



# KINDERGARTEN READINESS ASSESSMENT SOUTH CAROLINA

Technical Report

2018–2019

This report was prepared by:

WestEd  
Standards, Assessment, and Accountability Services  
730 Harrison Street  
San Francisco, CA 94107

## CONTENTS

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1	Overview .....	1
1.1	Purpose of the KRA .....	1
1.2	Purpose of This Report .....	1
2	KRA Design .....	1
2.1	Common Language Standards .....	1
2.2	KRA Item Types .....	1
2.3	KRA Blueprint .....	2
3	Item Analyses and IRT Scaling .....	3
3.1	Classical Item Analysis .....	3
3.2	Item Response Theory (IRT) .....	4
3.3	KRA Reporting Scale .....	4
4	Validity and Reliability .....	6
4.1	KRA Validity .....	6
4.2	KRA Reliability .....	8
5	KRA Reports and Results .....	9
5.1	Individual Student Report (ISR) .....	9
5.2	Reports for Teachers and Administrators .....	9
5.3	KRA Results for Fall 2018 .....	10
	References .....	12
	Appendix A — Classical Item Statistics .....	13
	Appendix B — Reliability by Subgroups .....	15

# 1 OVERVIEW

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## 1.1 PURPOSE OF THE KRA

The Kindergarten Readiness Assessment (KRA) provides valid and reliable information on children’s learning and development across the essential domains of school readiness.<sup>1</sup> This information can be used by stakeholders at the local, regional, and state levels to better understand children’s preparedness for kindergarten. Detailed score reports at the individual, classroom, school, district, and state levels inform policy, research, and programmatic decisions. Further, and most importantly, families and teachers learn about each child’s skills, knowledge, and developmental needs so that teachers can identify strengths and weaknesses for each child.

## 1.2 PURPOSE OF THIS REPORT

The purpose of this report is to provide evidence of the technical qualities of the KRA, including its reliability and validity for use as a measure of school readiness. Further, this report supplements the original KRA Technical Report (2014) and KRA Technical Report Addendum (2015), which provide detailed descriptions of the design and development processes, scaling and standard-setting methods, professional development to support administration, and the Ready for Kindergarten Online (KReady) system.

# 2 KRA DESIGN

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## 2.1 COMMON LANGUAGE STANDARDS

The KRA is a criterion-referenced assessment based on the Common Language Standards. The Common Language Standards are based on prekindergarten standards and incorporate the essential domains of school readiness as defined by the U.S. Department of Education.<sup>2</sup>

## 2.2 KRA ITEM TYPES

A KRA item is one question or observation that aligns to a specific essential skill and knowledge statement from within the Common Language Standards and that results in one recorded score. The KRA comprises three item types: selected response, performance tasks, and observational rubrics.

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<sup>1</sup> The U.S. Department of Education defines the essential domains of school readiness as language and literacy development, cognition and general knowledge (including early mathematics and early scientific development), approaches toward learning, physical well-being and motor development, and social and emotional development.

<sup>2</sup> The Social Foundations domain for the KRA incorporates the social and emotional development and approaches toward learning essential domains.

Selected-response items consist of a question or prompt and three possible answer options, of which there is only one correct answer. A student indicates his or her response by touching one of the three answer options. Selected-response items are worth one score point. Benefits of selected-response items are that they require the least amount of time to administer and that they can be administered via the KRA App.

Performance tasks consist of an activity or action that is completed by the student in response to a prompt. In some instances, manipulatives are provided with performance tasks to allow the student to demonstrate the skill being assessed. Performance tasks are scored with a rubric that is based on the proficiency of the student’s performance, and are worth one, two, or three score points. The benefit of performance tasks is that they allow a student to demonstrate his or her knowledge and, in some instances, to provide an explanation or reason. Some performance-task items can be administered via the KRA App.

Observational rubrics describe specific behaviors or skills that a student should demonstrate during typical classroom activities. The teacher evaluates and scores each student’s behaviors or skills using a rubric that describes the quality for each criterion. Observational rubrics do not require the teacher and the student to directly interact (i.e., the student is unaware of the teacher’s intention to assess) and, therefore, provide the advantage of assessing the student in a natural classroom environment.

### 2.3 KRA BLUEPRINT

The KRA Blueprint, shown in Table 2.3, outlines the distribution of selected-response (SR) items, performance-task (PT) items, observational-rubric (OR) items, total items, total points, and percentage of total points across the domains, as defined in the Common Language Standards.

