

Abstract Submitted
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Quantification and its importance to modeling in introductory physics SUZANNE WHITE BRAHMIA, Univ of Washington — A typical modeling instructional framework includes the development of a model and additional processes beyond its development (e.g. testing, refining, deployment, application). In this talk I will discuss a crucial part of developing a model - generating the physical quantities that are the subjects of the model. Mathematicians use the term quantification to describe the process of generating new quantities characterize attributes of an object or system. Many mathematics educators consider quantification to be an essential, and challenging, cognitive process for students, yet students experience with quantification is mostly missing from physics instruction. I present evidence that students taking calculus-based physics struggle to use simple mathematics in the sophisticated ways of physics quantification by providing two examples: 1) generating an unfamiliar ratio quantity (acceleration) and 2) interpreting the meaning of a negative quantity (work). I describe available supplemental physics instructional materials that target quantification as a learning outcome, and that show improvements in physics learning outcomes as measured by the Force Concept Inventory and CLASS-Physics.

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