Evaluation of the impact of a multistep synthesis project

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Introduction

Multistep Synthesis:

- A **newer alternative** to traditional cookbook labs
- Potential advantages:
 - Resembles real-world synthesis
 - Increases student interest and engagement
 - Increases student sense of accomplishment

A multistep synthesis project was implemented for 2 years in an Organic Chemistry II Lab course.

Guiding Question:

Is the project effective?

- Specifically, is there alignment between course goals and what students find valuable?

Course Details

- Organic Chemistry II Lab project
- Multistep synthesis
- Introduce students to green chemistry
- Work in groups
- Students write papers in Journal of Organic Chemistry format

Methods

Data:

- 113 student completed surveys
- 13-16 open-ended questions
- Spring 2018, Spring 2019

Coding/ Analysis:

- Open coding
- Student responses assigned to multiple themes

Discussion

Course goals were met:

- Students reported they gained **lab skills** and **experience** pertinent to organic chemistry
- Students made the **connection** between **lab** and **lecture**
- Students learned to write a **scientific paper**
- Students learned about **green chemistry** and **green metrics**

There was **alignment** between the instructor intended purpose (course goals), the student perceived purpose, and the student perceived value.

Future Directions

Evaluate student outcomes using:

1. CURE survey
 - Pre/ post course survey using Likert scales
 - Assesses student perceived gains and ideas about science
2. ELIPSS Process Skills Rubrics
 - Assesses critical thinking and problem solving abilities

References:

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A multistep synthesis project was effectively implemented in an Organic Chemistry II Laboratory course.

Scan for all survey questions and the themes developed from student responses

Results

Course Goal #1:

Students perform synthesis of organic molecules.

Survey Question: What did you see as the **purpose** of your lab?

Survey Question: Please identify those aspects of lab you found most **useful** or **valuable** for your learning.

Course Goal #2:

Students communicate experimental results in written reports.

Survey Question: What was the most **useful skill** you have learned when you were writing the final report?

Course Goal #3:

The concepts students are taught in lecture are reinforced in lab.

Survey Question: Describe **connections** that you see between lecture material and the experiments that were conducted?

Course Goal #4:

Students are introduced to green chemistry concepts.

Survey Question: List **green chemistry** concepts you learned this semester.

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