A Case Study of “Flipping” Technical Communication Lectures in a Chemical Engineering Laboratory Course

Mary Jane Northrop and Elaine Wisniewski
Lecturers in the Program in Technical Communication, College of Engineering

Introduction

Course Overview
- Course: CHE 360 Laboratory, 4 credits
- Instructional team: 1 technical, 2 technical communication, 3 graduate student instructors
- Enrollment: 54 students
- Weekly Schedule: One 4-hour laboratory, two 50-minute lectures (1 technical communication, 1 technical)
- Lecture Delivery: All via PowerPoint slides (before flip)

Motivation for Project
- Students typically received first exposure to technical communication content in lecture.
- Assignments and grades were mostly team-based.
- Students received little individual writing feedback.
- Technical Communication instructors sought to:
  - Increase student engagement
  - Provide individual feedback to students
  - Explore effectiveness of a flipped classroom, including pre-recorded, short videos

Research Questions (RQ)
- RQ1: What are student perceptions of their communication skills before and after course?
- RQ2: Did student performance on homework assignments increase throughout the semester?
- RQ3: How are course evaluation scores affected with flipped classroom approach?

Design of Flipped Classroom

Schedule of Pre-Work and In-Class Activity

Pre-Work Activity: Watch video and critique sample document

Students watch video lecture (5 to 12 min.)

In-Class Activity: Group Work and Presentation

Students write memo that critiques sample document (rubric below)

Note: Students also had access to a “feedback” video after TC HW1, 2, and 3 that provided a “talk through” of key elements that should have been included in their individual critiques. Watching these videos was optional.

Initial Results

RQ1: Students seem to perceive an improvement in written communication skills after completing the course (n=56)

RQ2: Avg. TC HW performance increased (n=54)

RQ3: Course evaluation scores increased for “excellent instructor” with flipped classroom

Data Collected

Pre-Course Survey: Online survey with questions regarding their:
- Experience in academics and industry
- Experience with flipped classrooms
- Assessment of strengths and areas for improvement in written and oral communication
- Preferred teaching approaches
- Expectation of how videos will affect their learning

Midterm Feedback Session: Learning and Teaching Consultant conducts 45-minute discussion with class about student experiences with course and instructors.

Post-Course Survey: Online survey with comparable questions from Pre-Course Survey.

Debriefing Meeting: 15-minute meeting with instructor to discuss their:
- Use of the video content
- Time spent on each TC HW assignment
- Grades on TC HW assignments
- Use of comments on previously graded TC HW
- Major concerns or feedback with course

Course Evaluation Scores: Scores from Fall 2013 and previous semesters (Fall ’12, Winter ’13) regarding student ratings of the excellence of the course and instructor, and desire to take course.

Course Performance: Scores from TC HW1, 2, 3, and 4 and overall technical communication score.

Course Online Resources Usage: Measure of whether student accessed and downloaded the technical communication resources (e.g., videos, lecture slides, grading rubrics).

Conclusions

- Low responses to course evaluation limit conclusions, but do show higher instructor approval and no significant changes in class approval despite the lowest score in class history on “I had a strong desire to take this class”.
- Potential undesired negative effect not related to “flipped” approach. Repetitious nature of homework assignments seemed to be associated with some, possibly unwarranted, negative connotations for the flipped approach.
- Students wrote an average of 10 more individual pages with flipped approach versus past semesters and also met individually with class instructors more than past semesters.
- Creating more engagement in the writing process and genre awareness via the critique memo assignments created moderate positive gains in student perception and affect.
- Future modifications include more variation in assignments and in-class activities to address student concerns over repetitive assignments. Also plan to generate more video reference materials to address a perceived lack of positive direction.