

# Students' Perspective of Organic Chemistry Laboratory Course Designs

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## Abstract

This report is a follow-up to the previously published paper focused on designing two undergraduate organic chemistry laboratory courses in a hybrid format at the department of chemistry, Iowa State University (ISU). Students of the course 'Laboratory in Organic Chemistry II' were asked to participate in an anonymous survey considering the latest course design. The implications of these assessments for future laboratory designs environments that would likely facilitate better student learning in a hybrid format are discussed.

## Keywords

Survey, Organic Chemistry, Laboratory Instruction

## Introduction

Understanding how students perceive and learn in an undergraduate chemistry teaching laboratory is one of the vital elements to evolving and improving an evidence-based laboratory curriculum.<sup>1-2</sup> The goal of this teaching-as-research study was to improve the design of the organic chemistry laboratory courses in a hybrid learning environment.<sup>3</sup> To do so, the survey was administered during the spring semester of 2021 amongst students taking the course 'Laboratory in Organic Chemistry II' as they had attended the course 'Laboratory in Organic Chemistry I' prior to the new course designs. Students were asked to fill in their responses towards the end of the semester. Most of the students (80.00%) taking the survey sensed they had learned as much in a hybrid class as in a face-to-face laboratory course (Table 1).

**Table 1:** Student response to question: I have learned/ have NOT learned as much in my hybrid class as in a face-to-face laboratory course.

#	Answer	%	Response Count
1	have learned	80.00%	28
2	have NOT learned	20.00%	7
	Total	100%	35

The student responses to the question on aspects of the course design that worked well were quite encouraging:

- “The page layout, which is easy and efficient to use.”
- “Having chapter tabs with everything under there that we need to study and read and do for homework helped me stay organized.”
- “Lab report templates are much easier to access and submit in the new Word format.”
- “Easily accessible with buttons.”
- “Being able to view lectures at whatever speed I want and whenever I want.”
- “The templates for the labs help a lot and save a lot of time.”
- “Love the spreadsheet on the homepage with the schedule and links to what needs to be done that week.”
- “The experiment readings, pre-lab talks, and lab template are the same as if we had lab in person. The tutorials are very helpful because they are given and we do not have to search for something we're confused about.”
- “Very well organized and is clear of what is due.”
- “I like that everything for that experiment is listed under the module for that week.”

A student also commented “I feel that I am learning the material very well based on what is on canvas.”

However, areas of consensus in which they felt the course design could improve were as follows:

- (1) “Notifications of upcoming assignment due dates. Designing the canvas to help with which lab is due when. Due dates will help too.”
- (2) “More pre-lab talks explaining the content.”
- (3) Some students also expressed the need for more personal meetings and office hours in a hybrid format.

### **Conclusion**

Although this survey was taken by a smaller majority of students taking the course (35 out of ~150), it gives us an idea of the aspects of the course where the design worked well and where there remains room for improvement. Overall, the Teaching Assistants (TAs) thought the schedule table worked well and color coding helped in distinguishing the sections with hyperlinks making it convenient for both students and TAs. They also suggested that more image guided explanations could be included to break up blocks of texts along with addition of more tutorial videos to prepare the students well before the actual lab period.

### **Notes**

Each survey mentioned the disclaimer: "The data from the survey would be used anonymously as a part of a study report. The goal of the research study report is to help the overall course and other instructors to improve the effectiveness of their teaching".

### **Acknowledgments**

This work would not be conceivable without the help from the instructor of the course, Dr. Teresa Fernando (terry@iastate.edu), Iowa State University, Iowa, USA. A special mention to all

the students who participated in the survey. This work was completed as part of the Preparing Future Faculty Special Topics, Iowa State University, Iowa, USA.

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