Table 2.3  
*KRA Blueprint*

Domain	SR	PT	OR	Total Items	Total Points	Percentage of Total Points
Language and Literacy	6	9	2	17	34	35%
Mathematics	3	11	0	14	25	26%
Physical Well-Being and Motor Development	0	0	7	7	14	14%
Social Foundations	0	0	12	12	24	25%
Total	9	20	21	50	97	100%

### 3 ITEM ANALYSES AND IRT SCALING

#### 3.1 CLASSICAL ITEM ANALYSIS

All of the KRA items that were administered in fall 2018 were evaluated for their mean, standard deviation, difficulty ( $p$ -value), score-point distribution, and discrimination (item-total correlation).

The  $p$ -value statistic is a measure of item difficulty (or item easiness) and falls between 0 and 1. The higher the value, the easier the item. For dichotomous items, the  $p$ -value represents the proportion (i.e., percentage) of students who correctly answered the item. For polytomous items, the  $p$ -value is relative to the maximum item score and is calculated by dividing the mean by the maximum possible score for each item. Therefore, the  $p$ -value for polytomous items does not correspond directly to the percentage of students who received the maximum item score. The  $p$ -values are expected to be slightly higher than is typically observed in other state- or grade-level assessments because the KRA Blueprint is based on prekindergarten early learning standards. The score-point distributions provide the percentages of students who received each score point on a specific item. Together,  $p$ -values and score-point distributions provide valuable information when determining the difficulty of items.

The item-total correlation is a measure of item discrimination. It is expected that students who achieve higher overall (or total) scores on the assessment will achieve higher scores on individual items, and students who achieve lower overall (or total) scores on the assessment are expected to achieve lower individual item scores. The item-total correlation is used to evaluate item discrimination by determining an individual item's relationship to the overall (or total) score, excluding the item of interest. Item-total correlations are values between  $-1.00$  and  $1.00$ , where 0 represents no correlation. Item-total correlations are expected to be positive values because students who perform better overall are expected to perform better on the individual items, leading to a positive correlation between performance on an individual item and the overall assessment.

Table 3.1 provides a summary of the classical item statistics by domain. The classical item statistics for all 50 KRA items administered in fall 2018 are provided in Appendix A.

Table 3.1

*Summary of Classical Item Statistics for the KRA Items by Domain*

Domain	Number of Items	$p$ -Value			Item-Total Correlation		
		Mean	SD	Range	Mean	SD	Range
All	50	0.73	0.14	0.35–0.92	0.49	0.12	0.26–0.69
Language and Literacy	17	0.73	0.14	0.53–0.92	0.46	0.13	0.29–0.67
Mathematics	14	0.66	0.17	0.35–0.90	0.41	0.11	0.26–0.58
Physical Well-Being and Motor Development	7	0.84	0.05	0.77–0.90	0.53	0.06	0.47–0.64
Social Foundations	12	0.75	0.08	0.61–0.85	0.60	0.07	0.45–0.69

### 3.2 ITEM RESPONSE THEORY (IRT)

The KRA utilizes a one-parameter item response theory (IRT) model, commonly referred to as the Rasch model, to define the relationship between the assumed latent trait (readiness for kindergarten) and the probability of a student correctly answering a given KRA item. This model assumes that responses are a function of a student's knowledge about the assessment content and of the difficulty of the item. This model allows the student score and the difficulty of the item to be placed on the same scale, known as theta ( $\theta$ ), which represents the latent trait being measured. This  $\theta$  scale allows direct interpretation of the difficulty of an item and the probability of a student answering an item correctly. The probability that a student will answer a question at a given level is determined by whether the student's score is below, at, or above the difficulty threshold for the level.

In mathematical terms, the Rasch model is a logistic regression model based on a single parameter known as the item difficulty parameter ( $b$ ). The formula for this model is a logistic equation:

$$P(U_i = 1 | \theta) = P(\theta_i) = \frac{e^{(\theta - b_i)}}{1 + e^{(\theta - b_i)}}$$

In this equation,  $b_i$  = item difficulty and  $\theta$  = student ability. The expression  $P(U_i = 1 | \theta)$  represents the probability of a student of ability  $\theta$  answering item  $i$  correctly.

