In the fall of 2018, I started a new teaching assignment at Synergy School in San Francisco, CA. Synergy is a small independent progressive school where middle school science classes are mixed grade-level (6-8), and meet twice per week in 100-minute blocks. Under the instructional model I was used to of direct instruction, guided inquiry, and group-work all happening in the regular class period with practice problems and writing tasks such as lab reports happening outside of class, I found that we were not making the kind of progress I envisioned.

With the goal of optimizing this class-time for hands-on activities, peer collaboration, and frequent teacher-student interactions, while at the same time making class content and learning experiences available outside of the physical and temporal space of the classroom, I set out investigating the effectiveness of a flipped learning model (Fig 1.).

**Research Questions**

- How does a flipped learning model influence students’ engagement, comprehension, and collaboration?
- How will the flipped model affect student-teacher interactions and relationships?
- How will the flipped model affect the use of class time by students and by the teacher?

**Methodology**

**Out-of-Class**
- Students watched direct instruction videos
- Interactivity component with comprehension check

**In-Class**
- Whole-class instruction <10 minutes for 100-minute period
- Emphasis on face-to-face interactions & active learning

**Key Data Collection**
- Quizzes and Modeling Assessments
- Unit Surveys

**Data & Analysis**

While there was a dip in the first treatment quiz, the second treatment had a median score of 100% (Fig. 2). Modelling assessments were the same across units.

Fig. 2: Subunit Quiz Scores. (N=63).

Many students enjoyed the flipped learning format, though a handful found it more difficult to engage with their groups, and found that their groups did not work as well together (Fig. 3).

**Conclusions**

- No major change in comprehension, though final quiz scores encouraging
- Student collaboration became more organic with varied and self-differentiated grouping; while effective for many, some students slipped through the cracks
- Greater class time allowed more opportunity for deep conversations and to address individual misconceptions