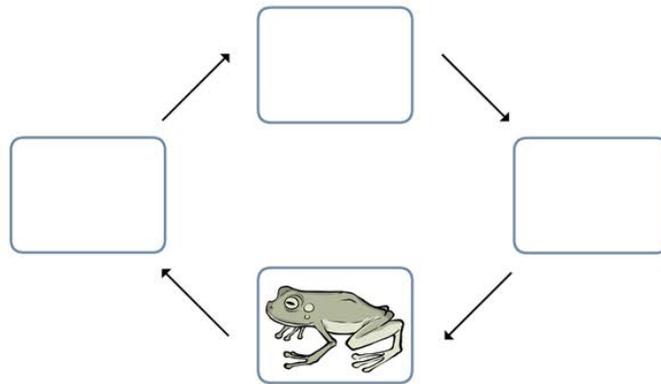
Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

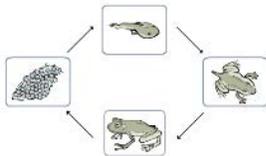
Sub-area: From Molecules to Organisms: Structures and Processes

NWEA Learning Statement: Constructs models to show patterns of physical development in the life cycles of animals	DCI: Growth and Development of Organisms	SEP: Developing and Using Models	CCC: Patterns
Item RIT: 196 Item DOK: 2			

Drag and drop the stages of the life cycle of a frog into the diagram in the correct order.



Correct Response:



Narrative: This grade 3-5 item provides evidence of students' growth in understanding the life cycles of organisms. Students demonstrate this by using sketches to represent the pattern of changes to frogs in this life cycle model. This item aligns to the 3 dimensions of multidimensional elementary standards. Notice how the item's RIT is in the middle of the 3-5 RIT Norms. NWEA is a WebbAlign® Depth of Knowledge Partner. This item is rated a DOK 2.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

Sub-area: From Molecules to Organisms: Structures and Processes

NWEA Learning Statement: Develop an argument that internal structures of plants support the survival of plants

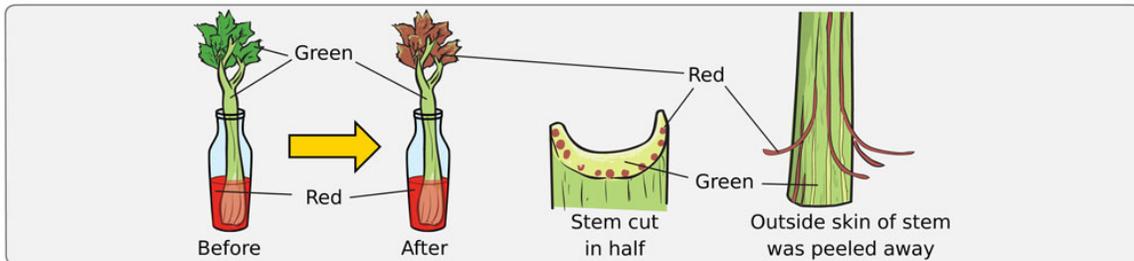
DCI:
Structure and Function

SEP:
Engaging in Argument from Evidence

CCC:
Systems and System Models

Item RIT: 210 **Item DOK:** 2

A student put water and red food coloring into a glass. He put a stem of celery into the glass. The next day he drew pictures of what he saw.



Use evidence to explain how plant leaves get water. Click on the answers to the questions.

How do plant leaves get water?

- Leaves get water from the air.
- Leaves get water through the whole stem.
- Leaves get water through small tubes in the stem.

What is the evidence?

(Click on all the evidence that helps your explanation.)

- The leaves turned red.
- The outside of the stem is green.
- The inside of the cut stem is green with red dots.
- There are red lines under the outside skin of the stem.
- The celery is 15 cm tall.

Correct Response:

<p>How do plant leaves get water?</p> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px; margin-bottom: 2px;">Leaves get water from the air.</div> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px; margin-bottom: 2px;">Leaves get water through the whole stem.</div> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px;">Leaves get water through small tubes in the stem.</div>	<p>What is the evidence? (Click on <u>all</u> the evidence that helps your explanation.)</p> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px; margin-bottom: 2px;">The leaves turned red.</div> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px; margin-bottom: 2px;">The outside of the stem is green.</div> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px; margin-bottom: 2px;">The inside of the cut stem is green with red dots.</div> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px; margin-bottom: 2px;">There are red lines under the outside skin of the stem.</div> <div style="border: 1px solid gray; border-radius: 10px; padding: 2px;">The celery is 15 cm tall.</div>
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Narrative: This grade 3-5 item provides evidence of students' growth in understanding the relationship between the functioning of internal and external structures of plants and animals and the functioning and survival of the organism as a whole. Students demonstrate this by making a claim about how the internal structures of a plant system interact to provide the leaves with water and then supporting the claim with evidence. This item aligns to 3 elementary dimensions. This is a difficult item for students as reflected by the high RIT. However, it is only rated a DOK 2 because students are performing a series of DOK 2 steps and not providing reasoning.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

Sub-area: From Molecules to Organisms: Structures and Processes

NWEA Learning Statement: Describes how information from sound is received, processed and acted upon by humans, using a model

DCI:
Information Processing

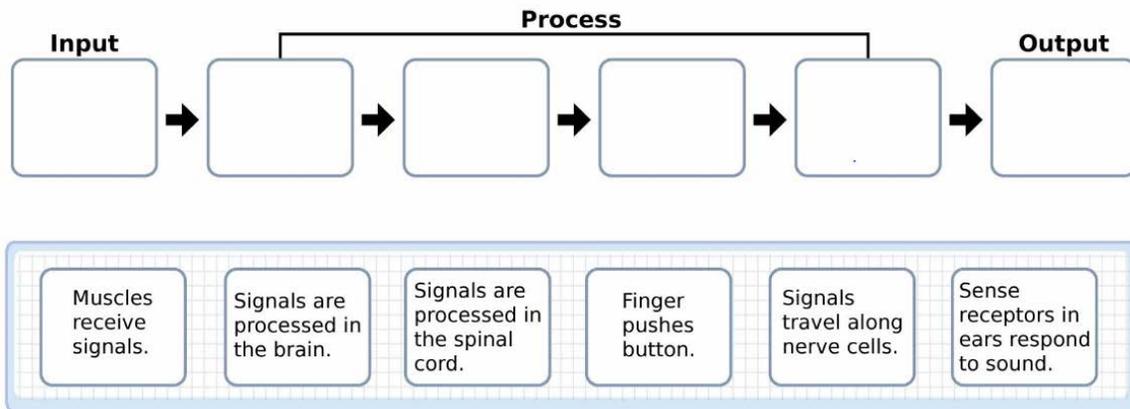
SEP:
Developing and Using Models

CCC:
Cause and Effect

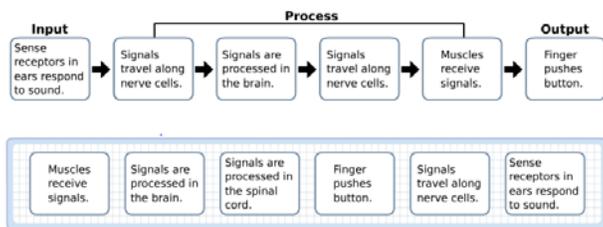
Item RIT: 210 **Item DOK:** 2

Students test how quickly they can hit a button after hearing a sound. The student with the quickest time took 0.17 seconds. They wonder why no one was faster than 0.17 seconds. Students make a model to explain why the nervous system takes time to respond to hearing a sound.

Complete the model by dragging statements to the empty boxes. Statements can be used more than once or not at all.



Correct Response:



Narrative: This grade 6-8 item provides evidence of students' growth in understanding of how information from sound is received, processed and acted upon. Students use a model to explain why there is a delay when responding to a stimulus by tracing the path signals take from sensory receptors to the brain to the resulting behaviors. This item is rated DOK 2 because students used a given model instead of constructing their own model.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

Sub-area: Ecosystems: Interactions, Energy, and Dynamics

NWEA Learning Statement: Determines producers, consumers and decomposers in models

DCI:
Cycles of Matter and
Energy Transfer in
Ecosystems

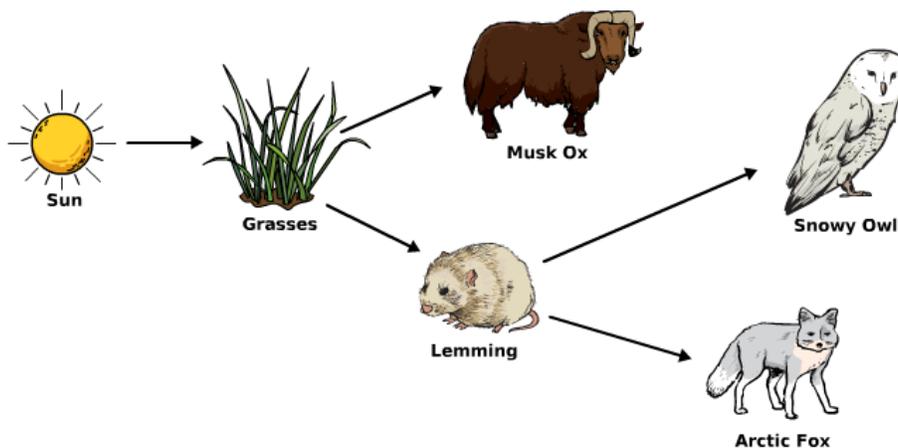
SEP:
Developing and
Using Models

CCC:
none

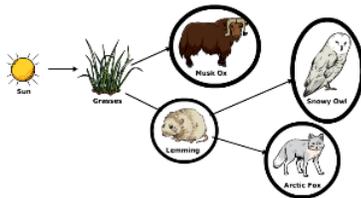
Item RIT: 203 **Item DOK:** 2

The diagram shows a food web for a tundra ecosystem.

Click on all the consumers in the ecosystem.



Correct Response:



Narrative: This grade 6-8 item provides evidence of students' ability to interpret a model of a food web showing the relationships among the living and nonliving parts of an ecosystem. The item is easy for middle school students according to its RIT and well-connected to elementary ideas so it is in both the 3-5 and 6-8 test item pools. The item has only 2 dimensions with core ideas from *A Framework for K-12 Science Education* (2012 NRC). This is an example of an item written prior to the *Framework*. Over time, items written for multidimensional standards will fill the item pools for the *MAP Science* assessments.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

Sub-area: Heredity and Biological Evolution

NWEA Learning Statement: Applies scientific ideas to explain why organisms are able to survive in specific environments

DCI:
Adaptation

SEP:
Constructing Explanations and Designing Solutions

CCC:
Structure and Function

Item RIT: 196 **Item DOK:** 2

The picture shows a penguin. It lives in Antarctica.



How do the wings help penguins live in Antarctica?

- A. They help penguins swim very fast.
- B. They help penguins dig into the ice.
- C. They help penguins fly high above the ice.
- D. They help penguins grab fish out of the water.

