

A Synopsis of the Journal of the Advanced Undergraduate Physics Laboratory Investigation

Introduction

The term advanced laboratory is nebulous meaning to some every laboratory post-introductory laboratory and to others a specific stand-alone laboratory experience. There are many goals for advanced laboratory differing from institution to institution and instructor to instructor. However, one goal is common: the desire that students understand the physics of their investigations.

For a scientist, significant synthesis occurs as she/he writes an article for a scientific journal.[1, 2] Unfortunately, when students write, the synthesis or sense-making is often absent and students perform answer-making. One reason for this is audience. Scientists write to their peers as an audience. Student papers are generally written for their professor. However, writing can help students with understanding science in general and their investigations in particular. [3-5]

In writing for a scientific journal, scientists are actively participating in a scientific community. One of the duties of this participation is the responsibility for what is accepted for publication through the process of peer review. Unfortunately it is not uncommon to receive a review which is devoid of usefulness and which provides no way for the author learn. Where do upcoming scientists learn how to review papers?

Finally, there has been recent discussion in the physics teaching community about the relative sense of isolation common to instructors of advanced laboratories.[6] This sense of isolation is indicative of a lack of community, a lack of common activity. Likewise, students often operate in a sense that they are alone. Students are often amazed to find that there are physics students at other institutions involved in similar activities.

Solutions

To provide a solution to these problems, we are proposing to develop an on-line journal: The Journal of the Advanced Undergraduate Physics Laboratory Investigation to which students submit articles about their work and review articles submitted by students at other institutions. Because the students recognize they are writing for their peers they cannot help but recognize that there is a different audience than the professor. Furthermore, because the reviewers are at institutions different from that of the author (reviews are double blind), the reviewers are able to provide a honest review which is difficult or impossible when they review a classmate's work.

Because the students are participating in an extra-institutional activity, they recognize the existence of a greater community of students working in advanced laboratory activities. Similarly faculty engaged with other advanced laboratory instructors in the governance of this journal, students participating in a common activity, have a shared activity which provides for a sense of community.

The audience of this journal is two-fold. First, it is the students writing for the journal. They are provided with a tangible outcome of their work which is published on the web for all to see. But the second audience is the advanced laboratory instructors who share in the activity. Perhaps a third

audience will be faculty who wish to contribute to this larger community involved in educating our students.

Students cannot be asked to review articles without guidance. Nor can the reviews be unmonitored. As such there will be calibration reviews similar to those described in reference 7, but for more advanced and less uniform assignments. These reviews will be produced by laboratory instructors as a check and learning tool for reviewing.

Finally, the papers and the reviews will contain a wealth of information about how the student understands their investigation and about their writing skills. As such, these artifacts will be mined for student understanding of the physics in their investigation and critical abilities such as uncertainty and data analysis will be monitored.

Value Added

By participating in this project, not only is a new opportunity provided to your students to both improve their understanding of physics and their writing skills. Not only will they be exposed to reviewing articles. The laboratory instructor will get feedback on student writing and reviewing skills as well as measures of student understanding of the physics in their investigations with comparison to the cohort of participating institutions.

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