Authenticity in the undergraduate teaching laboratory: analysis of the literature and surprises from our students

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The teaching laboratory is a core learning environment for undergraduate science students. We use an educational model called the Authentic Large-scale Undergraduate Research Experience (ALURE), but the definition of 'authenticity' in laboratory learning is contested. We present an examination of ALURE authenticity that draws on literature analysis and the student voice. We compare the data from ALURE students to data from students in a more traditional laboratory with surprising results. ALURE is an Australia-wide laboratory program that is used to replace the regularly-timetabled laboratory sessions in undegraduate science programs. Design for ALURE authenticity draws on the work of Jonassen (1999). Using this lens, ALURE is authentic because students (i) answer a research question with no known answer (using techniques and approaches that are appropriate to their field of study), and (ii) are assessed on their ability to communicate their (novel) findings to an "audience who cares" (Rowland, Pedwell, Lawrie, and Worthy, 2016). In order to investigate the authenticity of ALURE we first conducted a comprehensive literature review to identify definitions of authenticity in science education. Thematic analysis of the 22 resultant papers revealed a diversity of opinion about authenticity both within and between groups of theoreticians, K-12 educators, and tertiary educators. We built a set of common, if not consensus, definitions of authenticity. Reflections from ALURE students (94 reflections) were coded using a framework from Hunter et al. (2007) and compared to the common literature definitions of authenticity. The students described multiple experiences, affects, and ideas that matched the definitions. In this study the ALURE laboratory model runs in parallel to another more traditional laboratory program called LEAPS (Laboratory Experiments for the Acquisition of Practical Skills). Surprisingly, our analysis showed that these students (510 reflections) also perceived authenticity in their experience. This study leads us to consider the perspective of Rahm et al. (2003) who caution against pre-authentication of educational experiences and, instead, suggest students will construct personally-relevant conceptions of authenticity from the lived curriculum.

Hunter et al. (2007). Becoming a scientist: The role of undergraduate research in students' cognitive, personal, and professional development. Science Educ. 91(1), bn36-74.

Jonassen (1999). Designing Constructivist Learning Environments. In Instructional-Design Theories and Models. Ed: C. M. Reigeluth, Routledge.

Rowland et al. (2016). Developing and resourcing academics to help students conduct and communicate undergraduate research on a large scale. Final Report 2015. Canberra: Office for Learning and Teaching

Rahm et al. (2003). The value of an emergent notion of authenticity: Examples from two student/teacher-scientist partnership programs. JRST, 40(8), 737-756.