For polytomous items, the partial credit model dichotomizes responses by making binary comparisons between adjacent score categories ( $k$  and  $k-1$ ). The probability that a person of ability  $\theta$  will reach response  $k$  given that the response is in either  $k$  or  $k-1$  is:

$$P_{ik|k,k-1}(\theta) = \frac{P_{ik}(\theta)}{P_{i,k-1}(\theta) + P_{ik}(\theta)} = \frac{1}{1 + e^{(b_{ik} - \theta)}} = \frac{e^{(\theta - b_{ik})}}{1 + e^{(\theta - b_{ik})}}$$

The IRT parameters for the KRA items were calculated using Winsteps Rasch measurement software, with the mean student ability set to 0. A more detailed description of the KRA scaling process, including the IRT parameters and fit statistics, can be found in the KRA Technical Report (2014).

### 3.3 KRA REPORTING SCALE

Raw scores (i.e., the total score points obtained across all items) on the KRA are converted to scale scores using the Rasch model described in the preceding section. Scale scores are preferred over raw scores. The use of scale scores precludes interpreting results as the percentage of items answered correctly. Given that the KRA includes a sample of items that could be used to measure readiness for kindergarten, percent-correct scores would not provide a complete explanation of a student's readiness for kindergarten. Scale scores account for the difficulty of individual items and forms, providing consistency in the interpretation of results and allowing for comparison of results across cohorts and forms.

The Rasch  $\theta$  scale is centered at 0 and extends in both positive and negative directions. Applying a linear transformation to the  $\theta$  scale is desirable because it allows for a scale that is more easily understood by stakeholders and that does not include negative values. The  $\theta$  scores determined by IRT scaling are converted using a linear transformation such that the *scale score* =  $12 * \theta + 250$ .

The KRA scale is truncated at  $\theta$  scores of  $\pm 4$ , which results in minimum and maximum scale scores of 202 and 298, respectively. The KRA overall scale score determines each student's performance level: Demonstrating Readiness, Approaching Readiness, or Emerging Readiness. Table 3.3.A shows the performance levels and their descriptions, including their associated overall score ranges.

Table 3.3.A

*Performance Levels and Overall Scale Score Ranges for the KRA*

Performance Level	Description	Overall Score Range
Demonstrating Readiness	A student demonstrates foundational skills and behaviors that prepare him/her for a curriculum based on kindergarten standards.	270–298
Approaching Readiness	A student demonstrates some foundational skills and behaviors that prepare him/her for a curriculum based on kindergarten standards.	258–269
Emerging Readiness	A student demonstrates minimal foundational skills and behaviors that prepare him/her for a curriculum based on kindergarten standards.	202–257

To show relative strengths in each student's performance, domain scale scores can be reported for each student, with each based on the subset of KRA items that are aligned to each domain. The domain scale scores can be reported using the same scale as the overall score. Table 3.3.B shows the ranges of possible scale scores for each domain.

Table 3.3.B

*Domain Scale Score Ranges for the KRA*

Domain	Scale Score Range
Language and Literacy	202–298
Mathematics	202–298
Physical Well-Being and Motor Development	202–289
Social Foundations	202–298

*Note: The Physical Well-Being and Motor Development domain has a lower maximum score due to limited numbers of items and score points within the domain.*



## 4 VALIDITY AND RELIABILITY

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The *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014) provide detailed explanations of validity and reliability. These standards were used to guide the entire design, development, scoring, administration, and reporting processes for the KRA.

### 4.1 KRA VALIDITY

According to the *Standards for Educational and Psychological Testing*, validity refers to the degree to which evidence and theory support the interpretation of test scores for proposed uses of tests. Further, the process of validation involves accumulating relevant evidence to provide a sound scientific basis for the proposed score interpretations. Therefore, statements about validity should refer to particular interpretations for specified uses (AERA, APA, & NCME, 2014, p. 11).

Every aspect of an assessment, including design, content specifications, item development, psychometric characteristics, and administration procedures, provides evidence in support of its validity (or evidence of lack of validity). Therefore, every section of this report provides evidence of validity for the use of the KRA to describe children’s readiness for kindergarten curriculum.

#### 4.1.1 Evidence Based on Test Content

The KRA Blueprint, item specifications, and item development process provide evidence for test content validity.

As described in Section 2 of this report, the KRA is aligned to the Common Language Standards, which are based on the KRA states’ early learning standards and incorporate the essential domains of school readiness as defined by the U.S. Department of Education (78 FR 5337). The KRA Blueprint emphasizes all domains of school readiness and utilizes multiple item types to best assess the skills and behaviors within each domain.

