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Investigating Students' Reflective Thinking in the Introductory Physics Course

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Over the past 30 years, physics education research has guided the development of instructional strategies that can significantly enhance students' functional understanding of concepts in introductory physics. Recently, attention has shifted to instructional goals that, while widely shared by teachers of physics, are often more implicit than explicit in our courses. These goals involve the expectations and attitudes that students have about what it means to learn and understand physics, together with the behaviors and actions students think they should engage in to accomplish this learning. Research has shown that these "hidden" elements of the curriculum are remarkably resistant to instruction. In fact, traditional physics courses tend to produce movement *away* from expert-like behaviors. At Western Washington University, we are exploring ways of promoting metacognition, an aspect of the hidden curriculum that involves the conscious monitoring of one's own thinking and learning. We have found that making this reflective thinking an explicit part of the course may not be enough: adequate framing and scaffolding may be necessary for students to meaningfully engage in metacognition. We have thus taken the basic approach of developing metacognition, like conceptual understanding, through guided inquiry. During our teaching experiments, we have collected written and video data, with twin goals of guiding iterative modifications to the instruction as well as contributing to the knowledge base about student metacognition in introductory physics. This talk will provide examples of metacognition activities from course assignments and labs, and will present written data to assess the effectiveness of instruction and to illustrate specific modes of students' reflective thinking.