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Using research to enhance student learning in intermediate mechanics

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For many undergraduate physics majors the sophomore/junior level course in intermediate mechanics represents their first step beyond the introductory sequence. Over the past several years research has shown that intermediate mechanics students often encounter conceptual and reasoning difficulties similar to those that arise at the introductory level. Many difficulties suggest deeply-seated alternate conceptions, while others suggest loosely or spontaneously connected intuitions. Furthermore, students often do not connect the physics to the more sophisticated mathematics they are expected to use. This presentation will highlight results from research conducted at Grand Valley State University, the University of Maine (by co-PI Michael Wittmann) and pilot sites in the *Intermediate Mechanics Tutorials* project. These results, taken from the analysis of pretests (ungraded quizzes), written exams, and classroom observations, will illustrate specific student difficulties as well as examples of guided-inquiry teaching strategies that appear to address these difficulties. (Supported by NSF grants DUE-0441426 and DUE-0442388.)