

## FC05 2:00 p.m. Dynamics of Student Concepts Regarding Electric Field and Potential

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Thornton<sup>1</sup> and Dykstra<sup>2</sup> have shown how analysis of the time-dependent pattern of responses to diagnostic questions may offer insight into the development of students' conceptual understanding. In related work, Leonard et al.<sup>3</sup> and Bao and Redish<sup>4</sup> have demonstrated that a detailed analysis of responses to multiple-choice questions may provide valuable information regarding students' mental models. Following this theme, I will present an analysis of students' pre- and post-test responses to several items on the Conceptual Survey of Electricity,<sup>5</sup> examining data from five separate courses. Among the findings to be discussed: (1) students with a more "refined" (i.e., detailed) version of a common misconception regarding work and potential are more likely to abandon their original idea than students who lack that refinement; (2) evidence that the relationship between electric field magnitude and equipotential line spacing often acts to confuse students' understanding of work and electric potential.

1. R.K. Thornton, "Conceptual Dynamics: following changing student views of force and motion," in *AIP Conf. Proc.*, edited by E.F. Redish and J.S. Rigden **399** (AIP, New York, 1997), 241-266.

2 D.I. Dykstra, "Essentialist Kinematics: A Road to a Newtonian View of Force," 123<sup>rd</sup> AAPT National Meeting (2001).

3. W.J. Leonard, W.J. Gerace, J.P. Mestre, and R.J. Dufresne, "Multiple-choice questions: Searching for some answers." 2000 AAPT Winter Meeting.

4. L. Bao and E.F. Redish, "Concentration Analysis: A quantitative assessment of student states," *Physics Education Research: A Supplement to Am. J. Phys.* **69** (SUPP1), S45-S53 (2001).

5. D.P. Maloney, T.L. O'Kuma, C.J. Hieggelke, and A. Van Heuvelen, "Surveying students' conceptual knowledge of electricity and magnetism," *Physics Education Research: A Supplement to Am. J. Phys.* **69** (SUPP1), S12-S23 (2001).