

APPENDIX F

Abridged Reliability Analysis

2011-2012

Maryland Model for School Readiness
Fall 2011 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 (r²) for each X_iY:

N = 63,951

| <u>Domain</u> | | <u>Correlation Coefficient (r)</u> | <u>Coefficient of Determination (r²)</u> |
|-----------------------|----------------|---|--|
| Personal & Social | X ₁ | 0.790 | 0.624 |
| Language & Literacy | X ₂ | 0.913 | 0.834 |
| Mathematical Thinking | X ₃ | 0.884 | 0.781 |
| Scientific Thinking | X ₄ | 0.883 | 0.780 |
| Social Studies | X ₅ | 0.896 | 0.803 |
| The Arts | X ₆ | 0.766 | 0.587 |
| Physical Development | X ₇ | 0.756 | 0.571 |

As expected, the domains requiring more cognition have a higher correlation to the composite score as well as a higher coefficient of determination. Language and Literacy continues to reign as the most correlated domain to the composite score with a coefficient of 0.913, followed by Social Studies with a coefficient of 0.896, Mathematical Thinking (0.884) and Scientific Thinking (0.883). It is concluded that students who perform better in these domains tend to have a higher composite score. For the 2011-2012 assessment, the average domain increase of students being fully ready was 2%. The greatest increases were in Social Studies and Scientific Thinking, thus supporting the State percentage increase of students being fully ready.

- **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 63,951 (N) observations is 0.969. 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 0.793. 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 2011 assessment is found to be 83 ± 4.004 , **yielding the true percentage of fully ready kindergarten students to be between 78.996% and 87.004%**. 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 | 0.705 | 0.968 | 0.706 | 0.968 |
| IB1 | 0.578 | 0.969 | 0.584 | 0.969 |
| IB2 | 0.630 | 0.969 | 0.636 | 0.969 |
| ID1 | 0.621 | 0.969 | 0.627 | 0.969 |
| IIA1 | 0.755 | 0.968 | 0.749 | 0.968 |
| IIA3 | 0.728 | 0.968 | 0.719 | 0.968 |
| IIB1 | 0.720 | 0.968 | 0.716 | 0.968 |
| IIC2 | 0.763 | 0.968 | 0.755 | 0.968 |
| IIC4 | 0.786 | 0.968 | 0.777 | 0.968 |
| IID2 | 0.756 | 0.968 | 0.751 | 0.968 |
| IIIA1 | 0.763 | 0.968 | 0.753 | 0.968 |
| IIIB1 | 0.734 | 0.968 | 0.727 | 0.968 |
| IIIC2 | 0.730 | 0.968 | 0.725 | 0.968 |
| IIID1 | 0.753 | 0.968 | 0.747 | 0.968 |
| IVA1 | 0.772 | 0.968 | 0.765 | 0.968 |
| IVA2 | 0.761 | 0.968 | 0.756 | 0.968 |
| IVB1 | 0.793 | 0.968 | 0.785 | 0.968 |
| IVC1 | 0.773 | 0.968 | 0.766 | 0.968 |
| VA1 | 0.777 | 0.968 | 0.771 | 0.968 |
| VB2 | 0.781 | 0.968 | 0.777 | 0.968 |
| VB3 | 0.749 | 0.968 | 0.745 | 0.968 |
| VC1 | 0.740 | 0.968 | 0.743 | 0.968 |
| VIA1 | 0.588 | 0.969 | 0.600 | 0.969 |
| VIA2 | 0.603 | 0.969 | 0.616 | 0.969 |
| VIA3 | 0.688 | 0.968 | 0.697 | 0.968 |
| VIB1 | 0.683 | 0.968 | 0.691 | 0.968 |
| VIIA1 | 0.547 | 0.969 | 0.559 | 0.969 |
| VIIB2 | 0.625 | 0.969 | 0.635 | 0.969 |
| VIIC1 | 0.584 | 0.969 | 0.596 | 0.969 |
| VIIC2 | 0.644 | 0.969 | 0.656 | 0.968 |