Students’ Perceptions of Teaching and Learning in Intro Organic Chemistry

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Purpose

- To explore how students’ metacognition and self-efficacy change over the course of the semester
- To gain knowledge about how students study and the factors they perceive as limiting/enhancing their learning
- To understand the events, activities, and/or interactions that students perceive as triggering how they think about and approach their learning
- To find out students’ perceptions of the course curriculum and pedagogy
Organic chemistry has a reputation as a challenging course (Grove & Bretz 2012; Lynch & Trujillo, 2010)

Undergraduates often lack the metacognitive skills and self-efficacy to be successful in organic chemistry (Zhao et al., 2014)

**Metacognition** is the ability for students to control, evaluate, plan, and monitor their learning (Flavell, 1979)

**Self-efficacy** is a student’s confidence in their ability to tackle a particular task or course (Bandura, 1993; Schraw et al., 2006)
This course had roughly 1,100 registered students in five sections.
The participants in this study were enrolled in two sections during term 1 of 2013/2014.

The majority of students were in their 2nd year of a biological sciences degree.

This course has recently adopted aspects of a flipped classroom approach:
- Outside of lecture: Pre-class videos, quizzes, and problem sets (graded online and ungraded paper-based)
- Within lecture: Group worksheets, clicker questions, practice
Data Collection Tools

- Pre-post SEMLI-S (Self-Efficacy & Metacognition Learning Inventory – Science) survey instrument
- Midterm reflections and survey responses
- Classroom observations
- End-of-term individual student interviews (n=26)
- Student grades
Preliminary Findings: SEMLI-S

- Initial analysis of the SEMLI-S reveals a significant drop in students’ perceptions of their:
  - Ability to connect organic chemistry to other courses and their life ($t=4.69$, $p<.001$)
  - Strategies for monitoring, planning, and evaluating their learning ($t=3.69$, $p=.001$)
  - Self-efficacy ($t=2.131$, $p=.035$)

- There was no significant difference in students’ perceptions of their:
  - Awareness of their weaknesses ($t=0.174$, $p=.862$)
  - Control of their concentration ($t=0.141$, $p=.888$)
Preliminary Findings: Interviews/Survey Responses

*Interviews are currently being transcribed and analyzed

Preliminary analysis reveals:

- Successful students exhibit metacognitive strategies and high self-efficacy
- Mid/low-performing students rarely implement advice from the instructor
- Students’ preconceived notions of learning limit their success
- Students attribute time pressures and a lack of effective learning strategies as limiting their learning
- Students provide useful feedback on the flipped classroom approach
- The first midterm is the primary crossroad at which students critically reflect upon their learning (and is a crossroad for change in some cases)

“While I do study hard, I don’t think I study smart”
Preliminary Findings: Observations and Midterm Survey Responses

- The instructor presents a Learning Sequence and study advice/workshops to guide student learning
  - Few students remember the sequence/advice despite it being discussed consistently throughout the course
  - Students value this information but do not seem to engage with it

- Students are initially hesitant about the flipped classroom approach
  - Some students comment that they learn best via lecture
  - Students like pre-class videos to be < 25 minutes

- Students appreciate formative feedback
Continuing Analysis

- Comparison of SEMLI-S data with students’ exam and course grades
- Transcription of interviews
- Analysis of classroom observations and students’ written reflections
- Triangulation of the data
- Providing implications for instructors and students


