Abstract Submitted
for the APR17 Meeting of
The American Physical Society

What Physicists Mean By the Equals Sign in Undergraduate Education KELLIANNE KORNICK, Rochester Institute of Technology, DINA ALAEE, ELEANOR SAYRE, Kansas State University, SCOTT FRANKLIN, Rochester Institute of Technology — Mathematical syntax allows for the description of meaningful concepts in the physical sciences, and having nuanced proficiency in mathematical formalism is closely tied to communication and understanding of physical principles. The concept of equality is especially important, as it constrains and dictates the relationships between two equated expressions, and a student with detailed understanding of these relationships can derive physical meaning from syntactical expressions mediated by equals signs by knowing the meaning of equals signs. We delineate types of equals signs as used in undergraduate textbooks and develop a categorization scheme in order to investigate how equals signs are used paradigmatically and culturally in textbooks to convey physical meaning. We classify equals signs into general clusters (causal, definitional, assignment, balancing, and just math), each cluster containing more detailed types. We investigate differences across various topics and between introductory and upper-division textbooks. We found that upper division textbooks are more likely to use balancing, definitional, and more complex kinds of assignment forms, while introductory texts have much higher frequencies of simple assignment and just math types.

Kellianne Kornick
Rochester Institute of Technology

Date submitted: 01 Oct 2016 Electronic form version 1.4