# A Comparative Study of Mathematics Self-beliefs between Students in Shanghai-China and the US using a Multidimensional MIMIC Model with Ordered Categorical Items from PISA 2012

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**12:45 – 14:00**
*Chair: Dr. Lawrence Ng*

**Abstract:**
This study utilized MIMIC method to deal with multiple covariates, multiple dimensions and ordered categorical variables with threshold structures in both categorical confirmatory factor analysis (CCFA) and multidimensional graded response model (GRM) to study differential item functioning (DIF) among mathematics self-beliefs items across Shanghai-China and the United States from PISA 2012. The MIMIC approach with mediators was also applied in the study, which helped to detect variables that could account for meaningful partial or complete DIF effects.

CFA indicated that the three-factor structure worked for the data. It also indicated that the self-belief questionnaire in PISA 2012 measured the same constructs in Shanghai-China and the US.

Both robust weighted least square (WLSMV) estimator and robust maximum likelihood (MLR) estimator were used in the parameter estimation to obtain items with DIF and items with DIF of meaningful effect size.

It was found in the study with MIMIC method that both in-school mathematics class periods and out-of-school study hours had partial effects on most items with meaningful DIF effects.

*Key words: MIMIC; PISA; measurement invariance; DIF*

**About the speaker:**
Dr. Shi Zhu is now an associate professor at the Department of Applied Foreign Language Studies at Nanjing University, China. He got his Ph.D. from University of Virginia, majoring in educational research, statistics and evaluation. He is also holding a Ph.D. in history from Nanjing University.

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