Title:

**Building a Theoretical Foundation for Quantitative Measurement in Physics Education Research**

**Abstract:**

Quantitative measurement in educational research is vastly different from its counterpart in natural science research. Such difference concerns the unique variables of interest, measurement tools, scales, and data types that educational researchers are dealing with on a daily basis. As a result, scholars in this field are facing great challenges in making valid and reliable inferences. It is from this point of view that theoretical foundations become critically important in quantitative educational studies. In this talk, I highlight the role of theoretical frameworks in the context of physics education research (PER). Specifically, I discuss the function, construction and evaluation of theoretical frameworks in PER. In addition, an empirical example is presented of building and testing a theoretical model to verify the causal influences of epistemologies and reasoning skills on student conceptual learning gains in physics. The methodologies discussed herein, albeit presented in PER, are applicable to other educational research areas.

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Lin Ding, Ph.D. is a faculty member in the Department of Teaching and Learning at The Ohio State University (USA). Dr. Ding is a recognized scholar in the field of Physics Education Research. His work includes theoretical and empirical investigations of student content learning, problem solving, reasoning skills, and epistemological development. Dr. Ding is well-regarded for his quantitative approaches to science education research. He has published dozens of high-impact journal articles, book chapters, and research proceedings papers. Currently, Dr. Ding is leading two National Science Foundation sponsored projects. He is also an Editor for the *Physics Education Research Conference Proceedings* and an Editorial Board member for the *Journal of Research in Science Teaching*. Dr. Ding has been frequently invited to serve as an NSF panelist and a referee for various international journals.

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