CHEM 10300 Spring 2020 Assessment Report 

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| Date of report: | **June 2020** |
| Course: | General Chemistry I |
| Materials used: | Surveys, homework assignements |
| Preliminary Assessment Team Members: | **Chemistry department faculty and Chair** |
| Coordination/ Oversight: | **Ana Vasovic** |

COURSE OVERVIEW

General Chemistry I (CHEM 10300) description: This course is the first 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: measurement; stoichiometry; the gaseous state; thermochemistry; atomic structure; chemical bonding; redox reactions; solids, liquids and intermolecular forces. 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 recitation aims to show how the concepts covered in lecture are applied in practice in solving problems. 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

Introduce components of flipped classroom innovative instructional approaches to General Chemistry I (CHEM 103) drawing from approaches tested at other institutions (including Lehman College) via prerecorded video lectures and apportion more lecture time to problem solving.

METHODOLOGY

Student engagement was gaged through (a) student survey for comprehension/ appreciation of course materials and (b) comparison of the number of students who complete HW vs previous years along with HW performance.

OVERVIEW

Flipped classroom elements were applied during Spring 20 in one section of General Chemistry II, enrollment of 201. Two main components were piloted:

(i) Integration of videos for learning outside of the classroom. 36 videos were made available via Blackboard: 30 from chemistry learning content available on YouTube and 6 created by instructors. Due to COVID-19, video content was especially timely and useful. Data statistics show >90% of students viewed the videos. E.g. Instructor-created video “acid-base chemistry” had 629 views by 244 unique viewers (an average of 2.6 views per viewer). Data analysis indicates optimal average duration is 12 minutes.

(ii) In-class problem solving/active learning administered through iClickers to assess student comprehension of concepts and calculations in real time. Participation was incentivized by cumulative iClicker score contributing to 10% of the final grade. Built-in assessments showed: 97% lecture attendance rates; >30% increased engagement during lectures; 0.6 positive correlation coefficient between iClicker scores and exam performance.

ASSESSMENT FINDINGS

Surveys: Students were surveyed on the use of flipped classroom learning tools (iClicker and videos). Out of 201 students who were surveyed, 35 responded as follows:

Use of iClicker: 51% felt that iClicker increased their problem solving skills; 26% were neutral; 22% disagreed.

Instructor Videos: 63% felt the instructor videos improved their understanding of concepts in chemistry and those covered in the course; 23% were neutral; 14% disagreed.

Use of flipped learning tools for hybrid experience: 72% felt that the inclusion of the flipped learning tools were overall beneficial and contributed to an improvement in their course grade; 14% were neutral; 14% disagreed.

Comments were highly in favor of the potential of the flipped learning tools, but comments were also directed at the difficulties of full scale remote instruction, indicating the importance of in-person activities and instruction. Videos were popular due to the opportunity to play multiple times and concentrate at will, while iClicker presented opportunities of earning credit and active participation.

Homework: All students enrolled with ALEKS which was higher than previous years, for which enrollment was always less than 100%. 87.7% of the students attempted to complete the HW series as compared to previous years (2017-19) 75-85% range.

Course pass rates analysis indicates improved engagement and success (81.8% in Spring 20 vs.79.2% before).

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|  | Spring 20 | Fa 17-Fa 18 |
| A range | 34.9%; | 34.5% |
| B range | 33.3%;  | 25.7% |
| C+/C range | 13.5%;  | 19.0% |
| C- or below | 18.2%.   | 20.8% |

CONCLUSION

Students generally supported the use of the flipped modes of instruction, and the modes seem to have contributed to student success. The department will continue to utilize these learning tools (iClicker/videos) and further explore the concept of hybrid classroom learning.