Narrative: This item provides evidence of students' ability to apply scientific ideas of structure and function to explain how the wings of penguins help the birds survive in polar environments. This 3-dimensional item is rated a DOK 2 because students choose a brief explanation of the relationship between structure, function and environment.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

Sub-area: Heredity and Biological Evolution

NWEA Learning Statement: Identifies body parts adapted to specific habitats

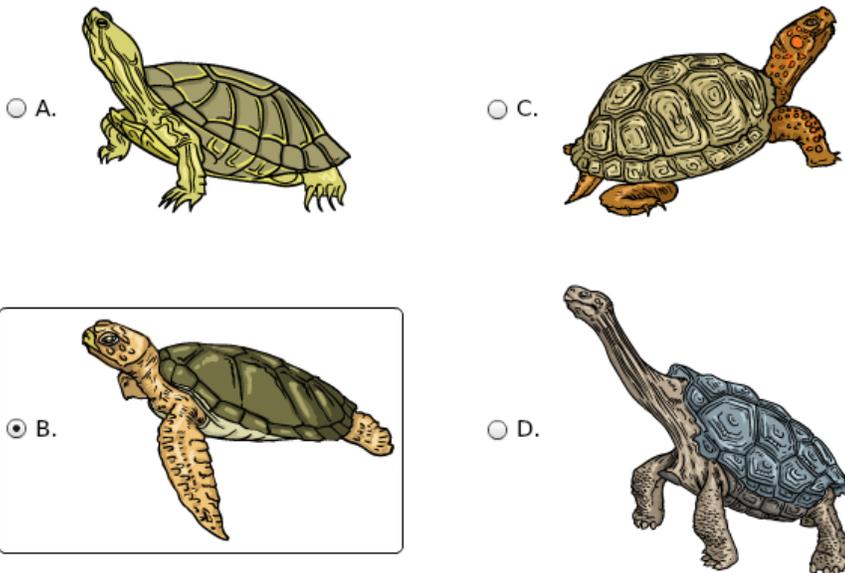
DCI:
Adaptation

SEP:
none

CCC:
Structure and Function

Item RIT: 173 **Item DOK:** 2

Which turtle would have the best chance for survival in an ocean environment?



Narrative: The item provides evidence of students' growth in understanding of how physical adaptations can improve chances of survival in particular habitats. Students must decide how the structure of the turtle's body parts affects its ability to function in an ocean environment. This is a simpler item than the previous penguin item, as reflected by the RIT, since students do not have to explain how the flippers or streamlined body shape help the turtle to survive. This is a 2-dimensional item because students are not demonstrating a SEP.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Life Sciences

Sub-area: Heredity and Biological Evolution

NWEA Learning Statement: Determines the probability of offspring inheriting a trait, using Punnett squares

- DCI:**
- Inheritance of Traits
 - Variation of Traits

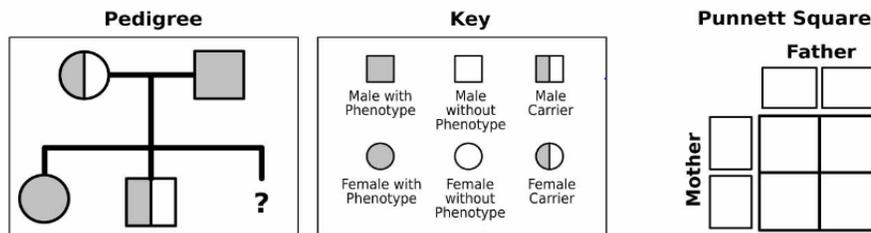
SEP:
Developing and Using Models

CCC:
Cause and Effect

Item RIT: 216 **Item DOK:** 2

The phenotype of attached earlobes is a recessive trait (*d*). The inheritance of attached earlobes is outlined in the pedigree chart. The parents shown in the pedigree chart decide to have another child.

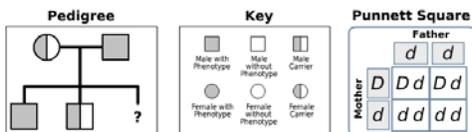
- Drag alleles from the toolbox to the Punnett square to show the cross between the parents and the resulting offspring.
- Drag a percentage onto the blank line to show the probability that the parents' next child will have attached earlobes.



Probability of attached earlobes: _____

<i>D</i>	<i>d</i>	0%	25%	50%	75%	100%
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Once Correct Response:



Probability of attached earlobes: 50%

<i>D</i>	<i>d</i>	0%	25%	75%	100%
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Narrative: The grade 6-8 item demonstrates students' understanding of the relationship between gene transmission and the genetic variation seen in offspring, including the appearance of recessive traits. Students show this by determining the genotypes of the parents and predicting the likelihood of particular traits appearing in their offspring using models. This item is rated DOK 2 because students are performing a series of steps at the DOK 2 level.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Physical Sciences

Sub-area: Matter and Its Interactions

NWEA Learning Statement: Applies conservation of matter to determine mass/weight after changes of state	DCI: Structure and Properties of Matter	SEP: Constructing Explanations and Designing Solutions	CCC: Energy and Matter
Item RIT: 201 Item DOK: 2			

Kayla weighed out 500 g of chocolate chips. She put the chocolate chips into a pot on the stove, and the chocolate chips melted.

How much should the chocolate weigh after it melts?

- A. It will weigh about 400 g because melted chocolate is hot.
- B. It will weigh about 450 g because melted chocolate takes up less space.
- C. It will weigh about 500 g because the solid chocolate only changed form.
- D. It will weigh about 550 g because solid chocolate has a lot of air pockets.

Narrative: This grade 3-5 item provides evidence of students' growth in understanding of the conservation of matter/weight in a quantitative and qualitative manner appropriate for 5th graders (201 RIT). By selecting 500 g with an explanation of why the weight of the melted chocolate remains the same, students avoid misconceptions about heat/energy affecting weight and about solids containing air pockets. Notice that constructing explanations is often a DOK 3 level of complexity. This item is rated a DOK 2 because students did not construct the explanation themselves.

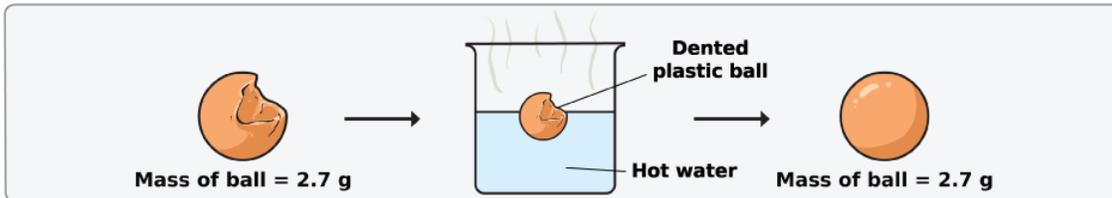
Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Physical Sciences

Sub-area: Matter and Its Interactions

<p>NWEA Learning Statement: Applies conservation of matter to determine mass/weight after changes of state</p> <p>Item RIT: 201 Item DOK: 2</p>	<p>DCI: Structure and Properties of Matter</p>	<p>SEP: Constructing Explanations and Designing Solutions</p>	<p>CCC: Energy and Matter</p>
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A student wants to remove a dent from a hollow plastic ball used for table tennis. He reads that table tennis balls are filled with oxygen gas. He decides to put the dented ball into hot water to see what happens. The diagram shows the results.



Construct an explanation for the results of the investigation. Click on the explanation and all supporting evidence.

Explanation
(Choose one.)

Hot air molecules enter the ball. The increased number of molecules pushes out the dent.

Hot water molecules enter the ball. The increased number of molecules pushes out the dent.

Oxygen molecules inside the ball fill with heat, grow larger, and push out the dent.

Oxygen molecules inside the ball move further apart and push out the dent.

Evidence
(Choose all that apply.)

Volume of the ball increases.

Ball loses its dent.

Mass of the ball stays the same.

Ball floats on the surface of the water.

Correct Response:

Explanation
(Choose one.)

Hot air molecules enter the ball. The increased number of molecules pushes out the dent.

Hot water molecules enter the ball. The increased number of molecules pushes out the dent.

Oxygen molecules inside the ball fill with heat, grow larger, and push out the dent.

Oxygen molecules inside the ball move further apart and push out the dent.

Evidence
(Choose all that apply.)

Volume of the ball increases.

Ball loses its dent.

Mass of the ball stays the same.

Ball floats on the surface of the water.

Narrative: This grade 6-8 item provides evidence that student can construct an explanation with evidence of what causes the removal of the dent in the ball. Notice that constructing explanations is often a DOK 3 level of complexity. This item is rated DOK 2 because students did not construct the explanation themselves.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Physical Sciences

Sub-area: Motion and Stability: Forces and Interactions

NWEA Learning Statement: Describes how simple machines change applied forces, using a model

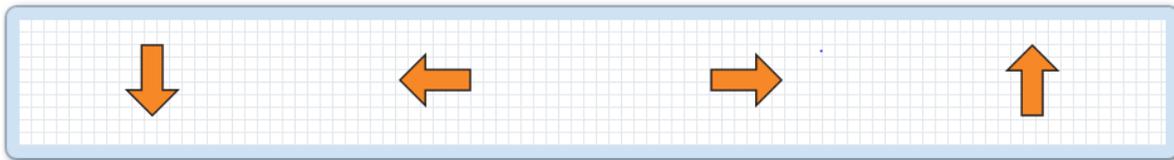
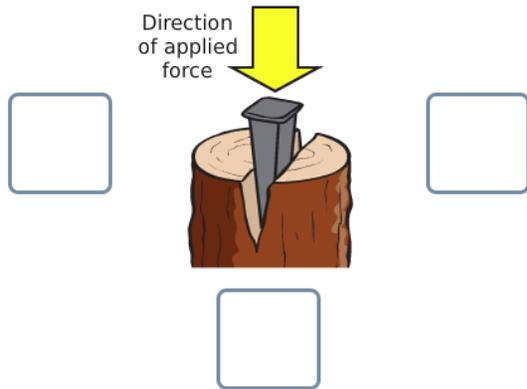
DCI:
Forces and Motion

SEP:
Developing and Using Models

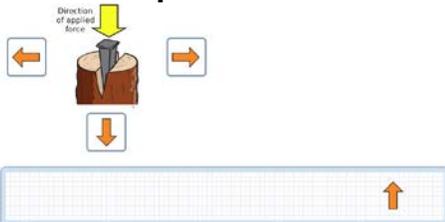
CCC:
Stability and Change

Item RIT: 200 **Item DOK:** 2

The diagram shows a wedge being used to split a log. Describe how the wedge changes the direction of the applied force by moving arrows into the boxes. Not all boxes or arrows need to be used.



Correct Response:



Narrative: This grade 6-8 item provides evidence of students' growth in understanding that change happens due to how forces act on objects. The item demonstrates students' ability to use arrows to model the phenomena. In this item students use a model to describe the phenomena which may have been part of an investigation, but that was not apparent in the item. So the item is aligned to a modeling SEP rather than investigating. The item is rated a DOK 2 because students are using a given model, not constructing one.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Physical Sciences Sub-area: Energy and Waves

NWEA Learning Statement: Describes energy conversions in devices, using a model

Item RIT: 202 **Item DOK:** 2

- DCI:**
- Definitions of Energy
 - Conservation of Energy and Energy Transfer

SEP:
Developing and Using Models

CCC:
Energy and Matter

Describe the energy conversions in this electric circuit.

Drag the names of the energy forms before and after each conversion to the correct boxes.

