Title: Impact of Use of Technology on Student Learning Outcomes

Technology interventions to achieve the sustainable development goal of better learning outcomes face issues of implementation and scaling up. Most technology interventions require student-to-computer ratio much lower than what is currently available in many developing countries (Banerjee et al. (2007), Suhr et al. (2010)). Also, most of these interventions require a change in pedagogy and classroom practices which need large-scale retraining of teachers prior to launch of the program (Mo et al. (2014), Lai et al. (2013)), impeding the implementation of the intervention. Research has so far not addressed the issues of implementation and scalability of such technologies used to improve school outcomes. Our paper is one of the first to evaluate an intervention design that deals with these concerns.

We conduct a large scale randomised field experiment in 1823 rural government schools in Karnataka, India that uses technology-aided-teaching to replace one-third of traditional classroom teaching. It combines computers and broadband / cellular connectivity with more conventional satellite technology to deliver classes taught by expert teachers at a central location using multimedia teaching aids. The intervention requires one computer per school, which translates to a student-to-computer ratio of 135:1, and is similar to what is observed in most developing countries. While the intervention uses multimedia tools for teaching, the pedagogical adjustments and prior training requirements for the school teachers are kept at a minimum. This, along with a high student to computer ratio makes the program unique and easy to scale-up.

We evaluate this intervention using pre and post test-scores conducted under the project. At the end of the year test scores show an improvement between 0.1\sigma and 0.18\sigma across different grade-subject combinations. We achieve this increase in learning outcomes at an estimated cost of USD 11.2 per student per year per one-tenth of standard deviation, as against another recent study in India conducted by (Muralidharan et al. (2016)) which reports a cost of USD 50 per student per year per one-tenth of standard deviation of effect-size. The intervention design, therefore, offers real policy alternative by using resources more judiciously.