Flexible and Flipped Delivery Modules for First-Year Chemistry
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Rationale and Goals

- 90% of first-year chemistry students do not pursue a degree in the chemical sciences

Attrition of students in chemical sciences at UBC Okanagan

An introductory chemistry course should:
- teach a last chemistry course, not a first one
- prepare scientifically-informed, critically-thinking citizens
- explain relevance of chemistry to global and societal issues

Impact on Curriculum

- revised objectives / concepts / topics for CHEM 11X/12X
- explicit cognitive and affective learning objectives
- thematic context of UN Sustainable Development Goals

Impact on Student Learning

- learning activities used with > 7800 students since 2016
- 2015 – 2019 success rates +23% overall, +34% among CHEM 11X students (with CHEM 11 entry)
- student perception of conceptual learning favourable for all module formats

Impact on Student Attitudes

- 99% of students believe chemistry improves their lives

As a result of the context study activities, my views of the impacts of chemistry on...

- quality of life are less
- health and well-being are less
- the environment are less
- I believe that overall, discoveries and advances in chemistry...

Impact on Teaching Practice

- developed 16 large-class active- and peer-learning activity modules in different formats
- guided inquiry modules: foundational concepts students develop / apply themselves with scaffolding, in cycles of exploration, invention, application
- flipped classroom modules: challenging concepts in H5P interactive instructional video, students apply in class
- context studies: application of multiple course concepts to a topic of societal / environmental / biological importance

Outcomes and Future Work

- 2 publications[2,6] and >30 conference presentations / workshops, 4 further publications forthcoming
- 16 large-class active-learning activities redesigned as OER, to be released to UBC OER, OER Commons, MERLOT, National Center for Case Study Teaching in Science
- UN SDGs as thematic framework promotes highly positive attitudes and beliefs toward societal impacts of chemistry
- H5P interactivity in instructional videos improves student cognitive learning and engagement
- dramatic improvement in student completion rates

References / Bibliography