Prior to item development, detailed item specifications aligned to the Common Language Standards were created by WestEd content experts and reviewed by content experts from the KRA states’ departments of education. The item specifications ensure alignment to the KRA Blueprint and Common Language Standards and describe the parameters for item development.

As described in detail in the (separate) KRA Technical Report (2014), cognitive interviews, a pilot, and a field test were conducted. Each step of these processes further contributed to the validity and reliability of the KRA and provided several opportunities for expert and stakeholder review and feedback, in addition to statistical analyses. Prior to field testing, every KRA item went through a bias and content review. The bias and content review committees consisted of early childhood educators from the states. Staff from the state departments also reviewed and approved each item prior to field testing. The extensive rounds of review and feedback ensure fidelity to the standards and appropriateness for use with children entering kindergarten.

All students, including students with disabilities and students who are English learners, are required to participate in the KRA. A fully accessible approach to assessment design and implementation was necessary to ensure that students with diverse learning characteristics had the opportunity to demonstrate their knowledge and skills. The guidance document for administering the KRA to diverse populations of students is referred to as the *Guidelines on Allowable Supports for the Kindergarten Readiness Assessment*. These guidelines provide detailed information on the strategies and practices that support differentiated administration of the assessment. The KRA training ensures that trainers and teachers learn about the Universally Designed Allowances that are available for all students, including materials presentations, procedures, and settings that can be used to ensure that all students can access KRA items. These guidelines also provide an item-by-item decision-making process for providing supports to students with disabilities and to English learners, called Level the Field supports. These supports provide equal access and opportunity for all students to participate in the KRA without substantially altering what a student is expected to do. They are intended to reduce or even eliminate the effects of a student’s disability or limited English proficiency.

#### 4.1.2 Evidence Based on Response Processes

Response processes of test takers can provide evidence supporting the fit between the construct and the nature of the performance or response that test takers engaged in (AERA, APA, & NCME, 2014). The cognitive interviews described in the KRA Technical Report (2014) were conducted so the assessment developers could better understand new item types and formats and to confirm hypotheses about access to the aligned content. The cognitive interviews allowed the developers to test assumptions about the intent of an item or task, including the reasoning processes that students used to respond to the item.

In addition to the cognitive interviews, the teacher surveys that were conducted during the pilot and the field test included questions designed to provide evidence that the students were engaging with and responding to items as intended. As described in the KRA Technical Report (2014), the results from the teacher surveys include strong evidence to confirm that the response processes of students were consistent with the intended designs of the items.

#### 4.1.3 Evidence Based on Internal Structure

The classical item statistics from the 2018 administration of the KRA, as described in Section 3.1 and provided in Appendix A, fall within acceptable ranges. The descriptions of the IRT calibration and reporting scale in the KRA Technical Report (2014) provide further validity evidence based on internal structure. Table 4.1 shows the Pearson correlation coefficients between the overall score and the domain scores.

Table 4.1

*Pearson Correlation Coefficients between the Overall Score and the Domain Scores*

	<b>Overall</b>	<b>LL</b>	<b>MA</b>	<b>PD</b>	<b>SF</b>
Overall	1				
Language and Literacy (LL)	0.90	1			
Mathematics (MA)	0.84	0.75	1		
Physical Well-Being and Motor Development (PD)	0.76	0.58	0.49	1	
Social Foundations (SF)	0.83	0.62	0.52	0.77	1

Additional validity evidence based on internal structure is described in Section 4.2, which includes the descriptive statistics, reliability coefficients, and standard errors of measurement for the KRA overall and domain scale scores.

## 4.2 KRA RELIABILITY

In its simplest form, reliability measures the consistency of students' scores if the assessment were given multiple times or via multiple forms. There are several ways to measure reliability. The most common measures of reliability are internal consistency (typically Cronbach's alpha), separation reliability under Rasch IRT, test-retest, split-half, parallel forms, and interrater.

Cronbach's alpha was used to evaluate the reliability of the KRA. Cronbach's alpha is a function of the number of items, the sum of all the item variances, and the variance of the total scores. The maximum value for Cronbach's alpha is 1, indicating perfect reliability. Greater values of Cronbach's alpha indicate that the items are closely related to each other and students score consistently across the items. The standard error of measurement (SEM) is a function of the reliability measure (Cronbach's alpha) and is defined as the standard deviation of error scores for a student under repeated independent testings with the same test (Allen & Yen, 1979).

