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**The role of representation when solving physics problems**

PATRICK KOHL, University of Colorado, Boulder, NOAH FINKELSTEIN, University of Colorado — Physics problems can be represented in a number of different ways, including mathematical, graphical, pictorial, or verbal formats. In a series of studies of large-lecture introductory physics courses at the University of Colorado, we have investigated the effect of problem representation on student performance and what factors influence how students use and learn to use representations appropriately. We have found that student performance can vary strongly with representation, that giving students a choice in representational format of their physics problems can have strong effects on performance, both positive and negative, and that students in a PER-informed course may develop a broader set of representational skills than those in a traditional course.

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