Battery

Before

After

Bulb

Before

After

and

chemical electrical heat light mechanical sound

Correct Response:

Battery

Before

After

Bulb

Before

After

and

chemical electrical heat light mechanical sound

Narrative: This grade 3-5 item provides evidence of students' growth in understanding of energy conversions in a battery and a bulb by naming before-after energy forms in this model. We can also infer an understanding that electrical energy is transferred from the battery to the bulb. This 3-dimensional item's 202 RIT indicates high achieving 4th graders would likely answer correctly.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Physical Sciences

Sub-area: Energy and Waves

NWEA Learning Statement: Describes energy conversions in devices, using a model

Item RIT: 213 **Item DOK:** 2

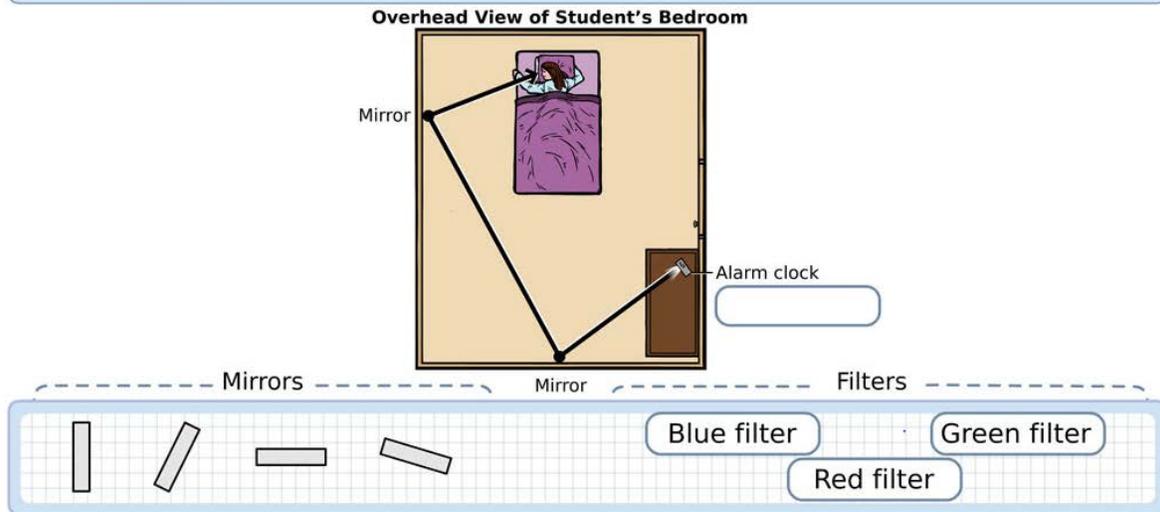
- DCI:**
- Electromagnetic Radiation
 - Developing Possible Solutions

SEP:
Developing and Using Models

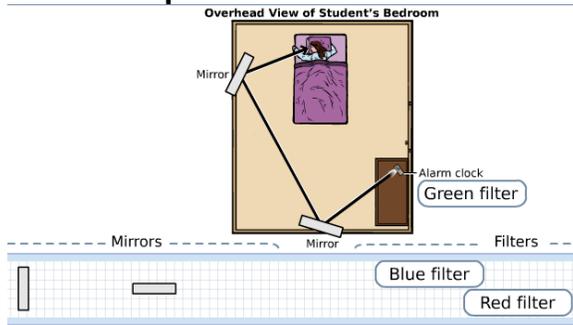
CCC:
Structure and Function

A physics student has an alarm clock that flashes a beam of white light when the alarm sounds. The student wants a green light from the alarm clock to flash directly into her eyes to help her wake up.

- 1. Position the mirrors so the light will shine directly into the student's eyes. Drag the 2 mirrors with the appropriate angles into the diagram.**
- 2. Choose the filter that will change the color of the light. Drag the appropriate filter to the box.**



Correct Response:



Narrative: This grade 6-8 item provides evidence of students' growth in their understanding of developing a solution to a problem involving light and the functions of mirrors and filters using a model. Notice that this item aligns to both a physical science and an engineering design DCI. Students develop a solution to this alarm clock problem by selecting a green filter that absorbs all colors but green and positioning mirrors to reflect the green light to the sleeping student's eyes. This Learning Statement would appear in both the light and engineering topics of the Learning Continuum reports demonstrating how all engineering items are embedded in the disciplinary context of the items. Notice that this item is rated DOK 2 because students were not asked to write an explanation of why they chose to position the mirrors and filters the way they did.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Earth and Space Sciences

Sub-area: Earth's Place in the Universe

NWEA Learning Statement: Constructs models to show daily patterns of how the Sun appears to move across the sky

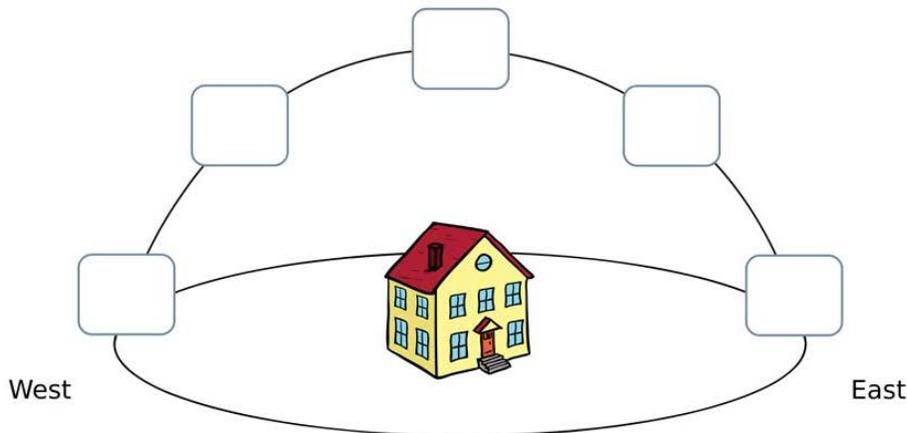
DCI:
Earth and the Solar System

SEP:
Developing and Using Models

CCC:
Patterns

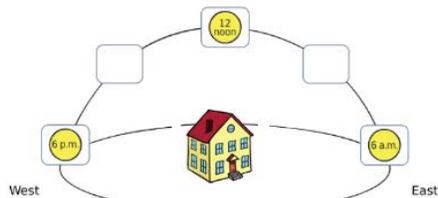
Item RIT: 198 **Item DOK:** 2

Show the position of the Sun in the sky at 6 a.m., 12 noon, and 6 p.m. in March by dragging the 3 Suns to the correct boxes.



	6 a.m.	6 p.m.	12 noon
--	--	--	---

Correct Response:



Narrative: This grade 3-5 item provides evidence of students' growth in the ability to develop a visual model showing how the Sun changes positions in the sky, following the same general pattern from day to day. The NWEA learning statement reflects this item's alignment to the modeling SEP, to the patterns CCC, and to a DCI in *A Framework for K-12 Science Education* (2012 NRC): the changing positions of the Sun in the sky. This 3-dimensional item's RIT places it in the middle of the 3-5 grade band.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Earth and Space Sciences

Sub-area: Earth's Place in the Universe

NWEA Learning Statement: Applies scientific ideas to explain the patterns of apparent movement of stars in the sky

DCI:
The Universe and Its Stars

SEP:
Constructing Explanations and Designing Solutions

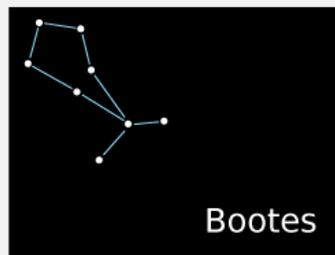
CCC:
none

Item RIT: 205 **Item DOK:** 1

In May, a student observes the constellation Virgo in one area of the sky. One month later, the student observes the constellation Bootes in the same area of the sky.



May 10:00 P.M.



June 10:00 P.M.

Why does the student observe the constellation Virgo in May and then Bootes in June?

- A. Stars fade in and out.
- B. Earth rotates on its axis.
- C. Stars revolve around the Sun.
- D. Earth revolves around the Sun.

Narrative: This grade 6-8 item provides evidence of students' growth in their understanding of why two different constellations appear in the same area of the sky at different times of the year, a core idea described in *A Framework for K-12 Science Education* (2012 NRC). The item asks students to apply scientific ideas to explain a phenomenon. The item does not align to the CCC of patterns because the two graphics are not enough data to establish a pattern, so students are most likely drawing on content knowledge to explain the observation rather than using a pattern to predict a relationship. The item's RIT places it around the early middle school norm, and the DOK 1 rating is based on students' ability to provide a simple scientific explanation for common observations.

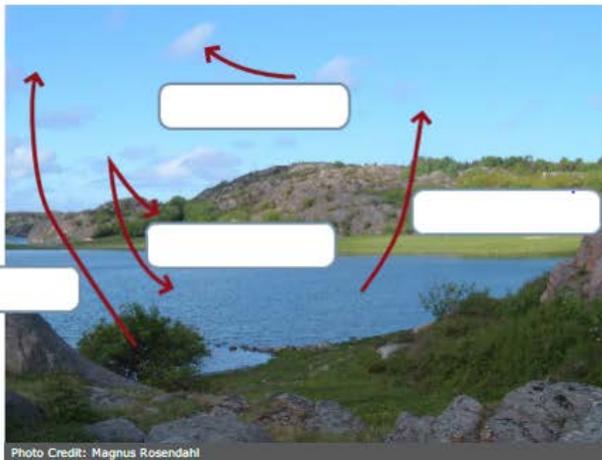
Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Earth and Space Sciences

Sub-area: Earth's Systems

<p>NWEA Learning Statement: Represents processes of the water cycle in models</p> <p>Item RIT: 213 Item DOK: 2</p>	<p>DCI:</p> <ul style="list-style-type: none"> • Earth Materials and Systems • Roles of Water in Earth's Surface Processes 	<p>SEP:</p> <p>Developing and Using Models</p>	<p>CCC:</p> <p>Systems and System Models</p>
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The diagram represents the water cycle in an area with a lake and plants. Label the arrows by moving the names of the processes into the appropriate boxes.



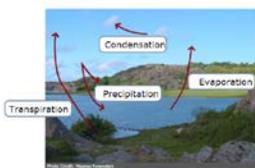
Evaporation

Condensation

Precipitation

Transpiration

Correct Response:



Evaporation Condensation Precipitation Transpiration

Narrative: This grade 6-8 item provides evidence of students' growth in their ability to model interactions among the hydrosphere, biosphere, and atmosphere, in the context of the water cycle. The NWEA Learning Statement is linked to two DCIs because of the strong overlap of ideas between the water cycle and Earth's systems. This item is rated a DOK 2 since students are specifying relationships among parts of a familiar system.

Sample 3-5 and 6-8 MAP Science Items

Instructional Area: Earth and Space Sciences

Sub-area: Earth and Human Activity

NWEA Learning Statement: Applies scientific ideas to design solutions to problems involving human impacts on ecosystems

Item RIT: 216 **Item DOK:** 2

DCI:
Human Impacts on Earth Systems

SEP:
Constructing Explanations and Designing Solutions

CCC:
Cause and Effect

Students want to develop a plan for their school yard that will help the ecosystem.

Which plan will help the ecosystem?

- A. Remove earthworms and ants from the yard.
- B. Plant native plants to reduce water runoff.
- C. Use more fertilizer in the school garden to grow more food.
- D. Leave food out for animals such as raccoons, deer, and coyotes.

