CHEM 10400 Spring 2020 Assessment Report 

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| Date of report: | **June 2020** |
| Course: | General Chemistry II |
| Materials used: | Student surveys |
| Preliminary Assessment Team Members: | **Chemistry department faculty and Chair** |
| Coordination/ Oversight: | **Ana Vasovic** |

COURSE OVERVIEW

This course is the second of a two-semester sequence and provides an in-depth introduction to the fundamental laws and techniques of chemistry for majors in science and engineering. Topics include: intermolecular forces, solutions and their physical properties, chemical kinetics, equilibrium, acids and bases, solubility and complex ion equilibria, thermodynamics, electrochemistry, and nuclear chemistry. It consists of three components (lecture, laboratory, and recitation), which are integrated to provide a comprehensive but thorough introduction to the principles of chemistry. The laboratory component introduces students to common laboratory methods including visible spectroscopy and titration. The course allows STEM major to receive credit in the Life and Physical Sciences or Scientific World category of Pathways General Education requirements. It is taught as a large lecture (300+ students) with lab and recitation sections (up to 20 students each).

GOAL

Achieve higher levels of comprehension of fundamental concepts in General Chemistry II (CHEM 104) by introducing active-learning Virtual Lab modules in place of traditional labs. Upgrade several traditional labs. Implement successfully tested model and approach from General Chemistry I.

METHODOLOGY

Compare the effectiveness of the new virtual/upgraded labs with the former labs by surveying students on their interest, level of engagement, content understanding, and overall quality of the labs. Monitor impact on grades by comparing with previous years.

OVERVIEW

Four new virtual labs were integrated into the General Chemistry II curriculum during Spring 2020 so that all students were introduced to skills and an emerging technology that they don’t usually get in a traditional chemistry lab. The effort was timely and made it possible for a seamless transition when the College went to distance learning, as labs are accessible online. Although most of Gen Chem II labs had to be carried out online due to the move to distance learning, students were surveyed on the specifically designed PhET virtual labs compared to traditional labs carried out early in the semester.

ASSESSMENT FINDINGS

Out of 201 students who were surveyed, 35 responded as follows:

Interest and engagement: 37% felt the inclusion of Virtual Labs increased their interest; 37% were neutral; 26% disagreed.

Content understanding: 46% felt that the inclusion of Virtual labs helped to improve understanding of concepts in chemistry and those covered in the lectures; 40.0% were neutral; 14% disagreed.

Overall quality of the labs: when compared to traditional labs, 31% felt Virtual Labs could improve the overall quality of the lab experience; 29% were neutral; 40% disagreed.

Comments were in favor of Virtual Labs applauding a mix of both. Advantages cited were being able to take as much time as needed, following a long lab manual was not necessary and being able to experiment freely.

CONCLUSION

It appears that Virtual Labs contribute to comprehension of concepts and material covered in the lecture and students generally support them, but a better integration with the lab series and more guidance is needed in order for them to augment the overall quality of the lab component of the course. Our goal is to further improve virtual lab implementation by developing a manual and offering labs in a group setting (rather than at home, individually) to provide peer and instructional support.