TLI Teaching as Research Project Proposal

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Increasing Student Agency in Organic Chemistry through Consistent Skill-Building and Reflection

This proposal is for a Teaching as Research (TAR) Project to be carried out during the 2019-2020 academic year in Organic Chemistry I (Chem 202, Fall 2019, Hamilton and Spring 2019, McMenimen) and Organic Chemistry II (Chem 302, Spring 2019, Hamilton). The study will examine changes in student perception and agency during the semester as indicated by the analysis of pre- and post-semester self-reflections (qualitative), weekly "Problems of the Day" (quantitative) and evaluation of course content seven times throughout semester (quantitative). Global grade comparison over the last five years will be performed to evaluate iterative pedagogical changes (quantitative).

Organic chemistry has a long history of being a "gate-keeper" course and suffers from perpetuated student misconceptions and dread of the subject. From the minute students enter the classroom there exists, for many, a fear of the course material and a pervasive sense that the only way to excel, or even simply progess, is through endless "memorization" of the course content. This reality is isolating and may lead to a perception of inaccessiblity for many students.[1-3] Many students encounter organic chemistry at a critical juncture in their college careers as questions of major and post–graduation plans become pressing, especially for pre–health students. They also arrive at this point in their careers with diverse backgrounds and experiences in their scientific training and interests. With the redevelopment of the core chemistry curriculum at Mount Holyoke, the majority of students entering Organic I will be second-semester first year students. This is a critical time in their early scientific training and in their experience at the institution. As the chemistry curriculum is shifting to increase student flexibility and inclusion, students will be entering Organic Chemistry at an earlier stage in their careers. Enhanced support for the curriculum in general, and for the specific demands of organic chemistry in particular, will provide a solid foundation for knowledge acquisition and learning skill development and should prove of value for continued success and engagement with the discipline, and others.

Many students in organic chemistry will not become chemists, yet it is becoming increasingly important to be "chemistry-literate" and students need to know some of the course content for further studies. There is, at times, an overwhelming amount of material in the course. However, developing strategies to learn challenging material is beneficial beyond the scope of the course and can greatly contribute to their own selflearning process. Many different methods have been used to increase student success in the subject, including active learning strategies, introduction to mechanisms, and flipped classrooms. [4-6] However, these strategies often do not focus on the integration of student skill building and success comprehensively throughout the semester. In addition, learning effective mechanisms to succeed with organic chemistry teaches critical-thinking skills. Acknowledging that students have different motivations for taking the course and that those emotional responses affect their learning is essential to creating an effective student-directed teaching strategy. [1]

One of the goals of the revised syllabus and student-directed model is to build student confidence and self-reflection into the course activities consistently throughout the semester or year-long course. The assignment and grading structure are established to provide flexibility to the students and to incentivize understanding by the end of the semester. [7,8]

Course assessments:

1. Student reflections at beginning and end of Chem 202 and Chem 302
2. Grade distributions over previous 3 years
3. Student assessment of course syllabus and assignments

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