Narrative: This grade 6-8 item provides evidence of students' growth in ability to develop plans that would minimize human-related disruptions and protect a schoolyard environment. The item aligns to middle school DCI, SEP, and CCC but there is a strong progression from the elementary school DCI Human Impacts on Earth Systems. The SEP progresses from where elementary students are asked to research and report on ways to protect ecosystems, to middle school, where students are asked to design a solution to protect ecosystems. This item allows higher achieving elementary students to apply their understanding of core ideas to cause-effect relationships in systems and to compare solutions to a problem. The item is rated a DOK 2 because students are predicting the best outcome based on their knowledge of human-environmental relationships. This Learning Statement would appear under an Engineering Design topic, as well as the topic of Human Impacts in the Learning Continuum report.

Security Incident Response Policy

12371

Purpose

The purpose of this policy is to ensure the confidentiality, integrity, availability of NWEA Data and Computing Systems, and to mitigate damages and minimize risk to NWEA through early detection and response. In doing so, this policy requires:

- all NWEA employees, contractors and vendors to provide notice of any Security Incident they become aware of; and
- Information Owners to establish Security Incident Response Procedures consistent with this policy.

Scope

The provisions of this policy apply to all employees, contractors, vendors and others who use, maintain, process, store, transmit or have access to: (i) NWEA Data classified as Restricted, Confidential or Internal Use as defined in the [Data Classification Policy](#); and (ii) NWEA Computing Systems.

Definitions

Computing Systems: Any telecommunications and/or computer or related equipment or interconnected system, or subsystems, of equipment that is used in the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of voice and/or data (digital or analog): includes software, firmware, and hardware.

Information Owner: Information Owners are responsible for ensuring the proper classification of NWEA Data under their control and are responsible for granting data access permissions, appointing Information Custodians for their data, making sure people in data-related roles (Information Owner, Custodian, and User are defined in the [Data Classification Policy](#)) are properly trained, and ensuring compliance with all relevant policies and security requirements for all NWEA Data for which they have responsibility. Examples of Information Owners are: Executives, Vice Presidents, Sr. Directors, Directors and other heads of business units and departments, or their designees with responsibility for overseeing NWEA Data. Information Owners are determined by NWEA Executive members working in consultation with their respective departments.

NWEA Data: any data, regardless of format or media (not limited to electronic data) related to NWEA functions that are: (i) stored on NWEA Computing Systems; (ii) maintained by NWEA employees, contractors and vendors related to NWEA, its partners/customers, vendors, ; and (iii) collection of data that NWEA receives, maintains, or generates.

Security Incident: Any event that has the potential to negatively affect the confidentiality, integrity or availability of: (i) NWEA Data classified as Restricted, Confidential or Internal Use; or (ii) NWEA Computing Systems.

Security Incident Response Procedures: A structured and organized response to a Security Incident approved by the Information Owner and consistent with this policy.

Roles and Responsibilities

All employees, contractors and vendors who access, store, transmit or otherwise use NWEA Data classified as Restricted, Confidential or Internal Use or NWEA Computing Systems must acknowledge that they have read, understood and agree to comply with this Policy. This policy is owned and maintained by the Director of Privacy. Please contact the Director of Privacy with questions regarding this policy.

Policy Description

Employees and Contractors - In the event an NWEA employee or contractor becomes aware of a Security Incident they must immediately notify:

- their immediate manager;
- the Information Owner of the affected NWEA Data and Computing System; and
- the Enterprise Information Security Team at infosec@nwea.org.

Vendors - In the event an NWEA vendor becomes aware of a Security Incident they must immediately notify their NWEA employee contact. The NWEA employee shall in turn notify as set forth above.

In the event an NWEA employee, contractor or vendor is uncertain who the Information Owner of the affected NWEA Data and Computing System is, they shall immediately email the Enterprise Information Security Team at infosec@nwea.org.

Information Owners - Information Owners are responsible for the development, maintenance and administration of Security Incident Response Procedures for the NWEA Data and Computing Systems they own, which shall require and address the following:

- Description of the Security Incident, including affected systems and locations;
- Roles and responsibilities for all involved parties;
- Point of contact and contact list for all involved parties;
- Escalation of the Security Incident and prioritization of the Security Incident based on business impact and sensitivity of NWEA Data at issue;
- Containment and resolution of the Security Incident (if responsible for such action);
- Investigation plan and process, including documentation of all activities to contain, mitigate the Security Incident and restore the environment (if responsible for such action);
- Communication plan upon notice of a Security Incident, which shall include process to disseminate information and incident resolution status (if responsible for such action);

- Final communication plan on Security Incident resolution;
- Executive summary of incident; and
- Mitigation plan to minimize risk related to the Security Incident on a go forward basis.

If an Information Owner is not responsible for a particular action above, the Information Owner’s Security Incident Response Procedures must indicate who the responsible Information Owner is for that action.

Security Incident information is classified as Restricted as set forth in the [Data Classification Policy](#). NWEA employees, contractors and vendors shall handle it according to the Restricted Handling Procedures set forth in the [Data Classification Policy](#).

Security Incidents shall be handled in accordance with this policy and the Data Classification Policy.

Reference

- [Data Classification Policy](#)
- [Information Security Foundation Policy](#)

Ownership and Review

Document Owner:	Document Approver:	Approval Date:	Effective Date:	Review Date:
Jacob Carroll	Cohen, Geri	01/27/2017	01/20/2017	01/27/2018



Caveon Data Forensics Report

STATE Assessment Program

Grades 03-08 Math and Reading
June 2014 Paper-and-Pencil Administration

September, 2014

Draft for Review

Prepared for

STATE Department of Education

Prepared and submitted by Caveon Test Security

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Executive Summary

Caveon Data Forensics™ methods were used to analyze the Mathematics and Reading for STATE's Assessment Program exams, resulting from the June 2014 Paper-and-Pencil administration by the STATE Department of Education. The tests were administered to students in grades 3 through 8. The purpose of this study was to identify potential testing irregularities at the school level. The intent of this report is to identify and prioritize the more obvious statistical anomalies which could indicate test security issues. This information can be used by STATE Department of Education to effectively focus and utilize its investigative resources. We analyzed 593,612 tests that were administered at 1,083 schools from 170 school districts.

This report shows that nearly all testing for the June 2014 Paper-and-Pencil administration of the STATE Assessment Program exams was relatively fair and equitable. Most schools had few, if any, statistical anomalies detected by the security statistics. However, there were a few exceptions that are detailed in this report. Specifically, the anomalies included:

- There were 83 School-Subject-Grade groups flagged for statistical anomalies by one or more security statistics from the population of 6,954 School-Subject-Grade groups. These groups were from 68 schools in 41 districts. These groups are described in Table 2 and Table 3.
- While 682 clusters were detected by the similarity statistic, answer copying between students did not appear to be a major issue, as these clusters represent only approximately one-tenth of one percent of the total number of tests administered¹. This is due, at least in part, to the method of test administration. Since the exam was administered in three parts, it is likely that student seating would change with the administration of each part. Thus, it is possible that student answer-copying behavior would not be detected because such behavior for a given student could have been associated with as many as three different students, one for each part of the STATE Assessment Program.

¹ A very conservative threshold of one chance in one trillion (i.e. 10^{-12}) was used for this finding. A change in threshold would change the associated count and percentage.

In the Investigation Recommendations section of this report, we have provided Table 1, which lists sixteen schools ranked by statistical evidence indicative of test security violations. This table is intended to serve as a prioritization of schools which, in our judgment, are most like to have experienced a test security breach and to provide guidance for the use of investigative resources. The data forensics results for the entire state, including those supporting the list of sixteen schools in Table 1, are discussed further in the remaining sections of the report.

Investigation Recommendations

In this section, we have listed the sixteen schools with the most statistical evidence indicative of potential test security violations. The schools in Table 1 are ranked in descending order by statistical evidence. Following Table 1, we discuss how the rankings were determined.

Table 1: School Investigation Recommendations

Ranking	School Code	District	School	Summary of Evidence
1	0102	School District A	Elementary School A	Extreme rates of WTR and WTR-RTW Erasure detections for two consecutive years. Six Subject-Grade groups flagged in 2014 and six in 2013.
2	0304	School District B	Intermediate School A	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections for 2014. Two Subject-Grade groups were flagged.
3	0506	School District A	Elementary School B	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections for 2014. Two Subject-Grade groups were flagged.
4	0708	School District C	Elementary School C	Extreme rates of WTR Erasures, WTR-RTW Erasures, Score Gain, and WTR Difference detections for 2014. Two Subject-Grade groups were flagged.
5	0910	School District D	Elementary School D	Extreme rates of WTR Erasures, WTR-RTW Erasures, and M4 Similarity detections for 2014. Two Subject-Grade groups were flagged.
6	1112	School District E	Elementary School E	Extreme rates of WTR Erasures, WTR-RTW Erasures, and Score Gain detections for 2014. Two Subject-Grade groups were flagged.
7	1314	School District A	Middle School A	Extreme rates of WTR Erasures, WTR-RTW Erasures, and M4 Similarity detections for 2014. Two Subject-Grade groups were flagged.
8	1516	School District F	Elementary School F	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections. One Subject-Grade group was flagged in 2014.

Ranking	School Code	District	School	Summary of Evidence
9	1718	School District G	Elementary School G	Extreme rates of WTR Erasures, WTR-RTW Erasures, Score Gain, and WTR Difference detections for 2014. One Subject-Grade group was flagged.
10	1920	School District H	Middle School B	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections for 2014. One Subject-Grade group was flagged.
11	2122	School District A	Elementary School H	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections for 2014. One Subject-Grade group was flagged.
12	2324	School District A	Elementary School I	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections for 2014. One Subject-Grade group was flagged.
13	2526	School District A	Elementary School J	Extreme rates of WTR Erasures, WTR-RTW Erasures, and WTR Difference detections for 2014. One Subject-Grade group was flagged.
14	2728	School District I	Middle School C	Extreme rates of WTR Erasures, WTR-RTW Erasures, and Score Gain detections for 2014. One Subject-Grade group was flagged. Also flagged in 2013.
15	2930	School District J	Middle School D	Extreme detection rate by the Score Gain Statistic. Two Subject-Grade groups flagged. Also flagged in 2013.
16	3132	School District A	Elementary School K	Extreme detection rate by the Score Gain Statistic. One Subject-Grade group flagged. Also flagged in 2013.

In Table 1, the leftmost column is the school ranking. Schools with lower rankings have stronger statistical evidence that unusual behaviors occurred. The next three columns uniquely identify the school. The rightmost column contains a brief description of the statistical evidence supporting the ranking.

This Report presents statistical anomalies which could indicate test security was violated. A statistical anomaly is not the same as a test security violation or even a testing irregularity. In order to determine whether the presence of the anomaly was due to a test security violation, the situation must be assessed and an inference must be made. Because investigating each anomaly could require significant resources and time, Table 1 lists those schools, which in our judgment, are most likely to have experienced a test security breach.

We have used the following principles in guiding our ranking process:

1. If the school had been flagged for two consecutive years, it would indicate a stronger pattern than a flag for a single year.
2. If more than one subject-grade combination was flagged in the school, it would indicate that the potential misbehavior involved several groups of students and/or adults.
3. Some anomalies are more credible for making an inference that test security may have been violated. The erasure statistics provide greater credibility than the similarity, score difference, and score gains statistics.
4. Flags by multiple statistics indicate a stronger pattern than a flag by a single statistic.

Therefore, we have produced a scoring metric for ranking the schools detected with anomalies.

- Each erasure rate flag was assigned two points.
- Other flags, including flags that indicate performance was associated with the anomaly, were assigned one point.
- Points were carried forward for schools that were flagged for both years.

