



**THE MEASUREMENT, EVALUATION, STATISTICS, AND ASSESSMENT
DEPARTMENT**

Invites you to Attend the Final, Public Dissertation Defense for:

Kerry Cotter

Titled:

**Evaluating the Validity of the eTIMSS 2019 Mathematics Problem Solving and
Inquiry Tasks**

The defense will be held on

Friday, March 29th at 11 AM

in

**TIMSS & PIRLS International Study Center, 188 Beacon
Street- Basement**

Dissertation Committee:

**Dr. Ina Mullis (Chair), Dr. Zhushan Mandy Li (Reader),
Dr. Mary Lindquist (Reader), Dr. Michael Martin**

Abstract:

The eTIMSS mathematics PSIs were a new and pioneering effort to capitalize on the computer- and tablet-based mode of assessment delivery introduced in the eTIMSS 2019 assessments at the fourth and eighth grades. The PSIs were scenario-based mathematics problem solving tasks intended to enhance measurement of mathematics problem solving and reasoning skills and increase student engagement and motivation in the assessment. These unique tasks were designed to measure the same mathematics content as the rest of the mathematics items in the eTIMSS 2019 assessments, but because of their novelty, there was a question about whether the PSIs achieved this goal and could be reported together with the regular TIMSS mathematics items.

Following a full-scale field test in 30 countries completed in May 2018, this dissertation conducted an in-depth investigation of the validity of the eTIMSS 2019 mathematics PSIs with the goals of informing analysis and reporting plans for TIMSS 2019 and providing insights for future assessments aspiring to capitalize on digital technology. This investigation involved three key tasks: 1) examining and documenting the methods and procedures used to develop the PSIs and promote validity by design, 2) investigating the characteristics of the PSIs in terms of the content coverage and fidelity of student responses, and 3) using the eTIMSS field test data to evaluate the internal structure of the PSIs.

The results indicate that the PSIs are well-aligned with the *TIMSS 2019 Mathematics Framework* and elicited the intended interactions from students. The regular and PSI items were found to measure the same unidimensional construct, and therefore can be validly reported together on the TIMSS 2019 achievement scale. The lessons TIMSS learned in developing the PSIs for eTIMSS 2019 and suggestions for the future also are discussed.