Table 4.2 summarizes the descriptive statistics, Cronbach's alphas, and SEM for the KRA overall and domain scales. Table 4.2 is based on the total population of students. Appendix B summarizes the descriptive statistics, Cronbach's alphas, and SEM by subgroups.

Table 4.2

*Summary of Descriptive Statistics, Cronbach's Alpha, and SEM for the KRA Scales*

<b>Domain</b>	<b>Number of Students</b>	<b>Mean</b>	<b>SD</b>	<b>Range</b>	<b>Cronbach's Alpha</b>	<b>SEM</b>
Overall	54,857	265.51	13.59	202–298	0.94	3.26
Language and Literacy	54,857	264.99	14.50	202–298	0.84	5.84
Mathematics	54,857	263.89	14.58	202–298	0.80	6.57
Physical Well-Being and Motor Development	54,857	269.77	18.20	202–289	0.82	7.65
Social Foundations	54,857	270.92	20.82	202–298	0.92	5.85

To support reliability of item scores, all early childhood educators who administer the KRA must complete training activities, including a simulator that models proper administration and scoring processes. Further, before any early childhood educator can administer the KRA, he or she must also pass a content assessment. A more detailed description of the professional development and training content is provided in the KRA Technical Report (2014) and KRA Technical Report Addendum (2015).

## 5 KRA REPORTS AND RESULTS

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As described in Section 3.3, the KRA is designed to provide an overall score, a performance level (based on the overall score), and domain scores for each student. The overall score reflects the student's readiness for kindergarten curriculum, which determines the performance level, shown in Table 3.3.A.

The domain scores for each student are included on the KRA reports for teachers and administrators to indicate relative strengths and weaknesses for each student. For this reason, the domain scores are provided on the same scale as the overall score. Caution must be taken when interpreting domain scores, as these scores are determined by a subset of the items that compose the entire KRA, meaning that they provide a less-precise measure of ability.

The KRA scores should be used only to support the intended purposes of the KRA as described in Section 1.1 of this report and should not be used for any other purposes, including, but not limited to, denying entry to kindergarten.

### 5.1 INDIVIDUAL STUDENT REPORT (ISR)

Upon completion of the KRA, each student receives an individual student report (ISR). The ISR provides the overall score, the conditional standard error of measurement for the overall score, and the performance level, based on the overall score.

### 5.2 REPORTS FOR TEACHERS AND ADMINISTRATORS

In addition to the ISR, a variety of reports are available to teachers via the KReady system. The following reports can be accessed and generated by teachers at any time during and after the administration window:

- *Interactive Data Displays*: The Interactive Data Displays are interactive charts and graphs that present the KRA data in multiple ways, which include the option to filter by subgroups.
- *Domain Data Export*: The Domain Data Export is a Microsoft Excel file of a teacher's class roster, organized by domain, with total points.
- *Data Results Export*: Similar to the Domain Data Export, this report is organized by item. The spreadsheet can be sorted and filtered to meet the teacher's needs.
- *Class Item Results*: This report is a PDF, complete with scoring rubrics, which shows student performance by item.

- *Individual Student Item Results*: This report is a PDF of student scores by item, including scoring rubrics. This document can be printed separately for each student, showing scores for all items or only for selected items.

The KReady system also offers a variety of reports for school and district administrators or support staff. Having access to the KRA data and results allow school and district administrators to provide targeted supports or interventions. The following reports can be accessed and generated by teachers at any time during and after the administration window:

- *Interactive Data Displays*: The Interactive Data Displays are interactive charts and graphs that present the KRA data in multiple ways, which include the option to filter by subgroups.
- *Domain Data Export*: The Domain Data Export is a Microsoft Excel file of a teacher's class roster, organized by domain, with total points.
- *KRA ISR Report*: The KRA ISR Report is a Microsoft Excel file that includes all student data (including demographic information), teacher data, students' overall and item-level scores, and links to view students' ISRs.
- *ISR Zip File*: This report is a zip file that includes an ISR for every student.
- *KRA Percentage Completion Report*: This report provides the percentage of students who have completed the KRA.
- *KRA Completion by Item Report*: This report provides the percentage of students who have completed each KRA item.

Lastly, the South Carolina Department of Education is provided with a data export at the end of the KRA administration after all data have been entered. This data export includes student demographic information, individual item scores by student, and overall scores, performance levels, and domain scores by student.