The tabulated point values are provided in Tables 2 and 3 below in the “Weight” columns.

Description of Analysis Methods

In assessing the potential security breaches specific to individual schools and teachers, there are three general areas of concern:

- Tampering with answer sheets after test administration to raise the scores of marginal students from failing to passing.
- Disclosure of exam content by “teaching the test,” use of actual exam content in preparatory materials, and/or coaching students during the test (e.g., giving unauthorized assistance).
- Unauthorized collaboration between students during the testing session, possibly aided by a teacher, resulting in large clusters of similar tests.

Accordingly, this analysis used six statistics that were designed to detect statistical inconsistencies related to these security risks: M4 Similarity, Wrong to Right (WTR) Erasures, Wrong to Right minus Right to Wrong (WTR-RTW) Erasures, Scored-Diff, Score Gain, and Wrong to Right (WTR) Difference. Each is briefly described below. More detailed information is available in Appendix A.

- The M4 Similarity Statistic measures the degree of similarity among tests. Large numbers of similar tests may indicate partial content disclosure to the students in a particular group such as a subject-grade, or use of exam content by tutors who disclose live test questions.
- The WTR Erasures Statistic measures the significance of wrong-to-right (WTR) answer changes (i.e., erasing an incorrect answer and replacing it with a correct answer). A high proportion of answer sheets with detected WTR erasures may indicate answer sheet tampering, especially if these are associated with pass rate improvements. High erasure rates also can result from question-marking-and-review.
- The WTR-RTW Erasures Statistic measures the significance between wrong-to-right and right-to-wrong erasures. With normal test taking behaviors, these two counts should be approximately equal. A large difference between the two may indicate answer sheet tampering, especially if these are associated with pass rate improvements.

- The Scored-Diff statistic measures the difference in a student’s performance between scored and non-scored items. Non-scored items (also known as field-test or pre-test items) are usually being evaluated for use in future exams. Detections by the Scored-Diff Statistic may indicate disclosure of non-scored items from a previous year’s exam; for example, using exact questions from previous exams as preparatory material.
- The Score Gain Statistic measures the difference in a student’s performance between two consecutive years (2013 to 2014 in this case). A significant difference between the two may indicate that the higher score was “enhanced” by content coaching, answer sheet tampering, or some other type of security breach. The Score Gain Statistic must be treated carefully because many other factors, including improved instruction, contribute to score improvements.
- The WTR Difference Statistic measures the difference in a student’s number of WTR erasures between two consecutive years (2013 to 2014 in this case). A significant difference may indicate score tampering activity during the year with the higher rate.

These security statistics are interpreted using up to five quantities:

1. The rate (proportion) of test instances in the analysis set that were detected by the statistic,
2. The pass rate for the subset of test instances detected by the statistic,
3. The pass rate for the subset of test instances not detected by the statistic,
4. The estimated probability of the observed difference between the two pass rates (difference index),
5. The estimated probability of the observed rate of detected test instances (rate index).

For reporting convenience, the two probabilities (4 and 5 above) are expressed in base 10 logarithm units. Probabilities reported using base 10 logarithms are referred to as “index values.” For example, an index value of 6 corresponds to a probability of 10^{-6} (1 in one million or 0.000001) that the observed (calculated) value occurred by random chance. For each analysis group (i.e. school or classroom) the index values are combined into an Overall Index, which indicates the level of observed statistical inconsistency across all the security statistics for that

group of tests. The index is the key indicator of the severity and plausibility of the statistical inconsistency or anomaly; the greater the index, the greater the severity.

Analysis groups are “flagged” when one of the indices, or when the Overall Index, for a group of tests associated with the group exceeds a predetermined threshold. Thresholds for flagging can be set by the testing program managers/stakeholders or they can be derived statistically, where a calculation is performed to determine a threshold based on the size of the population.

Through consultation with the STATE Department of Education, the flagging threshold was set at 12 in this Report; however, some of the results presented herein are discussed in relation to a statistically derived threshold as well (a threshold of 5.84 in this case).

Analysis of Schools

The results of these analyses were compiled in the following Excel workbook:

'STATE-AllGrades_DF_school.excel_gSummary3_2014-Sep-15.xlsx'

Using the six security statistics, each of the 6,954 School-Subject-Grade groups (1,083 schools and 175 school districts) was analyzed. There were 83 School-Subject-Grade groups that had a security index of 12 or greater² for one or more of the security statistics. The groups were identified in 68 schools and 41 districts. An analysis group with an index exceeding 12 is herein referred to as a “group of interest.” Table 2 shows the Subject-Grade distribution of these 83 groups of interest among the 68 schools.

Table 2: Distribution of Subject-Grade Groups of Interest by School

School Code	District	School	RD-03	RD-04	RD-05	RD-06	RD-07	RD-08	MA-03	MA-04	MA-05	MA-06	MA-07	MA-08	2014 Weight	2013 Weight
0102	School District A	Middle School A										X			1	
0304	School District B	Intermediate School A										X			1	
0506	School District C	Elementary School A									X				1	
0708	School District D	Elementary School B							X						1	
0910	School District E	Elementary School C	X												4	
1112	School District F	Middle School B										X			1	1
1314	School District G	Middle School C												X	1	1
1516	School District H	Elementary School D				X									1	
1718	School District I	Middle School D						X							1	
1920	School District J	Elementary School E				X						X			11	

² The value of 12 was selected as the threshold in consultation with the STATE Department of Education.

School Code	District	School	RD-03	RD-04	RD-05	RD-06	RD-07	RD-08	MA-03	MA-04	MA-05	MA-06	MA-07	MA-08	2014 Weight	2013 Weight
2122	School District K	Intermediate School B									X				1	
2324	School District L	Elementary School F			X										6	1
2526	School District L	Middle School E												X	1	
2728	School District M	Intermediate School C										X			1	1
2930	School District N	Elementary School G								X					1	
3132	School District O	Elementary School H										X			1	
3334	School District P	Elementary School I									X				1	
3536	School District Q	Middle School F										X			6	
3738	School District R	Elementary School J										X			1	
3940	School District R	Elementary School K										X			3	
4142	School District S	Middle School G											X		1	
4344	School District T	Education Center A					X								4	
4546	School District T	Middle School H											X		1	
4748	School District U	Elementary School L	X						X						10	
4950	School District U	Elementary School M									X				1	
5152	School District V	Middle School I												X	1	1
5354	School District V	Middle School J										X	X		2	3
5556	School District W	Elementary School N									X				1	1
5758	School District W	Elementary School O	X	X	X				X	X	X				26	20

School Code	District	School	RD-03	RD-04	RD-05	RD-06	RD-07	RD-08	MA-03	MA-04	MA-05	MA-06	MA-07	MA-08	2014 Weight	2013 Weight
5960	School District W	Elementary School P			X						X				12	
6162	School District W	Elementary School Q								X	X				2	
6364	School District W	Elementary School R								X					4	
6566	School District W	Elementary School S								X					4	
6768	School District W	Elementary School T	X												4	
6970	School District W	Elementary School U									X				6	
7172	School District W	Elementary School V								X					6	
7374	School District W	Middle School K				X		X							6	2
7576	School District W	Elementary School AA							X						4	
7778	School District W	Elementary School BB									X				2	
7980	School District W	Elementary School CC									X				6	
8182	School District X	Elementary School DD										X			1	4
8384	School District Y	Middle School M												X	1	
8586	School District Z	Elementary School EE												X	1	
8788	School District AA	Elementary School FF								X					1	1
8990	School District AA	Elementary School GG									X				1	
9192	School District AA	Elementary School HH		X											1	1
9394	School District AA	Middle School N												X	1	
9596	School District BB	Elementary School II								X					1	

School Code	District	School	RD-03	RD-04	RD-05	RD-06	RD-07	RD-08	MA-03	MA-04	MA-05	MA-06	MA-07	MA-08	2014 Weight	2013 Weight
9798	School District CC	Elementary School JJ									X				1	1
9910	School District DD	Middle School O												X	1	
10001	School District DD	Intermediate School D				X									1	
10002	School District EE	Middle School P												X	1	
10003	School District FF	Middle School Q											X		1	
10004	School District FF	Elementary School KK									X				1	
10005	School District GG	Elementary School LL		X						X					9	
10006	School District HH	Middle School R									X				1	
10007	School District HH	Elementary School MM								X					1	
10008	School District II	Middle School S											X		1	
10009	School District JJ	Elementary School NN		X											7	
10010	School District JJ	Middle School T											X		1	
10011	School District KK	Middle School U										X		X	2	
10012	School District LL	Middle School V											X		5	1
10013	School District MM	Middle School W												X	1	1
10014	School District NN	Elementary School OO									X				1	1
10015	School District NN	Middle School X												X	1	
10016	School District NN	Elementary School PP									X				1	
10017	School District NN	Middle School Y											X	X	2	

School Code	District	School	RD-03	RD-04	RD-05	RD-06	RD-07	RD-08	MA-03	MA-04	MA-05	MA-06	MA-07	MA-08	2014 Weight	2013 Weight
10018	School District NN	Intermediate School E		X	X										8	14
Subject-Grade Totals			4	5	4	4	1	2	3	11	17	12	8	12		

Each row in Table 2 displays the information for one school. The rows are color grouped by district to aid readability. The school information is listed in the first three columns³. The next 12 columns are the Subject-Grades; for example, RD-04 is Reading-Grade 4 and MA-07 is Math-Grade 7. If a Subject-Grade was a group of interest, the appropriate cell is marked with an X. The “2014 Weight” column gives the total weight⁴ for the flagged Subject-Grades for each school, the “2013 Weight” column gives the total weight for the flagged Subject-Grades for each school from 2013, and the “Totals” row at the bottom gives the number of flagged schools for each Subject-Grade.

Table 2 shows that:

- One school had six flagged Subject-Grades
- Ten schools had two flagged Subject-Grades
- Fifty-seven schools had one flagged Subject-Grade

The weight values are provided to help prioritize the use of the STATE Department of Education investigative resources.

Table 3 provides additional security risk information for the schools of interest in Table 2. For each of the 83 flagged school-subject-grades in Table 2 (i.e. those marked with an X), the table shows the individual security statistics that produced the flagging.

³ The rows in Table 2 are ordered alphabetically by District and School.

⁴ These weights are tabulated from the individual School-Subject-Grade groups listed in Table 3.

