# 3ie-IFPRI Joint Seminar:
## Challenges in Educational Reform: An Experiment on Active Learning in Mathematics
### 10/27/2016

Dr. Matias Busso, from the Inter-American Development Bank, presented his co-authored work on "Challenges in Educational Reform: An Experiment on Active Learning in Mathematics" at the 3ie-IFPRI joint seminar series in Washington D.C. on October 27. Their study assesses a structured pedagogical intervention, designed to improve the ability of 18000 seventh-grade secondary school students to reason, argument, and communicate. They drew students from 85 schools located in urban or semi-rural areas in Costa Rica. The four-arm intervention consisted of testing the effectiveness of encouraging more student participation in the classroom, specifically combining active learning (AL) pedagogy with technology. Their intervention examined a 3-month period of teaching geometry during the second term of the school year.

The researchers use a randomized block design and an ordinary least squared model to build the counterfactual and to estimate the outcomes of each treatment arm. The study sample includes 4830 students, 190 teachers, 190 classrooms, and 85 schools, which constitutes the unit of randomization of the four treatment arms. The researchers' four clusters included: AL (20), AL plus an interactive whiteboard (15), AL plus a computer lab (15), and AL plus one computer per student (15) and the control group (20). Baseline and end line data were collected through a validated geometry test, using different scales to assess students' basic and higher-order skills. In addition, process evaluation data were collected through teachers' logs and class observations to measure class dynamics, beliefs, and attitudes. Despite a high compliance rate, significant changes in class dynamics and proper implementation, the evaluation showed that all treated children had on average learned less than the control group.

Dr. Busso's conclusions describe the outcomes and highlight the main factors and constraints that limited the effects of the new pedagogy. The evaluators conducted multiple tests of robustness of the estimated effects, which showed a consistency of the outcomes. Moreover, they conclude that the best students were harmed by the intervention and less experienced teachers performed poorly when teaching the new material. However, unlike the control group, the treatment groups failed in their class mediation, which led to a lower quality of student teacher interactions. The evaluators ultimately argue that short-term losses are difficult to measure against possible long-term gains from this type of educational intervention.

Dr. Rafael de Hoyos, from the World Bank, served as the research discussant. Dr. de Hoyos underlined the quality and the relevance of the study yet, pointed out some limitations in the theory of change. The discussant qualified the study as high-caliber and policy-relevant research for the education sector and gave credit to its design and implementation. However, considering that the AL had the intended classroom effects, he argued that the study design might not capture improved geometry skills. As a result, Dr. de Hoyos suggested exploring other possible outcomes, such as socio-emotional skills. Like the evaluators, the audience agreed that the implementation period might have been too short to elicit the behavioral change and effects expected from the AL intervention.