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## A Strategy to Increase Formative Assessment and Student Engagement during Labs

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# A Strategy to Increase Formative Assessment and Student Engagement during Labs

### The practice and the need it addresses

#### Learning Objectives (LOs) and Associated Practice Activities

In a 200-level biology laboratory course, we developed learning objectives (LO) for each lab. We also developed practice activities that directly corresponded to each LO. Students earned participation credit through completing the practice activities. As students progressed through their lab work and felt ready, they would request that the lab instructor come check their progress towards mastering a particular LO. If students were successful with the practice, the instructor would mark completion for that LO on the students' lab handout. If students were not successful, the instructor would provide feedback and recommend additional learning approaches. Since the purpose of the practice activities was to provide formative assessment, students were never penalized for mistakes. The LOs and associated practice tasks address the need for students to know what needs to be learned, to identify gaps or misconceptions in their knowledge, and to gauge their learning progress.

Example: Following completion of the lab, the student will be able to identify the structures of the brain, including the cerebrum, diencephalon, cerebellum, and brainstem

- \_\_\_ Name 2 structures of the brain that are composed of gray matter
- \_\_\_ Name 2 structures of the brain that are composed of white matter
- \_\_\_ Identify 3 structures of the cerebrum

### Evidence this practice benefits UNLV students

#### Student Achievement Increased When LOs Were Implemented

We observed the following benefits:

- Increased interactions between students and more group collaboration
- Increased interactions between students and instructors
- Balanced instructor interaction with all students (all students received instructor feedback multiple times during each lab session)
- Students demonstrated better time management and full use of lab time
- Students became more confident in their knowledge and skilled in how to prepare for graded quizzes and exams

**Student achievement improved on lab assignments, and students shared positive comments on course evaluations.**

Course	SP 2015 (No LOs in place)	FA 2015 (1 <sup>st</sup> semester with LOs)	SP 2016 (2 <sup>nd</sup> semester with LOs)
Human A&P I	lab average = 72.9% (609 students)	average = 74.5% (520 students)	average = 76.8% (615 students)
Human A&P II	lab average = 78.0% (418 students)	average = 80.7% (420 students)	average = 81.5% (378 students)

#### Representative student responses to the question, "What is the major strength of the anatomy and physiology lab?"

- "What we need to learn every week is well outlined."
- "The organization of the material. Breaking it down by category makes it somewhat easier."
- "A strength was going around the class and doing mini quizzes."
- "It is very organized and I know exactly what I need to know."
- "At first I didn't like the in class questions, but as time went on, I ended up liking them because they helped me focus on what was most important at the time."
- "The LOs helped me on what to focus on during lab."
- "Information was clear on what we needed to know."
- "I walk out knowing already what my strengths and weaknesses are for when I start studying."
- "The TAs and UTAs make sure that we are understanding the material and engaging with the material. It really helps a lot with the BIO lecture class."

### Resources and where to find them

The UNLV Office of Academic Assessment can support the development of Learning Objectives; the Office of the Vice Provost for Undergraduate Education organizes workshops and training events that support faculty implementation of practices to engage students in their learning process.

Relevant publications:

Kulasegaram, K. and Rangachari, P. K. (2018) Beyond "formative": assessments to enrich student learning. *Adv Physiol Educ*, 42(1), 5-14.

Goodman, B., Barker, M. K., and Cooke, J. E. (2018) Best practices in active and student-centered learning in physiology classes. *Adv Physiol Educ*, 42(3), 417-423.

### How other UNLV teachers might adopt this practice

Begin with creating LOs for a specific lab, assignment, or chapter. Develop a set of practice questions or tasks that correspond to each LO. Consider the following during your development process:

- emphasize that mistakes are a valuable part of the process; the practice questions/tasks are "low stakes", they are designed to help students explore the material and understand the level of knowledge that will be required for success on later quizzes or exams
- practice should be geared for in-class time and clarify what students need to follow up with during out of class time
- instructor feedback is important