### 5.3 KRA RESULTS FOR FALL 2018

Table 5.3.A provides the percentage of students at each performance level for all students and by subgroups of students. Table 5.3.B provides a summary of the descriptive statistics by performance level. The results include all students who completed the KRA in fall 2018.

Table 5.3.A

*Percentage of Students at Each Performance Level*

	<b>Number of Students</b>	<b>Demonstrating Readiness</b>	<b>Approaching Readiness</b>	<b>Emerging Readiness</b>
All Students	54,857	37.2%	38.1%	24.7%
Female	23,191	42.4%	37.5%	20.1%
Male	24,539	32.4%	38.6%	29.0%
American Indian	188	32.4%	35.1%	32.4%
Asian	760	47.4%	33.2%	19.5%
Black/African American	15,614	28.0%	41.8%	30.2%
Hispanic	4,492	23.8%	39.5%	36.8%
Multiracial	2,305	36.9%	39.1%	24.0%
Native Hawaiian/Pacific Islander	81	27.2%	37.0%	35.8%
White	22,834	46.8%	35.3%	17.9%
Not Identified	8,583	34.7%	38.5%	26.8%
English Learner	2,555	23.2%	39.0%	37.8%
Special Education	2,074	17.0%	32.5%	50.4%

Table 5.3.B

*Descriptive Statistics by Performance Level*

<b>Domain</b>	<b>Performance Level</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Overall	Demonstrating Readiness	20,406	278.66	7.35
	Approaching Readiness	20,905	263.77	3.46
	Emerging Readiness	13,546	248.41	9.46
Language and Literacy	Demonstrating Readiness	20,406	277.22	9.19
	Approaching Readiness	20,905	263.91	6.45
	Emerging Readiness	13,546	248.21	12.31
Mathematics	Demonstrating Readiness	20,406	275.49	10.69
	Approaching Readiness	20,905	262.42	7.99
	Emerging Readiness	13,546	248.68	12.35
Physical Well-Being and Motor Development	Demonstrating Readiness	20,406	283.00	9.49
	Approaching Readiness	20,905	269.85	13.45
	Emerging Readiness	13,546	249.69	16.13
Social Foundations	Demonstrating Readiness	20,406	288.48	11.15
	Approaching Readiness	20,905	269.28	13.67
	Emerging Readiness	13,546	247.01	15.45

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## APPENDIX A — CLASSICAL ITEM STATISTICS

Item	Domain	N	Max	Mean	SD	Difficulty (p-value)	Item-Total Correlation	Percent at Score Point			
								0	1	2	3
A127	LL	54,670	1	0.59	0.49	0.59	0.42	41.2	58.8		
A130	LL	54,579	2	1.22	0.79	0.61	0.55	22.4	32.8	44.8	
A132	LL	54,580	3	2.08	1.06	0.69	0.56	12.4	15.8	23.4	48.4
A134	LL	54,597	2	1.71	0.58	0.85	0.57	6.3	16.6	77.1	
A136	LL	54,591	2	1.78	0.52	0.89	0.52	5.2	11.5	83.3	
A155	LL	54,577	3	2.65	0.67	0.88	0.52	2.3	4.1	20.3	73.4
A160	LL	54,671	3	2.54	0.79	0.85	0.53	3.2	8.9	18.4	69.5
A163	LL	54,648	1	0.57	0.49	0.57	0.30	42.6	57.4		
A164	LL	54,578	3	1.59	1.07	0.53	0.35	22.4	18.7	36.1	22.8
A180	LL	54,669	1	0.62	0.48	0.62	0.29	37.6	62.4		
A195	LL	54,579	3	2.46	0.75	0.82	0.49	3.0	6.4	32.5	58.1
H101	LL	54,619	1	0.90	0.30	0.90	0.30	9.7	90.3		
H103	LL	54,617	1	0.61	0.49	0.61	0.29	38.5	61.5		
H104	LL	54,614	1	0.92	0.28	0.92	0.35	8.5	91.5		
H106	LL	54,589	3	1.67	1.06	0.56	0.49	18.0	24.0	31.2	26.8
OR19	LL	54,635	2	1.52	0.66	0.76	0.63	9.1	29.9	61.0	
OR20	LL	54,634	2	1.53	0.66	0.77	0.67	9.6	27.5	63.0	
A101	MA	54,679	3	2.31	1.00	0.77	0.58	7.2	17.7	12.3	62.8
A104	MA	54,642	3	1.97	0.92	0.66	0.55	8.4	19.2	39.8	32.6
A115	MA	54,670	1	0.81	0.39	0.81	0.40	19.1	80.9		
A117	MA	54,453	3	1.94	1.15	0.65	0.57	18.1	15.4	20.7	45.9
A121	MA	54,674	2	1.80	0.51	0.90	0.45	5.0	10.1	84.9	
A123	MA	54,689	2	1.61	0.76	0.80	0.33	16.7	5.9	77.4	
A138	MA	54,686	1	0.41	0.49	0.41	0.34	59.2	40.8		
A143	MA	54,680	1	0.80	0.40	0.80	0.35	20.0	80.0		



