From online and hybrid instructional modes to residential classes: Lessons learned and activities to retain

Christian M. Cuba-Torres

Georgia Institute of Technology, School of Chemical & Biomolecular Engineering, Atlanta, GA 30332

Abstract

This paper is a Work-In-Progress. During the beginning of the Covid-19 outbreak, instructors quickly pivoted the delivery of classes from the traditional residential mode to an online instruction. As the pandemic progressed, this delivery mode were expanded to a hybrid mode, and starting Fall 2021, many US universities have returned back to the in-person instruction mode. During these unprecedented times, there were many lessons learned on how to continue delivering the best learning experience for students that can also be implemented back on residential classrooms. The present work in progress discusses the implementation in a full resident class the use of current technology, new active learning techniques, team projects and how to better communicate with students based in the author's experience after teaching a variety of asynchronous, synchronous and hybrid classes throughout the past 2020-2021 academic year.

Keywords

Active Learning, Online, Residential, Hybrid

Introduction and Background

The Covid-19 pandemic made universities to quickly change their teaching methods from a traditional residential mode to an online and hybrid mode in a short time. During this transition, the instructor has taught fully online Chemical Engineering Thermodynamics (ChBE 3130), Transport Phenomena I (ChBE 3200), and in a hybrid mode Kinetics & Reactor Design (ChBE 4300), Process and Product Design & Economics (ChBE 4510), and ChBE 3130. Below are listed a small background on the different activities done before and during the Covid-19 pandemic where some activities that were implemented during the online and hybrid mode are currently implemented in the full-residential mode at Georgia Tech pending more concrete results from the student evaluations.

a) Project: During pre-Covid times, project teams were usually set up semi-randomly by the instructor without collecting any input from students. The general idea for this semi-random pairing was to prepare them on how groups are setup once they join the workforce. Team dynamics were assessed through an anonymous Team Evaluation Survey that measured

levels of Group Participation, Time Management & Responsibility, Adaptability, Creativity/Originality, Communication Skills, General Team Skills, and Technical Skills.

However, as classes moved to an online, and later to a hybrid mode, an inclusive approach was implemented to better accommodate students during these challenging times. Part of this approach was to let students internally coordinate and let the instructor know if they have a preference to work with 1, 2, or 3 students based on their schedule, preference to meet on-campus or virtually, etc. It must point out that none of these students were new to campus as they already took chemical engineering classes on-campus before. We also included an option for students to anonymously post their availability through our online forum (Piazza). To finalize making groups, we first paired groups that indicated preference, i.e. groups of 2 were paired with other groups of 2 or 3, or paired groups of 2 with students that did not indicate any preference. This was with the intention to minimize adding a single student to a bigger group.

b) Active Learning and Use of Technology:

Before the pandemic hit, the instructor implemented a variety of active learning techniques such as a) Think-pair-share to promote collaborative learning, b) interactive polls to receive immediate feedback from students, c) handouts in class to balance attention and interaction, d) the use of an online forum (Piazza) for solidifying concepts, and e) the "*Brain-Based Learning*" to store information by Repetition + Motivation. Students found that these activities made them a positive impact in their learning experience.

Activities "b", "c", "d" and "e" were easily translated to the online and hybrid mode. The instructor implemented the use of breakout rooms through "Bluejeans" (the Georgia Tech cloud-based video meeting service) by creating random groups of 3 students to discuss for 1-2 minute different questions or topics as a replacement of the on-campus think-pair-share. However, based on anecdotical evidence, very few students did have an active discussion. Cameras were optional throughout the lecture and breakout sessions.

In addition, all classes were recorded to ensure that students that may miss a class due to various reasons, or don't have a strong internet bandwidth can re-watch it at a later time the lecture.

c) Communication:

During pre-pandemic times, the instructor held office hours and 1-1 appointments all on-campus. However, during the online and hybrid mode, office hours were moved online. Students did find this very useful, particularly students that commute a large distance. In addition, the instructor has proactively contacted students that started falling behind, particularly during these challenging times.

Findings and Conclusions:

As classes moved to a full residential mode this Fall 2021, the instructor decided to keep some of what it was learnt from previous semesters. Comparing to previous years teaching ChBE 4510,

we have not received any request for a meeting to solve any team issue within their teams. While we are still waiting for this semester results from a larger class, we believe that letting students pick their team (primarily) based on their availability decreased any potential discrepancy within their teams. No major discrepancies were reported in the anonymous team evaluations so far. In terms of Active Learning and Technology, active learning techniques were successfully implemented online and on-campus, with the exception of breakout rooms. No major discrepancies were found between these modes. The author of the paper looks forward to hear more ideas on how to further improve the think-pair-sharing technique. Finally, the major discovery is that students have found recording lectures to be very helpful from previous student evaluations, and plans to record lectures for the foreseeable future. The author of the paper is looking to further discuss at the conference what have been successfully implemented in this larger class.

Christian M. Cuba-Torres is a Lecturer at Georgia Institute of Technology, School of Chemical and Biomolecular Engineering since 2017. He received his B.S. in 2008 from National University of Engineering in Peru, and Ph.D. in 2015 from Washington State University. He is interested in developing and implementing new pedagogical methods including active and inquiry-based learning in an inclusive environment.