

DAMOP17-2017-000410

Abstract for an Invited Paper
for the DAMOP17 Meeting of
the American Physical Society

Investigating student learning in upper-division laboratory courses on analog electronics¹

MACKENZIE STETZER, University of Maine

There are many important learning goals associated with upper-division laboratory instruction; however, until recently, relatively little work has focused on assessing the impact of these laboratory-based courses on students. As part of an ongoing, in-depth investigation of student learning in upper-division laboratory courses on analog electronics, we have been examining the extent to which students enrolled in these courses develop a robust and functional understanding of both canonical electronics topics (e.g., diode, transistor, and op-amp circuits) and foundational circuits concepts (e.g., Kirchhoffs laws and voltage division). This focus on conceptual understanding is motivated in part by a large body of research revealing significant student difficulties with simple dc circuits at the introductory level and by expectations that students finish electronics courses with a level of understanding suitable for building circuits for a variety of practical, real-world applications. We have also recently extended the scope of our investigation to include more laboratory-focused learning goals such as the development of (1) troubleshooting proficiency and (2) circuit chunking and design abilities. This talk will highlight findings from written questions and interview tasks that have been designed to probe student understanding in sufficient depth to identify conceptual and reasoning difficulties. Specific examples will be used to illustrate the ways in which this research may inform instruction in upper-division laboratory courses on analog electronics.

¹This material is based upon work supported by the National Science Foundation under Grant Nos. DUE-1323426, DUE-1022449, DUE-0962805, and DUE-0618185.