

APPENDIX F

Abridged Reliability Analysis

2012-2013

Maryland Model for School Readiness
Fall 2012 Kindergarten Assessment Data

Abridged Reliability Analysis: Correlated Relationships Between the Seven Domains and Composite Score and the Consistency of the Work Sampling System Indicators

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Introduction:

The purpose of this document is to discuss the outcomes of two analyses performed on the Maryland Model for School Readiness (MMSR) Kindergarten Assessment. These analyses provide information regarding the subject matter of the assessment (the seven domains) and the individual components of each subject that are evaluated (the 30 indicators). The contents of this report represent a portion of a larger analytical document that investigates other areas of the MMSR assessment.

- **Correlation Analysis of the Composite Scores with the Seven Domains**

The correlation coefficient represents the linear relationship between each domain and the composite score. Using the Sum of Squares Method, the coefficient is calculated to determine which domains have a high correlation to the composite score. A high correlation coefficient indicates a significantly high relationship between the domain score and the composite score. The coefficient of determination represents the proportion of common variation (or strength) of the two variables. The composite score acts as the 'Y' variable and each domain is the X_ith variable. The following table shows the resulting correlation coefficients (*r*) and coefficients of determination (*r*²) for each X_iY:

N = 66,381

<u>Domain</u>		<u>Correlation Coefficient (<i>r</i>)</u>	<u>Coefficient of Determination (<i>r</i>²)</u>
Personal & Social	X ₁	0.791	0.625
Language & Literacy	X ₂	0.912	0.832
Mathematical Thinking	X ₃	0.889	0.790
Scientific Thinking	X ₄	0.891	0.794
Social Studies	X ₅	0.898	0.807
The Arts	X ₆	0.759	0.577
Physical Development	X ₇	0.750	0.562

The results for the Correlation analysis are based only on student records that are fully assessed, meaning that all 30 indicators were rated by the teacher. As expected, cognition based domains have a higher correlation to the composite score as well as a higher coefficient of determination. Language and Literacy is the domain the consistently has the highest correlation to the composite score with a coefficient of 0.912. This is the second year that the analysis has shown that Social Studies is the second highest correlated domain to the composite score with a coefficient of 0.898 (up by 0.002 from SY 2011-2012). This year the Scientific Thinking domain had a correlation coefficient of 0.891, an increase of 0.008 from last year and thereby, showing a higher correlation than Mathematical Thinking for this assessment year. The coefficient for Mathematical Thinking was calculated to be 0.889, which is an increase in from 0.884 from last year. It can be presumed that student achievement may be leveling out in the areas of Language & Literacy and Mathematical Thinking and beginning to improve in Social Studies in Scientific Thinking. It has shown that the latter domains have had a significantly increased improvement in ratings. This analysis proves that students who perform better in these domains tend to have a higher composite score.

- **Measurement of the Inner Consistency of the Work Sampling System Indicators – Chronbach’s Alpha (α)**

Establishing that performance in specific domains directly affect the composite score, we now take a look at the components of the domains, the 30 indicators. Chronbach’s Alpha is an estimate of the reliability of interrelated items that are summed to obtain an overall score. It determines the internal consistency of the test or the correlation of each test item within the test. Generally, the alpha increases when the correlation between the test items increases. The calculated alpha (α) for the 30 indicators and 66,381 (N) observations is 0.970. For each indicator, we look to see if the correlation will either decrease or increase if that item is deleted from the scale. A decrease in the correlation indicates that the indicator is highly correlated with the other indicators on the scale. A low correlation to the other items on the scale is indicated with an increase in the correlation value after the indicator is deleted. The raw correlation value is based on the interrelationship of each item while the standard correlation value is based on the item covariance, or the distribution of that variable. A high correlation value yields a high covariance value.

The indicators with the highest correlations were in the domains of Language and Literacy (IIC4), Scientific Thinking (IVA1, IVB1, IVC1), and Social Studies (VA1, VB2), which were subsequently domains that were highly correlated to the composite score. The Science indicator, IVB1, “identifies, describes, and compares properties of objects”, had the highest correlation of 0.806. It can be concluded that students who perform well on these indicators are most likely to be rated approaching or fully ready. The lower correlated indicators occurred in the domains of The Arts and Physical Development. Using Chronbach’s Alpha, a 95% Confidence Interval for fully ready students for the Fall 2012 assessment is found to be 82 ± 4.020 , **yielding the true percentage of fully ready kindergarten students to be between 77.980% and 86.020%**. The following table illustrates the correlation values for each of the 30 indicators.

Correlation Table of the Work Sampling System Indicators

Indicator	Raw Correlation if Item Deleted	Raw Alpha if Deleted	Standard Correlation if Item Deleted	Standard Alpha if Deleted
IA2	0.969	0.969	0.711	0.712
IB1	0.970	0.970	0.587	0.594
IB2	0.970	0.969	0.634	0.641
ID1	0.970	0.970	0.624	0.631
IIA1	0.969	0.969	0.766	0.759
IIA3	0.969	0.969	0.726	0.716
IIB1	0.969	0.969	0.729	0.723
IIC2	0.969	0.969	0.764	0.754
IIC4	0.969	0.969	0.788	0.778
IID2	0.969	0.969	0.763	0.757
IIIA1	0.969	0.969	0.774	0.764
IIIB1	0.969	0.969	0.741	0.732
IIIC2	0.969	0.969	0.745	0.738
IIID1	0.969	0.969	0.770	0.763
IVA1	0.969	0.969	0.786	0.780
IVA2	0.969	0.969	0.769	0.764
IVB1	0.969	0.968	0.806	0.798
IVC1	0.969	0.969	0.782	0.774
VA1	0.969	0.969	0.788	0.782
VB2	0.969	0.969	0.788	0.783
VB3	0.969	0.969	0.756	0.752
VC1	0.969	0.969	0.745	0.749
VIA1	0.970	0.970	0.593	0.607
VIA2	0.970	0.970	0.609	0.622
VIA3	0.969	0.969	0.680	0.691
VIB1	0.969	0.969	0.676	0.686
VIIA1	0.970	0.970	0.535	0.548
VIIIB2	0.970	0.970	0.609	0.619
VIIC1	0.970	0.970	0.593	0.605
VIIC2	0.970	0.969	0.648	0.661