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What do we mean by knowledge when teaching physics?[1]

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For decades, the science education research community has studied the knowledge teachers have which goes far beyond knowing just the content. Working with many collaborators, I have spent several years investigating middle school teachers' understanding of energy and non-uniform motion. In many of our professional development activities, we have teachers engage with student data in order to develop their own content understanding and their knowledge of students' ideas. In the process, we discuss learning goals, assessment, and curricular materials designed to help student learning. To analyze our observations, we use a resources framework, a knowledge in pieces approach that lets us pay attention not just to the idea but how it is being used in a particular context. As an extension of our work, we have modified our graduate courses in Integrated Approaches to Physics Education for pre-service teachers. Our goal is to help teachers be more responsive to the creative and useful ideas their students bring to the classroom.

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