Item	Domain	N	Max	Mean	SD	Difficulty (p-value)	Item-Total Correlation	Percent at Score Point			
								0	1	2	3
A147	MA	54,674	1	0.45	0.50	0.45	0.40	55.3	44.7		
A149	MA	54,666	1	0.50	0.50	0.50	0.26	49.9	50.1		
A152	MA	54,693	2	1.46	0.70	0.73	0.46	12.0	30.2	57.8	
A174	MA	54,689	1	0.35	0.48	0.35	0.32	64.9	35.1		
A177	MA	54,690	2	1.42	0.64	0.71	0.26	8.4	41.5	50.1	
A191	MA	54,629	2	1.43	0.68	0.72	0.51	10.8	35.0	54.2	
OR01	PD	54,638	2	1.75	0.51	0.88	0.48	3.9	17.0	79.1	
OR05	PD	54,628	2	1.71	0.56	0.86	0.47	5.6	17.4	77.0	
OR06	PD	54,641	2	1.55	0.65	0.77	0.57	8.7	28.1	63.2	
OR08	PD	54,638	2	1.66	0.59	0.83	0.54	6.3	21.8	71.9	
OR09	PD	54,592	2	1.53	0.65	0.77	0.64	8.4	29.8	61.8	
OR10	PD	54,618	2	1.70	0.54	0.85	0.50	4.1	21.9	74.0	
OR15	PD	54,637	2	1.79	0.46	0.90	0.51	2.2	16.5	81.3	
OR12	SF	54,632	2	1.29	0.72	0.65	0.66	15.5	39.9	44.7	
OR25	SF	54,634	2	1.55	0.62	0.78	0.61	6.8	31.1	62.1	
OR32	SF	54,633	2	1.56	0.64	0.78	0.68	8.2	27.5	64.3	
OR35	SF	54,630	2	1.57	0.63	0.78	0.61	7.9	27.7	64.5	
OR42	SF	54,630	2	1.50	0.65	0.75	0.63	8.6	32.7	58.8	
OR43	SF	54,634	2	1.63	0.60	0.82	0.62	6.1	24.8	69.1	
OR49	SF	54,637	2	1.62	0.60	0.81	0.45	6.3	24.9	68.7	
OR55	SF	54,637	2	1.23	0.71	0.61	0.58	16.6	44.3	39.2	
OR58	SF	54,638	2	1.31	0.71	0.65	0.69	14.8	39.4	45.8	
OR64	SF	54,633	2	1.43	0.67	0.71	0.64	10.0	37.1	52.9	
OR68	SF	54,636	2	1.64	0.57	0.82	0.56	4.7	26.6	68.8	
OR69	SF	54,635	2	1.70	0.55	0.85	0.49	4.6	21.1	74.3	

LL = Language and Literacy, MA = Mathematics, PD = Physical Well-Being and Motor Development, SF = Social Foundations

The values of *N* for the item-total correlations may be smaller than the reported *N* due to listwise deletion (i.e., students with no total score are deleted).