Table 3: Security Statistics Detail for Schools of Interest

School Code	District	School	Grade	Subject	Number of Tests	Pass Rate	Mean Score	M4 Similarity	WTR Erasures	WTR-RTW Erasures	Scored-Diff	Score Gain	WTR Difference	Weight
0102	School District A	Middle School A	06	MA	185	0.68	217					X		1
0304	School District B	Intermediate School A	06	MA	214	0.58	212					X		1
0506	School District C	Elementary School A	05	MA	97	0.85	224					X		1
0708	School District D	Elementary School B	04	MA	234	0.53	212					X		1
0910	School District E	Elementary School C	03	RD	68	0.71	215		X	X				4
1112	School District F	Middle School B	06	MA	167	0.59	213					X		1
1314	School District G	Middle School C	08	MA	371	0.69	220					X		1
1516	School District H	Elementary School D	06	RD	62	0.69	217					X		1
1718	School District I	Middle School D	08	RD	245	0.53	210					X		1
1920	School District J	Elementary School E	06	MA	33	0.58	211		X	X		X		5
1920	School District J	Elementary School E	06	RD	33	0.55	208		X	X			X	6
2122	School District K	Intermediate School B	05	MA	217	0.68	218					X		1
2324	School District L	Elementary School F	05	RD	56	0.73	219		X	X			X	6

School Code	District	School	Grade	Subject	Number of Tests	Pass Rate	Mean Score	M4 Similarity	WTR Erasures	WTR-RTW Erasures	Scored-Diff	Score Gain	WTR Difference	Weight
2526	School District L	Middle School E	08	MA	226	0.31	205					X		1
2728	School District M	Intermediate School C	06	MA	134	0.60	216					X		1
2930	School District N	Elementary School G	04	MA	98	0.83	229					X		1
3132	School District O	Elementary School H	06	MA	82	0.60	214					X		1
3334	School District P	Elementary School I	05	MA	46	0.83	221					X		1
3536	School District Q	Middle School F	06	MA	240	0.35	206		X	X			X	6
3738	School District R	Elementary School J	06	MA	65	0.52	212					X		1
3940	School District R	Elementary School K	06	MA	42	0.86	225		X			X		3
4142	School District S	Middle School G	07	MA	95	0.37	207					X		1
4344	School District T	Education Center A	07	RD	11	0.18	196		X				X	4
4546	School District T	Middle School H	07	MA	168	0.52	214					X		1
4748	School District U	Elementary School L	03	MA	27	0.48	209	X	X	X				5
4748	School District U	Elementary School L	03	RD	27	0.93	219	X	X	X				5

School Code	District	School	Grade	Subject	Number of Tests	Pass Rate	Mean Score	M4 Similarity	WTR Erasures	WTR-RTW Erasures	Scored-Diff	Score Gain	WTR Difference	Weight
4950	School District U	Elementary School M	05	MA	45	0.58	215					X		1
5051	School District V	Middle School I	08	MA	300	0.54	213					X		1
5253	School District V	Middle School J	06	MA	239	0.64	217					X		1
5253	School District V	Middle School J	07	MA	221	0.76	224					X		1
5455	School District W	Elementary School N	05	MA	89	0.60	213					X		1
5657	School District W	Elementary School O	03	MA	92	0.58	216		X	X				4
5657	School District W	Elementary School O	03	RD	92	0.75	220		X	X				4
5657	School District W	Elementary School O	04	MA	111	0.56	212		X	X				4
5657	School District W	Elementary School O	04	RD	111	0.73	218		X	X			X	6
5657	School District W	Elementary School O	05	MA	116	0.55	210		X	X				4
5657	School District W	Elementary School O	05	RD	116	0.82	220		X	X				4
5859	School District W	Elementary School P	05	MA	100	0.77	222		X	X			X	6
5859	School District W	Elementary School P	05	RD	98	0.85	225		X	X			X	6
6061	School District W	Elementary School Q	04	MA	95	0.72	218	X						1

School Code	District	School	Grade	Subject	Number of Tests	Pass Rate	Mean Score	M4 Similarity	WTR Erasures	WTR-RTW Erasures	Scored-Diff	Score Gain	WTR Difference	Weight
6061	School District W	Elementary School Q	05	MA	100	0.81	222					X		1
6263	School District W	Elementary School R	04	MA	54	0.50	211		X	X				4
6465	School District W	Elementary School S	04	MA	37	0.35	208		X	X				4
6667	School District W	Elementary School T	03	RD	77	0.43	206		X	X				4
6869	School District W	Elementary School U	05	MA	84	0.25	200		X	X			X	6
7071	School District W	Elementary School V	04	MA	96	0.55	213		X	X			X	6
7273	School District W	Elementary School W	06	RD	211	0.23	197		X				X	4
7273	School District W	Elementary School W	08	RD	240	0.24	199		X					2
7475	School District W	Elementary School X	03	MA	45	0.47	211		X	X				4
7677	School District W	Elementary School Y	05	MA	74	0.34	205		X					2
7879	School District W	Elementary School Z	05	MA	88	0.77	218		X	X			X	6
8081	School District X	Elementary School AA	06	MA	43	0.77	218					X		1
8283	School District Y	Middle School K	08	MA	349	0.66	218					X		1
8485	School District Z	Elementary School BB	08	MA	32	0.78	219					X		1
8687	School District AA	Elementary School CC	04	MA	35	0.74	222					X		1
8889	School District AA	Elementary School DD	05	MA	55	0.80	217					X		1
9091	School District AA	Elementary School EE	04	RD	99	0.72	218					X		1

School Code	District	School	Grade	Subject	Number of Tests	Pass Rate	Mean Score	M4 Similarity	WTR Erasures	WTR-RTW Erasures	Scored-Diff	Score Gain	WTR Difference	Weight
9293	School District AA	Middle School L	08	MA	333	0.62	216					X		1
9495	School District BB	Elementary School FF	04	MA	74	0.61	216					X		1
9697	School District CC	Elementary School GG	05	MA	82	0.87	225					X		1
9899	School District DD	Middle School M	08	MA	356	0.57	213					X		1
10001	School District DD	Intermediate School D	06	RD	334	0.71	218					X		1
10002	School District EE	Middle School N	08	MA	108	0.56	213					X		1
10003	School District FF	Middle School O	07	MA	220	0.69	221					X		1
10004	School District FF	Elementary School HH	05	MA	135	0.87	226					X		1
10005	School District GG	Elementary School II	04	MA	24	0.67	220		X	X		X		5
10005	School District GG	Elementary School II	04	RD	24	0.75	220		X	X				4
10006	School District HH	Middle School P	05	MA	90	0.48	209					X		1
10007	School District HH	Elementary School JJ	04	MA	85	0.91	231					X		1
10008	School District II	Middle School Q	07	MA	173	0.46	209					X		1

School Code	District	School	Grade	Subject	Number of Tests	Pass Rate	Mean Score	M4 Similarity	WTR Erasures	WTR-RTW Erasures	Scored-Diff	Score Gain	WTR Difference	Weight
10009	School District JJ	Elementary School KK	04	RD	102	0.79	220		X	X		X	X	7
10010	School District JJ	Middle School R	07	MA	327	0.50	210					X		1
10011	School District KK	Middle School S	06	MA	230	0.49	210					X		1
10011	School District KK	Middle School S	08	MA	241	0.57	214					X		1
10012	School District LL	Middle School T	07	MA	283	0.60	215		X	X		X		5
10013	School District MM	Middle School U	08	MA	131	0.69	217					X		1
10014	School District NN	Elementary School LL	05	MA	95	0.67	215					X		1
10015	School District NN	Middle School V	08	MA	226	0.38	206					X		1
10016	School District NN	Elementary School MM	05	MA	69	0.74	220					X		1
10017	School District NN	Middle School W	07	MA	240	0.45	209					X		1
10017	School District NN	Middle School W	08	MA	251	0.57	215					X		1
10018	School District OO	Intermediate School E	04	RD	113	0.70	217		X	X			X	6
10018	School District OO	Intermediate School E	05	RD	105	0.52	213		X					2
Totals								3	33	27	0	54	13	

In Table 3, each row provides additional information for a flagged school group in Table 2.⁵ The schools are highlighted by a common row color to aid in readability. The first five columns identify the school, grade, and subject. The next three columns give the test volume, pass rate, and mean score for the group. Pass rates and mean scores significantly exceeding the state-wide baseline values are highlighted with gold. The next six columns display the information for each of the six security statistics. If a security statistic had an index value above 12 for that School-Grade-Subject group, it is marked with an X (highlighted in red). Even though at least one index value above 12 was required for a School-Grade-Subject group to be included in the table, lesser anomalies⁶ have been marked with an X (highlighted in yellow). The final column (Weight) provides the overall weight assigned to the detected statistical anomalies (erasure anomalies are given a weight of two, and other anomalies are given a weight of one) for that group.

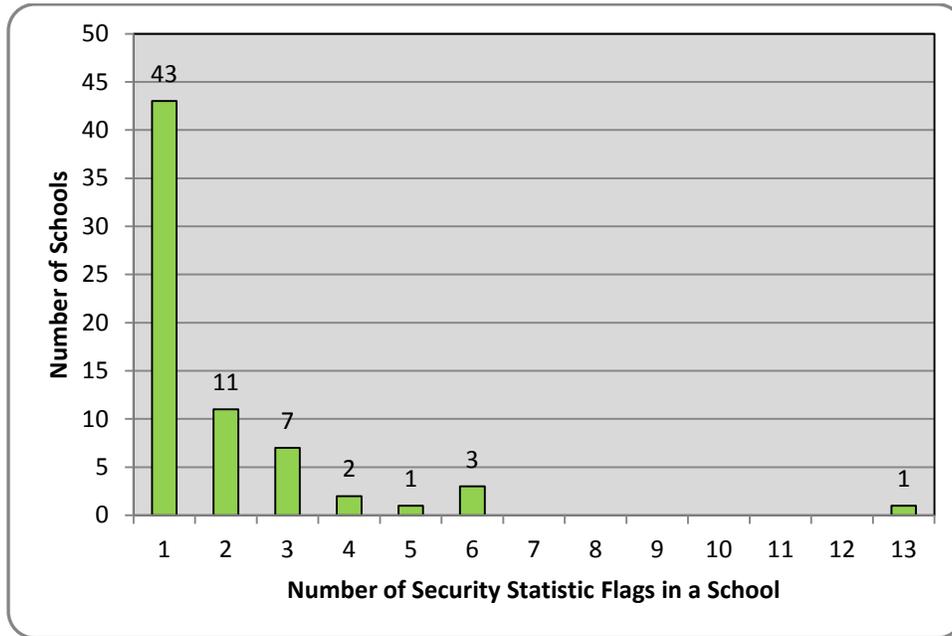
The information in Table 3 shows the types of statistical anomalies detected within a School-Subject-Grade group and is provided to guide school investigations.

Figure 1 summarizes the number of flags within the schools using a histogram.

⁵ The data in Table 2 are sorted by ascending District, School, Grade, and Subject.

⁶ These are associated with index values that exceeded 5.84. This value was determined using the Bonferroni correction at an alpha level of 0.01 with 6,954 school-grade-subject groups (e.g., 5.84 is the absolute value of $\log_{10}(0.01/6,954)$).

Figure 1: School Frequencies of Detections by the Security Statistics



The flagged schools had a total of 130 detections at the Grade-Subject level by the security statistics. The distribution of these detections is shown in Figure 2.

Figure 2: Distribution of Security Statistic Detections

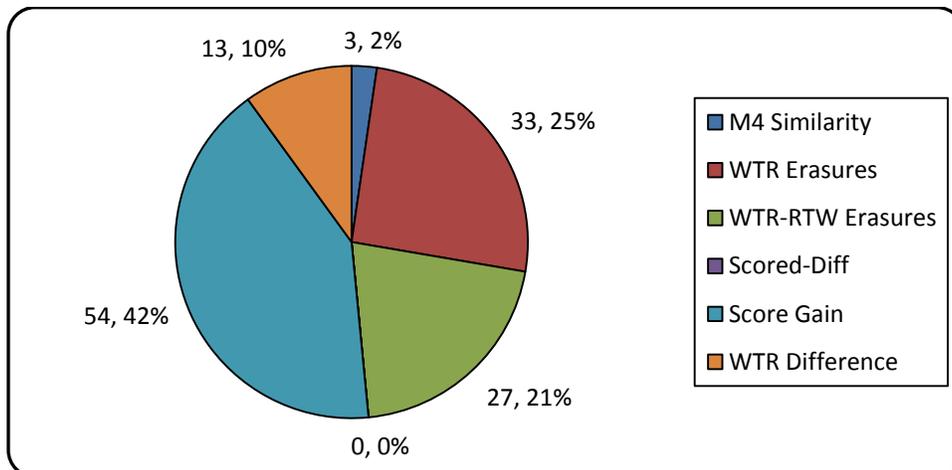


Figure 2 shows that almost one-half (46%) of the detections were due to anomalous erasing (WTR Erasures and WTR-RTW Erasures combined), indicating possible tampering. Forty-two percent (42%) were due to significant score gains from 2013 to 2014. Since the detection rate of

the M4 Similarity Statistic was quite low (2% of the detections), answer copying between students and/or disclosure of exam content by teachers appear to be minor concerns for this administration of the STATE Assessment Program.

