Table of Contents

I. Overview of the Group’s Work


2. David E. Meltzer, “Physics education at ISU” [invited paper], Iowa State University Department of Physics and Astronomy [Alumni Newsletter], Fall 2001, pp. 13-14............................................................. 5

II. Teacher Preparation and Instruction for Pre-College Students


4. David E. Meltzer, “‘Micro-Document’ for National Science Foundation teacher education workshop,” invited paper prepared for the National Science Foundation workshop Teacher Education: From Preparation to Practice, Washington, D.C., May 7-8, 1999................................................................. 13

III. Active Learning in Large Classes


11. David E. Meltzer, “Enhancing active learning in large-enrollment physics courses” [invited chapter], in Best Practices and Lessons Learned: Highlights from the NSF Collaboratives for Excellence in Teacher Preparation Program and Other Innovative Programs Around the Country, edited by Diane Smith and Elisabeth Swanson (Montana State University, Bozeman, MT, in press) ............... 51

IV. Student Learning and Reasoning in Thermodynamics


V. Multiple Representations and Learning of Physics


19. David E. Meltzer, “Student learning of physics concepts: Efficacy of verbal and written forms of expression in comparison to other representational modes” [invited paper], in Conference on Ontological, Epistemological, Linguistic and Pedagogical Considerations of Language and Science Literacy: Empowering Research and Informing Instruction, University of Victoria, Victoria, British Columbia, Canada, September 13, 2002; <http://www.educ.uvic.ca/faculty/lyore/sciencelanguage/> .................................................. 125


VI. **Methodological Issues in PER**


VII. **PER in Overview**


29. David E. Meltzer, Lillian C. McDermott, Paula R. L. Heron, Edward F. Redish, and Robert J. Beichner, “A call to the AAPT Executive Board and Publications Committee to expand publication of physics education research articles within the American Journal of Physics,” report to the American Association of Physics Teachers, revised December 29, 2003 .................................. 209