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**Excellence in Physics Education Award Talk: Learning to Listen - Implications for Interdisciplinary Instruction<sup>1</sup>**  
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For more than twenty years, researchers in the University of Maryland Physics Education Research Group (UMd-PERG) have been developing a theoretical framework for trying to understand how students think about and learn physics – Resources. The Resources Framework provides tools for interpreting how our students respond to our instruction. What may appear on the surface to be serious misconceptions can turn out to have a subtler explanation once one takes into account the roles played in student thinking by (1) experiential knowledge, (2) the dynamic character of their cognitive responses, (3) epistemological assumptions and expectations, (4) framing of the activity along multiple dimensions. The Resources Framework also provides tools to help us understand what knowledge our students bring into our classes and how they use that knowledge to interpret what they are learning. What we have learned in this research has powerful implications for instruction, especially in service courses where an expert is charged with teaching a discipline to students from a different discipline, such as when physicists teach physics to biologists or engineers. For more than a decade, the UMd-PERG and our collaborators have been studying how life science students respond to physics instruction. We have found many surprising results by listening carefully to what students say: Often, “student errors” turn out to be failures of communication between teacher and student. Many common practices turn out to be counterproductive and misleading. I will give examples from NEXUS/Physics, an introductory physics class for life science students, and I will suggest implications for instruction and curriculum development.

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