Longitudinal Analysis

This section provides information about the schools that had a security index of 12 or greater for one of the security statistics for both the 2013 and 2014 analyses (i.e., “school of interest”). There were 17 schools that were flagged in both analyses. Table 4 summarizes the statistical detections for the two years.

Table 4: Flagged Schools in 2013 and 2014

District-School	District	School	2013 Number Flagged Subject-Grades	2014 Number Flagged Subject-Grades	2013 WTR Erasures	2014 WTR Erasures	2013 WTR-RTW Erasures	2014 WTR-RTW Erasures	2013 Score Gain	2014 Score Gain	2013WTR Difference	2014 WTR Difference
0102	School District A	Middle School A	1	1					1	1		
0304	School District B	Middle School B	1	1					1	1		
0506	School District C	Elementary School A	1	1		1		1	1			1
0708	School District D	Intermediate School A	1	1					1	1		
0910	School District E	Middle School C	1	1					1	1		
0910	School District E	Middle School D	3	2					3	2		
1112	School District F	Elementary School B	1	1					1	1		
1112	School District F	Elementary School C	4	6	4	6	4	6			2	1

District-School	District	School	2013 Number Flagged Subject-Grades	2014 Number Flagged Subject-Grades	2013 WTR Erasures	2014 WTR Erasures	2013 WTR-RTW Erasures	2014 WTR-RTW Erasures	2013 Score Gain	2014 Score Gain	2013 WTR Difference	2014 WTR Difference
1112	School District F	Middle School E	1	2	1	2						1
1314	School District G	Elementary School D	1	1	1		1			1		
1516	School District H	Elementary School E	1	1					1	1		
1516	School District H	Elementary School F	1	1					1	1		
1718	School District I	Elementary School G	1	1					1	1		
1920	School District J	Middle School F	1	1		1		1	1	1		
2122	School District K	Middle School G	1	1					1	1		
2324	School District L	Elementary School H	1	1					1	1		
2526	School District M	Intermediate School B	3	2	3	2	3	1			1	1

In Table 4, each row shows the types of statistical anomalies detected for the two years for a school. The two years for each statistic are highlighted by a single color; for example, 2013 WTR Erasures and 2014 Erasures. Since none of these schools had any detections by the M4 Similarity, Scored Diff, or WTR Diff statistics, only three flagging statistics are presented. If a school was flagged by a given statistic in a given year, the number of flags was placed at the intersection of the school row and the year-statistic column.

Analysis of Individual Tests

The results of these analyses were compiled from the following Excel workbook:

'STATE-AllGrades_DF_extreme_examinee_2014-Sep-15.xlsx'

The student test response patterns for each School-Subject-Grade group were compared to detect the existence of similar test patterns. Each test was compared to every other test in the group. When the tests were compared, 682 tests were extremely similar⁷ to at least one other test. The vast majority of these tests formed pairs of extremely similar tests. Figure 3 shows the distribution of cluster sizes.

Figure 3: Extremely Similar Tests Cluster Sizes

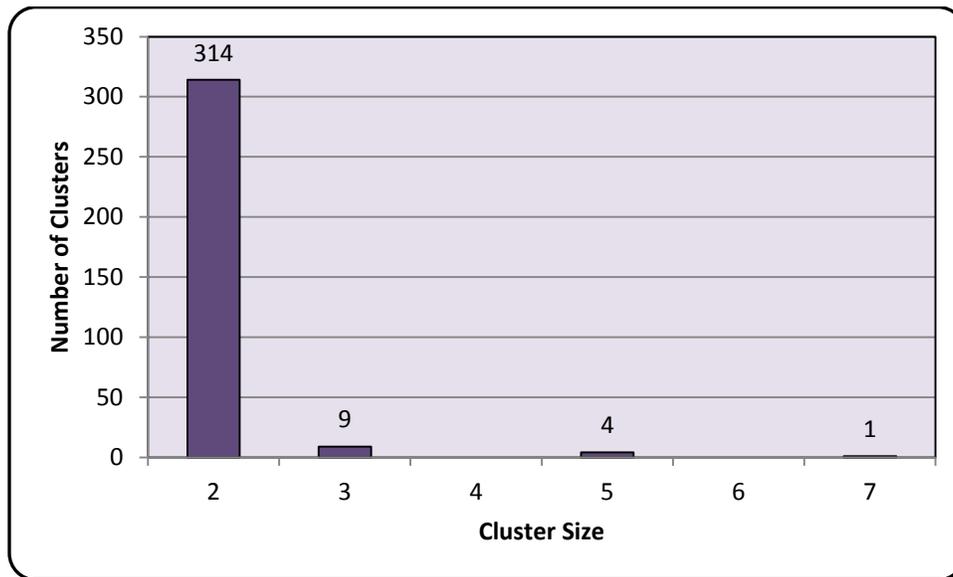


Figure 2 shows that the M4 Similarity Statistic detected 314 pairs of extremely tests, nine clusters of size three, four clusters of size five, and one of size seven.

To determine what action, if any, is warranted towards cluster members, we need to determine if any score advantage resulted from the behaviors that produced the similarity. The average scale score for the 682 anomalous test instances was 205, while the average scale score for all test instances was 210. The pass rate for the anomalous test instances was 38% compared to 51% for all tests. These results show that the similar tests were not generally associated with increased performance, although it is possible that a few individuals benefitted.

⁷ An extremely similar test is one whose probability index for the comparison is 12 or greater.

Additionally, we looked at the cluster distributions relative to Subject-Grade and school. These data are shown in Figures 4 and 5.

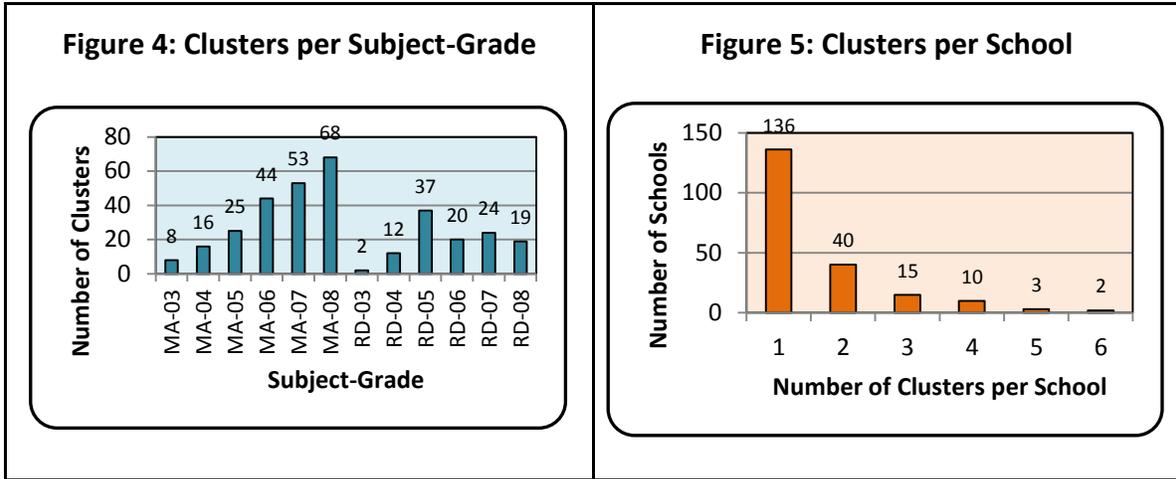


Figure 4 displays the number of clusters of extremely similar tests detected for each Subject-Grade group. The figure shows that the number of detected clusters in math increases as the grade level advances. This trend may be associated with increased difficulty of the math tests which could place more pressure on students at higher grade levels. An explanation should be sought for this trend. The reading tests do not show a similar trend.

Figure 5 displays the number of clusters detected at a school. The data show that the M4 Similarity Statistic detected one or more clusters at 206 schools⁸, but the number of detections for a given school were quite low.

Overall, the rate of extremely similar tests was very low, 0.11% (682 of 593,612). Extremely similar tests were not a major concern for this administration of the STATE Assessment Program.

Summary

Sixteen schools were identified with the most statistical evidence indicative of potential test security violations. These schools are ranked in descending order by statistical evidence in Table 1.

⁸ There were 877 (81% of 1,083) schools which did not have any detection by the M4 Similarity Statistic.

A total of 83 School-Subject-Grade groups were flagged for statistical anomalies by one or more security statistics from the population of 6,954 School-Subject-Grade groups. These groups were from 68 schools in 41 districts. The information provided in Table 2 can be used to determine priority and allocation of resources in the investigation of any schools.

A total of 682 clusters were detected by the similarity statistic; however, in general, answer copying between students did not appear to be a major issue as these clusters represent only approximately one-tenth of one percent of the total number of tests administered. This is due, at least in part, to the method of test administration. Since the exam was administered in three parts, it is likely that student seating would change with the administration of each part. Thus, it is possible that student answer-copying behavior would not be detected because such behavior for a given student could have been associated with as many as three different students, one for each part of the STATE Assessment Program.

Appendix A – Statistics used in the analysis

This appendix lists the statistics that were used in this analysis. Each statistic is described by what it measures and how it relates to potential test security violations. For individual tests, each measure is converted into a binary attribute or value, which is interpreted as “having the attribute” or “having a high or extreme value” (depending upon the threshold that is used). We will refer to these as “counting measures” or “statistical indicators,” respectively. Groupings of tests are analyzed by combining the individual statistics for the test instances in the groups and comparing them to the combinations for the entire set of test instances.

M4 Similarity: statistical indicator

This is a multivariate statistic which measures the degree of similarity between two tests under the assumption of independent test taking. This statistic is the number of identical correct responses (or those with non-zero scores) and the number of identical incorrect responses. These data follow a generalized trinomial distribution where the probabilities of matching answers are dependent upon test performance. We use a nominal response model to estimate the item response probabilities.

We have found this statistic to be a more powerful answer-copying detector than any other similarity statistic that we have studied. It is an extremely good statistic for detecting test coaching, answer-copying, proxy test taking, and collusion.

WTR Erasures: statistical indicator

Wrong to Right (WTR) Erasure data also are known as multiple mark data because the multiple mark (i.e., having more than one bubble filled in for a test question) could be due to several causes besides changing the answer. The scanning hardware and software usually read the intensities of the marked bubbles and usually infer that the darkest marked bubble corresponds to the selected answer, while bubbles with lighter marks correspond to erased answers.

Erasure analyses are based on estimated answer changing rates from wrong-to-right and anything-to-wrong for each individual test item. If those data are not available, a simpler statistical model will use the number of answer changes. Regardless of the model used, we seek to find answer sheets that are anomalous with respect to erasures. Some of these are potentially the result of test security violations.

