

Active Learning Opportunities Through Virtual Lab Curricular Integration Project Executive Report

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In the pilot stage of the Active Learning Opportunities Through Virtual Lab Curricular Integration project, Online Learning Strategies portfolio (OLS) collaborated with five instructors to integrate biology related Labster virtual labs into four undergraduate courses in 2017-2018 academic year. All Labster labs in their current catalogue were available to instructors and were provided at no cost to students.

OLS provided integration and faculty development support and conducted an evaluation project. First, the instructors integrated the virtual labs into their curriculum and connected them to the learning outcomes and assessment components of those courses. Labs served as complement to lectures, pre-lab activity for on-site labs, or provided the first ever labs available to some of the courses. Assessment was primarily participation based, however, virtual lab material could be exam-eligible. Instructors shared their observations at the mid-point while their students were using the integrated labs and again after the courses were completed, when the instructors provided their reflection and ideas for redesign in a focus group session. Following is a summary of insights gained from this evaluation project regarding the integration of Labster virtual labs into undergraduate biology courses:

- Rationale for virtual lab integration. Students can already use a plethora of electronic resources available to them to complement their course learning. The instructors posited that Labster virtual labs could be used to purposefully deepen students learning for complex or resource-intensive concepts and to deliberately connect those resource to their course learning objectives.
- Observed impact on students' learning. Self-paced virtual labs could be beneficial to students with accessibility requirements as they increase learner control over pace of learning. A pedagogically significant feature of Labster virtual labs was the embedded theory links within each lab that emphasized the connections between theoretical concepts and hands on labs experiments.
- Desired changes in Labster virtual labs. Labster virtual labs are non-customizable at this time. The instructors expressed their interest in having more granular control over the content and corresponding assessment questions of the labs so that they can select the most relevant section of the virtual labs to complement their instruction. As for data available in Labster dashboard, the instructors requested more detailed information on assessment results at the item level and on students' access to theory pages.
- Sustainability. Cost was a major concern about the sustainability of Labster virtual lab curriculum integration. Students were in favor of no-cost access to the Labster virtual labs. Moving forward, the instructors questioned the possibility of only selecting the labs that they need for their courses, instead of the current model wherein all Labs in the catalogue need to be purchased as a whole collection.

According to the instructors, informal feedback from their students supported the notion that virtual labs were aligned with their learning as supplementary resources, lecture substitute, and pre-lab activities. A research being conducted by the instructors is in the analysis phase and will provide further evidence on students' experience with virtual labs in these courses.