**Assignment 5**

**Growth Curve Modeling**

This assignment will involve examining change over time in reading and mathematics competencies using the Early Childhood Longitudinal Study. The ECLS program provides national data on children's status at birth and at various points thereafter; children's transitions to non-parental care, early education programs, and school; and children's experiences and growth through the eighth grade. The ECLS program also provides data to analyze the relationships among a wide range of family, school, community, and individual variables with children's development, early learning, and performance in school.

The steps of the assignment are as follows.

1. Estimate a linear growth curve model for the reading data and math data separately without adding the time-invariant predictor of gender. Set the intercept to Wave 1 (Fall Kindergarten). Interpret the intercept and rate of change over time for reading and math.

2. Add gender to each model separately and interpret their effects on the intercept and slope.

3. Repeat steps 1 and 2 examining non-linear growth by specifying a quadratic term in the model and interpret the findings. If the variance of the quadratic growth factor is negative, try freeing the factor loadings from Waves 3 through 4 (latent basis modeling)

4. Specify a latent basis model coding the first time point to 0 and the last to 1 and report on the total change and the proportional change over time for math and reading separately

5. Estimate a multivariate growth curve model by regressing the math and reading intercept and slope on gender. Feel free to use the latent basis modeling approach if the quadratic term variance is negative.

**Variables**

gender : Male is 1 and female is 0.

readfk, readsk, readff, readsf: Reading IRT scale score from Fall-K to Spring-First

mathfk, mathsk, mathff, mathsf: Math IRT scale score from the Fall-K to Spring-First

The sample size is 2,000. The missing data was already handled by generating one predictive mean matching imputation.