WTR-RTW Erasures

This statistic measures the significance between wrong-to-right and right-to-wrong erasures. With normal test taking behaviors, these two counts should be approximately equal. A large difference between the two can be an indication of answer sheet tampering, especially if these are associated with pass rate improvements.

Scored-Diff: statistical indicator

The difference statistic is used to estimate the statistical significance between the scores of two sets of test questions on the same test. An item-by-item composite score difference statistic is computed which is used to determine if an individual has realized two significantly different scores on the selected item subsets (after accounting for subset size differences). One use of this statistic is to compare the core items, common to all examination administrations, to those items that are unique to a particular test administration. Another use is to compare the performance for scored items on tests with pre-test or unscored items. Such a comparison might be a reasonable way to infer whether an individual has prior knowledge of the scored items.

Score Gain: statistical indicator

This statistic measures large score increases or large score decreases compared to the predicted score using previous test scores. We distrust any testing situation where a large score increase or large score decrease is shown, because we don't know which scores are trustworthy. Standard regression methodology is employed for detecting these large score changes. In testing data we generally see a larger number of score

increases than decreases, consequently it is fairly typical to see a positive score difference associated with score gains.

WTR Difference: statistical indicator

This statistic measures the difference in a student's number of wrong-to-right erasures between two consecutive years. A significance difference can indicate score tampering activity during the year with the higher rate.

Appendix B – Glossary

This glossary is provided to assist with understanding terms used in this Report and in the accompanying worksheets.

Aberrance - Aberrance occurs when the test taker's response pattern on some questions is inconsistent with demonstrated knowledge for other test questions on the exam. The simplest example of aberrance is when the test taker is able to answer difficult questions correctly, but is unable to answer easy questions correctly. In addition to cheating, other atypical behaviors contribute to aberrance. These other behaviors include fatigue, poor preparation, illness, running out of time, lack of motivation, guessing, differential test preparation (knowing some content well, but not knowing other content), and so forth. Hence, aberrance must be interpreted carefully.

Cheating - Cheating refers to having and using pre-knowledge of the test content, or receiving unfair assistance in answering the test questions such as through answer copying or answer sharing.

Collusion – Highly similar tests occur when test takers participate in activities that result in greater similarity between the responses for two or more tests than would be expected if the tests were answered in a statistically independent manner (i.e., statistical independence allows the estimation of similarity between the tests under chance alone). Collusion arises when test takers copy answers from each other, when answers are provided to candidates on a crib sheet or verbally, or when a person (known as a proxy) takes the exams on behalf of two or more individuals. This also can occur when candidates study together in pairs or groups.

Item Compromise - An item is compromised when the number of candidates that perform well on the item is significantly greater than expected (as predicted using the item models). Statistically this means that the number of correct respondents is greater

than expected under the null hypothesis using an extreme value hypothesis test. (See also: Test Compromise.)

Item Exposure – (See Test Content Exposure)

Item Response Theory - Commonly known by the three letter acronym, IRT, Item Response Theory provides psychometric models for estimating response probabilities at varying levels of examinee ability.

Nominal Response Model - Caveon Data Forensics uses Nominal Response IRT (Item Response Theory) models in order to estimate aberrance and collusion. These models allow probability computations for all the incorrect answer choices and are critical for establishing probabilities of independent test taking.

Pass Rate – Pass rate is the proportion of tests that were awarded a passing score.

Overall Security Index – This index value is derived from individual index values that are associated with specific security statistics. The value is most often used when comparing groups and determining which, if any, appear to be statistically anomalous.

Piracy – This term is used to describe fraudulent efforts by individuals to steal and disclose the test content. Piracy (or test content theft) occurs when test questions are copied electronically or manually and then redistributed to others. A mild form of piracy occurs when individuals who are not prepared to take the test repeatedly attempt the test and through exposure and memorization learn the test content. Blatant piracy efforts will use screen capturing or photography to obtain exact representations of the test items.

Retake Policy Violations – Most certification and licensure programs implement policies that dictate when an exam may be re-attempted. Violations of these rules allow the violator to gain an unfair advantage and are a form of cheating.

Security Risk Behavior – Security risk behaviors are observable and measurable instances of behaviors associated with test administrations that pose risk of test fraud. The behaviors themselves are not fraudulent, but excessive numbers of such behaviors are anomalous.

Statistically Anomalous - An observation is statistically anomalous when the measured attributes are seen to be extremely different than the expected values for those attributes. A common euphemism to describe anomalous observations is “outlier.” Statistical practice for outlier detection or declaring an observation to be anomalous is usually based upon statistical tests where the probability value of the test statistic is extremely small.

Statistical Inconsistency – This term is synonymous with anomalous data. Statistical inconsistencies are measured as extreme outliers using statistical models. By implication, detected statistical inconsistencies may have resulted from testing irregularities.

Test Compromise - Test and Item Compromise means that the test takers perform better than expected on the test or the item as a result of test content exposure. When the test or test items are compromised, some test takers gain an unfair advantage as a result of having pre-knowledge of exam content because they had access to the exposed test content. An extreme form of test compromise occurs when the test forms are stolen and disclosed. Test compromise also can occur during a test administration window when test takers begin remembering and sharing the test content.

Test Content Exposure – Test content exposure results when a test is administered so often or so frequently that the test content becomes well known. Test exposure can also occur when the test content is intentionally divulged by a person who has access to the test instruments or forms. Test coaching or teaching the test occurs when a trainer divulges or exposes the test questions by teaching them to the candidates before the test is given. Another aspect of exposure occurs when test takers collaborate on the Internet to disclose the test content.

Test Fraud - Test fraud is used to indicate behaviors that unfairly allow test takers to obtain higher test scores than would have been achieved if those involved had not participated in fraudulent behaviors. These behaviors include unfair access to the test content and answer copying (cheating); improper collaborative efforts that compromise test security (collusion); sharing the test content or teaching the actual test items (test coaching); or changing answers to raise scores (answer sheet manipulation).

Testing Irregularity – A “testing irregularity” is an event due to unusual (and perhaps malicious) behavior, taking place before or during test administration, and affecting the test results. The often hidden and covert nature of testing irregularities establishes the need for data forensics analysis.

Volatile Retakes or Retests – These are defined to be large score swings in either a positive or negative direction. Large positive swings represent content mastery in short amounts of time and are usually not to be trusted. Large negative changes place suspicion upon the reliability of the initial score. Large changes that would not normally be seen indicate the candidate may be involved in a fraudulent behavior.

Appendix C – Description of Statistical Methods

Ideally, the selected statistics measure quantities that are related to behaviors which could be associated with test security risks. For example, two tests with very similar responses⁹ could be the result of answer-copying behavior. We must recognize that the statistics do not actually measure the behaviors and they are subject to some inferential misinterpretation if care is not taken. For example, inconsistent responding (known as aberrance) could indicate that a student has pre-knowledge of the exam content, but it is more likely the test taker is tired or nervous about taking the test, unless there is evidence that the behavior associated with the aberrance is resulting in higher test scores and increased pass rates.

Whenever a statistical value is anomalous, we say that we have found a statistical inconsistency which may be associated with test security violations, such as answer copying or lax test security. An association between statistical inconsistencies and potential testing irregularities does not necessarily mean that the identified inconsistencies were due to testing irregularities. While the information presented in this report will help identify potential trouble areas, we emphasize that each identified inconsistency must be evaluated on its own merits and its actual cause determined.

Statistical inconsistencies, by definition, are unusual and rare. Consequently, we do not expect to find many statistical inconsistencies in these analyses. When they are found, an underlying cause is present. These statistics are designed to detect test fraud behaviors as potential underlying causes.

In these analyses, we refer to the data forensics statistics as security indicators, statistical inconsistency indicators, or security risk measures. The statistical inconsistency indicators are compared with two thresholds, a marginal or counting threshold and an extreme threshold. When the statistic for a test exceeds the marginal

⁹ These are tests with an excessively high number of same answers.

threshold, we say the test is “marginal.” Similarly, when a statistic for the test exceeds the extreme threshold, we say the test is “extreme.” Marginal tests are used to detect anomalies in grouped data, while extreme tests are used to indicate individual test instances that are anomalous. The marginal threshold is typically set at a level to detect approximately five percent of the tests by natural variation. If the proportion of tests exceeding the counting threshold for a group (i.e., a school) is statistically extreme, as compared to the overall or baseline rate, the group may be anomalous. We typically use a probability threshold of one in 100,000 or one in a 1,000,000 for stating that a test is extreme.

Throughout this report, statistical probabilities are usually given in terms of an “index” value. Index values are a convenient way of representing very low probabilities. The value represents the probability using a power of 10. For example, an index value of 6 means that the probability is one in 1,000,000 or 10^{-6} . Higher index values correspond to lower probabilities. The mathematical relationship between the index value and the probability is: $probability = 10^{-index}$.

Probability thresholds guide decisions for inferring that a test instance is extreme or that the data for a group are anomalous. Caveon Data Forensics is essentially a data mining operation. As such, it is susceptible to alpha inflation (increased probabilities of detecting anomalous data through chance). We use a very conservative procedure based on the maximum order statistic to downward adjust probability index values in order to control alpha inflation. Thus, the probability thresholds are adjusted in the analysis of group data so that when every group within the analysis is examined (among all the groups in the data set) the chance that *any* group or *even one* group out of all the groups is reported with a statistical anomaly (or as an outlier) is one chance in 100 (i.e., the simultaneous, experiment-wide Type I error is .01).

This is very different than stating that the probability of a statistical inconsistency is one in 100. In that case we would expect to see 1% of the groups reported with statistical inconsistencies by chance alone. Instead, we desire to have only a 1% chance of observing *any* statistical inconsistency by chance alone (i.e., for all of the groups that are analyzed). In order to satisfy this desire, the probability of observing a statistical inconsistency must be very small (typically less than one chance in 500,000). Conceptually this is the same as inspecting 100 bags, each containing 5,000 raisins, and only expecting to see one bad raisin in all 100 bags. Restating the concept in terms of this analysis, the threshold is set so that if this analysis were done every year for 100 years we would expect to see *only one* detected statistical inconsistency in all 100 years in which the inconsistency happened by natural variation alone.

The conservative approach used in this report ensures that, while not every potential instance of a statistical inconsistency is identified, naturally occurring statistical inconsistencies are improbable. This approach strengthens the inference that a testing irregularity may be a likely explanation for such a result. However, a conclusion that a testing irregularity has occurred should not be presumed purely on the basis of the statistical results. The statistics should aid and assist, but not guide or replace, human judgment. If at all possible, other forms of evidence that confirm or explain the statistical observations should be sought and obtained.

It is often the case that statistically inconsistent results are due to unique situations. For example, the statistical models are often unable to account for very unique group characteristics. Some of these characteristics might be classroom demographic differences, such as placing many students with a particular learning disability in the same class, or a group of students with a variety of cultural backgrounds. Environmental factors, such as a disruption during the test or perhaps an emotional crisis such as the death of a close friend or family member, can induce aberrant test taking. Factors that contribute to tests with very similar test responses can be quite subtle. These might

include intense pre-test review or classrooms that form highly collaborative study groups. Commonly held misunderstandings by a group of students may cause many of them to select the same particularly attractive incorrect answers. All of the above examples demonstrate the need to carefully consider unique situations as statistically inconsistent evidence is evaluated.