

Measuring Student Transformative Learning in a Biology Lab

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Abstract

Biology laboratory teaching techniques include active learning, collaboration, critical thinking, writing, reflection, and often discourse. Transformative learning theory states that students are given their best opportunities for transformation through willingness to grow, engagement in learning experiences, critical reflection, and substantive discourse. So, students in biology laboratories have a great setup through which to be transformed. To know if this really is happening, biology educators need assessment tools to measure levels of student transformation. Our university has recently implemented such a tool, campus-wide, through an initiative called the Student Transformative Learning Record (STLR, <http://uco.edu/stlr>). My poster at ABLE 2016 describes the STLR rubric and gives suggestions for other instructors to implement a similar framework in their biology laboratory courses.

Introduction

Transformative Learning is an adult learning theory. It states that students who are willing to learn, then go through disorienting dilemmas, resolve these through reflection and discourse, leading to a lasting change in their belief, perspective, or understanding (Mezirow, 2010; Taylor & Cranton, 2012). On our campus, Transformative Learning (TL) is part of our mission, as a means to graduate students who are productive, creative, ethical, and engaged citizens and leaders of their communities. We define TL as developing beyond-disciplinary skills and expanding students' perspectives of their relationships with self, others, community, and environment. We measure their transformation across our Central 6 Tenets: Discipline Knowledge; Global & Cultural Competencies; Health & Wellness; Leadership; Research, Creative & Scholarly Activities; and Service Learning & Civic Engagement.

Campus faculty and staff can create assignments and activities that are more conducive to student transformation by using high-impact practices (Kuh, 2008) like service learning, collaboration, undergraduate research, and writing-intensive projects. Since these are common practices in Biology laboratory courses, and promoted by ABLE, Biology education is an ideal setting to encourage and assess student transformative learning.

Methods

The University of Central Oklahoma has implemented a unique, campus-wide process to capture, assess, and track students' Transformative Learning. It is called the Student Transformative Learning Record (STLR, <http://uco.edu/stlr>). A team of faculty, staff, and administrators drafted definitions of TL and of our Central 6 tenets and developed rubrics for assessing students' growth in each of these. *Discipline Knowledge* was already assessed in coursework and recorded on the traditional academic transcript, but the other tenets needed criteria. We used existing American Association of Colleges and Universities' VALUE rubrics (<https://www.aacu.org/value>) as the foundation for our STLR rubrics, and drafted criteria to assess at the levels of Exposure, Integration, or full Transformation (see <http://uco.edu/tl>).

Scenario

For instance, a biology student might have an assignment in his introductory biology class to watch a documentary and TED talk about declining bee populations, then answer some prompts. The professor grades this assignment, but also gives Exposure-level credits for the student's Health & Wellness and Global & Cultural Competencies tenets. The student attends department seminars his sophomore and junior years that emphasize research. At each of these, he swipes his ID card to get automatic Exposure-level credits in the Research, Creative, & Scholarly Activities tenet. During his junior and senior years, he works in the lab of Dr. Wei Chen, researching laser immunotherapy for cancer treatment. He contributes to two research papers, presents his findings at a research day on campus, and writes up a reflection paper describing how his understanding of research, and his future career path in health research, have been changed through this research experience. Dr. Chen marks the student as having reached Transformation in the Health & Wellness and Research, Creative & Scholarly Activities tenets. The student attends a cording ceremony during graduation weekend, where the Provost presents him with green and fuchsia cords. The student highlights skills gained through these experiences on his graduate school applications.



Transformative Learning in your Lab

Using Backwards Design principles

1. Identify the beyond-biology skills you'd like students to have when they leave your class. Maybe your institution already has a set of these.
2. Decide what it would look like for a student to display evidence of the best mastery of those skills, intermediate mastery, or just beginning understanding. Then, put this into a rubric (on paper or an MS Excel file or in your LMS).
3. Create or modify activities (perhaps using existing ABLE resources) to meet those goals--tagging which activities give students the best chance for growth in the specific skills you identified.
4. Explain to students:
 - a) the goals of each activity;
 - b) this new, non-grade-based assessment; and,
 - c) some incentive (e.g., highlighting these skills to future employers may help you land the job; the student with the most, mastered skills at the end of the semester will receive a free lunch)

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