MR. MARTINEZ: Good morning, everybody. I'm Michael Martinez, and I'd like to welcome you to the first of three workshops on the application of experimental and quasi-experimental research designs to educational research, especially research in STEM education.

This series of workshops is sponsored by an NSF RETA grant from the Math Science Partnerships program.

Questions about research methodology address what claims are warranted from data. As you know, randomized field trials are widely credited to be the research design that best supports inferences about causal effects—a prized dividend of research for theory building as well as for making practical decisions on policy.

Still, there is ongoing debate about whether randomization is used widely enough, how it should be employed, and the benefits and drawbacks of
randomization. In addition, randomization as an experimental design feature is a subset of other methods that can be used to strengthen inferences from data.

As all of you know, the use of experimental designs in educational research, although not at all new, is in an early stage of application as a common or expected research strategy in comparison to other fields such as medicine, a fact which Dr. Boruch, one of our speakers, will be addressing today.

There are lots of good reasons for investing effort to deepen our collective understanding of experimental methods including the conceptual and practical difficulties of designing and conducting randomized trials in STEM education research and in educational research more broadly.

Because the issues are varied and complex, we are strategic to give it sustained attention in the MSP project portfolio, in other EHR projects and programs, and in STEM education research broadly.

We ignore the proverbial elephant in the room if we don't acknowledge the political dimension. The call for a greater proportion of educational research studies that appropriate some version of randomization is on the rise. Issues attendant to experimental design, implementation, and analysis are increasingly germane to educational research policy and funding decisions, and are evermore relevant to the priorities of the STEM education researcher.
The quality of inferences from data about intervention effects bear strongly on the merit of work funded by the National Science Foundation and other agencies, public and private, that support research design to enhance the efficacy of learning in science and mathematics, technology literacy, and other domains and skill areas.

The study and use of randomized field trials in medical research and federal social policy as well as education have expanded our knowledge of methodology considerably. We now have a better grasp of the difficulties of designing research that will yield inferences about causal relationships between variables.

For example, we know that research designs frequently entail tradeoffs such as between internal and external validity.

Moreover, randomized field trials are difficult and expensive to implement. This forces us to consider which innovations are worthy of time, effort and expense demanded by randomized designs in which less-promising interventions should be placed on the back burner.

Today's three speakers are here to advance our collective understanding of the important concepts and practical challenges that should be considered in planning and implementing experimental and quasi-experimental designs.

First, my erstwhile colleague at UC Irvine, stolen by Harvard, James Kim, known as Jimmy--
[Laughter.]

MR. MARTINEZ: --will speak on the topic "How Randomized Field Trials Help Democratize Knowledge of Education." We all know that there are good reasons to randomize during research. Professor Kim will ask us to think about whether we have considered the most important reasons for using true experiments, reasons that complement their more obvious value in advancing strong causal claims.

Professor Kim's talk will be followed by a discussion, a 15-minute interaction, as will the other two presentations.

The second presenter is a famous name in the national discourse on randomized trial. Robert Boruch is University Trustee Chair Professor in the Graduate School of Education and in the Statistics Department at the Wharton School in the University of Pennsylvania.

Professor Boruch will speak on the subject, "The Flight of Error: Scientific Questions, Evidential Answers, and STEM."

As this is our first workshop, to which we have attached the daring theme "The Key Issues," it is very fitting to have Professor Boruch anchor our team of experts.

Dr. Boruch's presentation will be followed by lunch, on your own. As we all know, there are plenty of wonderful places to eat lunch here.
The day's third presentation will be a name that is also very familiar in this town and widely, Professor Eamonn Kelly of George Mason University. Professor Kelly will speak on the topic, "A Claims-Based Framework for Evaluation."

Many of you know that Eamonn is gifted at finding themes and connections that are often overlooked. He is really good at discovering a new angle, whether he is wearing the hat of an educational technologist, a mathematics educator, educational psychologist, or today a research design methodologist. He does all of these things very well.

Our last session of the day, from three to four, will entail reassembling our three speakers to a panel. This last hour will be somewhat free-form. We will give each presenter an opportunity to comment, question or elaborate the ideas of the other presenters.

This session will include a full-on discussion with the workshop participants, yourselves, whose elements can range from clarification of abstract ideas to seeking practical advice about the specific aspects of design implementation and analysis. It will be relatively unstructured, which will allow its nature and products to be unpredictably good. Let's call it emergent.