

Student: Olivia Chesniak

Faculty Supervisor: Kevin D Walker

Please comment on the following aspects of the project:

Project Proposal

After gaining years of experience teaching various undergraduate (UG) laboratories at MSU, the Olivia observed a reciprocal disconnect between the time spent by the UG in the lab and their understanding of core chemistry principles. Overall, the proposal is hypothesis driven and is structured canonically by first describing the intent of the learning objectives offered in the CEM 355 course, followed by identifying the gap/problem in the teaching objectives. The hypothesis was organized by emphasizing a series of measurable exercises for the UG that could be practically implemented. The procedures are well-written and include examples of the types of questions and responses from a typical UG student. A scoring rubric is included to give the reviewer information on how answers to questions will be weighted and scored. The proposal followed a central guiding principle in Chemical Education to identify learning objectives and then define a means of effectively teaching those objectives.

Project Objectives

The objectives were designed to bridge the reciprocal disconnect between the extensive time spent by the UG in the lab and their retention/understanding of core chemistry principles that could be applied moving forward in their discipline. The teaching/learning objectives were extensions from a foundation of useful laboratory experiments. The goals were reasonable and geared to stretch the thinking of the UG laboratory student beyond a cookbook lab. The reflective exercises that Olivia included in her curriculum encourage students to explore the caveats of their experimental results, particular those experiments fraught with low yield or whose physical properties differed from expectations. Olivia understood that to initiate a different curriculum that she needed to attend all class meeting times, organize the timely receipt and return of graded work, and evaluate the graded material objectively according to a rubric. The project enabled Olivia to understand that while big data is essential to steer UG learning for developing new curricula, questioning a small sample size (Gallop polling) of students face-to-face enhances the understanding of student deficiencies and strengths is also beneficial.

A valiant attempt was made to assess the outcomes of the evolved curriculum, by comparing the UG student responses to and understanding of questions that Olivia presented separately in the Spring 2018 and Summer 2018. While several positive conclusions could be drawn, and methods towards them advanced to future semesters, the results of some desired outcomes were inconclusive. The unforeseen variables likely resulted from using only two semesters in the comparison, and using comparing students enrolled in the Spring and Summer semesters, which can be functionally different and invite a different demographic of enrollees.

Project Implementation

Olivia was present during the entire semester to ensure that her curriculum was in place. A large part of her implementation came in not being tempted to answer UG questions that appear on their worksheets. This encourages students to talk amongst themselves and resource solutions through their textbooks or online. She collaborated with me continually



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throughout the semester to ensure that implementation of the homework and prelab discussion did not retrograde to the older cookbook lab culture. Because questions were not "due" at the end of the lab session, students were able to complete their labs within the allotted time, and then cede to a more relaxed atmosphere outside of the lab to develop answers, hypotheses, and caveats observed during lab.

Assessment

Olivia had firsthand experience revising the CEM 355 curriculum so that it was inquiry and reflection based rather than enforcing students to rely on default rote memorization and cookbook application. Through this independent endeavor, she gained a perspective of course development by creating a teachable unit for STEM classes. Responsible and active involvement in this project was a practical experience for Ms. Chesniak to help shape her professional career.

Student's Teaching Ability

I worked closely with Olivia during meetings to develop grading rubrics for teaching assistants, laboratory curricula, and building design for the new STEM building laboratories at MSU (2020 projected completion) The many contact hours have given me firsthand knowledge of the applicant's accomplishments in teaching. We have interacted both in professional social and job-related settings that have provided an excellent foundation upon which I will evaluate her. Student feedback was positive; the only downside was the Olivia could not be in two places at once (the wet lab and the NMR lab). Consequently, the students could not receive from Olivia the same probing insights during NMR training that she provided in the lab. Olivia revamped the CEM355 syllabus before the semester and did all the grading throughout the semester. She is vested moving away from cookbook curricula in laboratories and classrooms and is motivated to help students learn how to think in general, which is foreseen to help them master skills in any endeavor.

Central to her success as an educator is her own chemistry laboratory research experience toward a Ph.D. in chemistry. Through her teaching and independent research experiences, Olivia has become a good departmental citizen. Besides teaching, her service as an undergraduate mentor in her research group has forced her to focus on and manage separate projects, and help undergraduate assistants learn the process of independent thinking, problem-solving, and hypothesis-driven research.

Student Development that resulted from the Mentored Teaching Experience/Project

Olivia is exhibiting exemplary performance in all aspects of her academic endeavors. She is on a trajectory to advance in the academic arena and thus is an ideal candidate for the advancement of chemical education. She has a unique mix of scholarly drive and self-motivation that prompts her to complete tasks and avoid procrastination. As important, Olivia *thinks* independently, and her communication skills are outstanding and confident. She has no hesitation to share her opinion or feelings that balances the tenor of a conversation, topic, or project where the overall outcome is productive.

Overall, Olivia Chesniak performed superlatively during this teaching project.

Sincerely,



Kevin D. Walker