## APPENDIX B — RELIABILITY BY SUBGROUPS

<i>Summary of Descriptive Statistics, Cronbach's Alpha, and SEM by Subgroups</i>						
Domain	Subgroup	<i>n</i>	Mean	SD	Alpha	SEM
Overall	All Students	54,857	265.51	13.59	0.94	3.26
	Female	23,191	267.28	13.17	0.94	3.28
	Male	24,539	263.89	13.78	0.94	3.25
	Not Identified	7,127	265.37	13.56	0.94	3.24
	American Indian	188	263.15	14.88	0.95	3.31
	Asian	760	268.16	14.78	0.95	3.28
	Black/African American	15,614	262.85	12.80	0.94	3.14
	Hispanic	4,492	260.88	13.24	0.94	3.14
	Multiracial	2,305	265.37	13.24	0.94	3.27
	Native Hawaiian/Pacific Islander	81	261.64	17.52	0.96	3.49
	White	22,834	268.52	13.44	0.94	3.33
	Not Identified	8,583	264.67	13.61	0.94	3.22
	English Learner	2,555	260.62	13.41	0.95	3.14
	Special Education	2,074	255.93	16.57	0.96	3.40
Language and Literacy	All Students	54,857	264.99	14.50	0.84	5.84
	Female	23,191	266.07	14.16	0.83	5.83
	Male	24,539	263.94	14.83	0.84	5.86
	Not Identified	7,127	265.07	14.17	0.83	5.78
	American Indian	188	260.85	17.70	0.88	6.20
	Asian	760	265.69	15.71	0.86	5.83
	Black/African American	15,614	262.98	14.16	0.83	5.78
	Hispanic	4,492	258.58	15.26	0.86	5.70
	Multiracial	2,305	264.93	14.23	0.83	5.90
	Native Hawaiian/Pacific Islander	81	261.51	17.71	0.86	6.57
	White	22,834	267.90	13.91	0.82	5.95
	Not Identified	8,583	264.31	14.29	0.84	5.76
	English Learner	2,555	258.24	15.48	0.87	5.68
	Special Education	2,074	256.03	18.14	0.88	6.25
Mathematics	All Students	54,857	263.89	14.58	0.80	6.57
	Female	23,191	264.77	14.32	0.79	6.54
	Male	24,539	263.32	14.93	0.80	6.61
	Not Identified	7,127	262.97	14.00	0.79	6.47
	American Indian	188	260.18	17.56	0.84	7.02
	Asian	760	267.99	15.74	0.82	6.71
	Black/African American	15,614	260.72	13.47	0.78	6.36

*Summary of Descriptive Statistics, Cronbach's Alpha, and SEM by Subgroups*

Domain	Subgroup	<i>n</i>	Mean	SD	Alpha	SEM
Mathematics (Continued)	Hispanic	4,492	258.78	14.79	0.81	6.48
	Multiracial	2,305	263.79	13.89	0.78	6.50
	Native Hawaiian/Pacific Islander	81	258.91	18.67	0.86	7.03
	White	22,834	267.43	14.50	0.79	6.67
	Not Identified	8,583	262.68	14.21	0.79	6.50
	English Learner	2,555	258.83	14.67	0.81	6.43
	Special Education	2,074	255.94	17.60	0.83	7.23
Physical Well-Being and Motor Development	All Students	54,857	269.77	18.20	0.82	7.65
	Female	23,191	273.26	16.92	0.81	7.40
	Male	24,539	266.49	18.69	0.82	7.88
	Not Identified	7,127	269.67	18.42	0.83	7.63
	American Indian	188	270.52	18.97	0.83	7.91
	Asian	760	273.07	18.03	0.83	7.36
	Black/African American	15,614	267.76	18.24	0.82	7.75
	Hispanic	4,492	268.72	17.63	0.80	7.84
	Multiracial	2,305	269.83	18.19	0.82	7.71
	Native Hawaiian/Pacific Islander	81	265.65	23.07	0.84	9.17
	White	22,834	271.64	17.92	0.82	7.50
	Not Identified	8,583	268.70	18.60	0.83	7.57
	English Learner	2,555	268.21	17.58	0.80	7.87
	Special Education	2,074	257.37	22.37	0.88	7.74
	All Students	54,857	270.92	20.82	0.92	5.85
Social Foundations	Female	23,191	274.25	19.87	0.91	5.83
	Male	24,539	267.55	21.03	0.92	5.92
	Not Identified	7,127	271.71	21.27	0.93	5.68
	American Indian	188	270.11	21.51	0.91	6.51
	Asian	760	274.14	21.94	0.93	5.67
	Black/African American	15,614	267.47	20.68	0.92	5.91
	Hispanic	4,492	267.25	20.44	0.91	5.96
	Multiracial	2,305	270.63	20.92	0.92	5.89
	Native Hawaiian/Pacific Islander	81	264.89	26.57	0.94	6.65
	White	22,834	274.10	20.17	0.92	5.81
	Not Identified	8,583	270.55	21.36	0.93	5.69
	English Learner	2,555	266.60	20.56	0.92	5.99
	Special Education	2,074	257.48	22.75	0.93	6.06