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**INTERNATIONAL COMPARATIVE STUDIES IN MATHEMATICS:
LESSONS FOR IMPROVING STUDENTS' LEARNING**

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Comparing is one of the most basic intellectual activities. We consciously make comparisons to understand where we stand, both in relation to others as well as to our own past experiences. There has been a long history of international comparative studies in education. Comparative studies not only provide information on students' achievement as examined in the context of the world's varied educational institutions, but also help identify effective aspects of educational practice. The focus of this Plenary Panel is to discuss the ways to use international comparative studies to improve students' learning. We take a strong position that the main purpose of educational research is to improve student learning. International comparative studies are not an exception.

In this panel, we use the phrase 'international comparative studies' to refer to those studies involving at least two countries, with an intention to compare at the country level. We include studies that are small and large, qualitative and quantitative, and initiatives of government and individual researchers. With this definition, we see international comparative studies in mathematics evolving from informal observations to the examination of performance differences, and from the examination of contributing factors to performance differences to the generation of theories, actions, and policies based on international comparative studies. In terms of scale, international comparative studies range from small-scale studies involving a few classes from two countries to the large-scale studies like TIMSS, PISA, and TEDS(M).

International comparative studies have completely transformed the way we see mathematics education. For example, because of the highest ranking of some Asian countries, the field of mathematics education over the years has been interested in mathematics education in Asian countries. We used to think that there was one basic way of teaching mathematics; international comparative studies, however, showed us many different ways of teaching mathematics in the classroom. We also learned that some student background variables (e.g., attitudes, gender) operate in different ways for students in different countries. With this panel, we have selected four lessons that we can learn from international comparative studies about improving students' learning: (1) understanding students' thinking, (2) examining the dispositions and experiences of mathematically literate students, (3) changing classroom instruction, and (4) making global research locally meaningful. We decided to focus on these four aspects because of their importance for the impact on students' learning. The first two lessons focus on students' mathematical thinking and literacy. The third lesson focuses on classroom instruction, and the fourth lesson focuses on policy in the local context. We have used both small- and large-scale international comparative studies to illustrate the lessons we can learn.