Online flipped classroom and assignment re-structuring for student engagement

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Jan. 15, 2021
Our remote classrooms

What differentiates SJSU remote education from other online learning?

Learning Community

Feeling of isolation

One-way communication

Losing interests

Students missing
Our resources for teaching

- Class time: asynchronous, synchronous, bi-synchronous
- Knowledge for the subject
- Problems from textbooks or custom-made
- Students with diverse academic preparedness
- Assignment dues (teachable moments)
- Quizzes and exams: highest commitment on studying
- Students’ expectation on time commitment (normally three hours per unit per week as per syllabus).
- Active engagement tools (i-clicker, live demo, multimedia, etc.)
Solving the problem of teaching

Problems
• Ignoring reading assignments
• High score on HW, low score on quizzes
• Feeling of isolation
• Less prone to ask for help
• Low attendance
• Low participation and attention during lectures

Goals
Mastery of concepts
Building a learning community
Active engagement

Action plan
• Flipped classroom
• Updating the use of problems in assignments
• Pre-assigned breakout rooms
• In-class problem solving as a group
Why flipped classroom?

- I have to lecture in front of camera anyway in remote teaching.
- The class time is NOT the first time students learn about a concept.
- Assignment dues aligns with the lecture pace.

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Current teaching (bisynchronous, meeting pattern mode 10)

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Updating the use of problems

**Problems**
1. Students do not care much about example problems.
2. Possibility of copying solution manuals for homework.

**Previous**
- Textbook examples
- End-of-Chapter problems
- Custom-made problem

**Current**
- Encouraging full digestion of examples via HW
- More problems solved actively as WS
- Use extra motivation of studying before exams to revisit problems again.
- Gradual increase in problem level
Comparison of number of problems

Average 30% increase in number of graded problems throughout all chapters.
HW as a proof of online learning

- Students take example problems seriously
- Motivated to watch lecture videos
- Students actually uses homework problems to study

**Example**
A plate of mass $m_p$ slides freely in the vertical direction along the frictionless guide rails. Given the mass flow rate $\dot{m}$ and the area of the nozzle, derive an expression for the steady-state constant velocity of the upward moving plate.

\[ \sum F_y = \dot{m} \rho V_{in} - \dot{m} V_{in} \]
\[ V_{in} = V_{j} - V_{cv} \]
\[ \dot{m} = \rho V_{in} \cdot A \]
\[ -W = -\rho V_{in} \cdot A V_{in} \]

**Homework problem**
4. A plate of unknown mass slides upward in the vertical direction at a constant velocity of 10 cm/s along the frictionless guide rails. Given the nozzle velocity of 25 cm/s and mass flow rate of 2 kg/s, calculate the mass of the plate.
Solving the problem of teaching

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Class time for group worksheet sessions

- Review
- Understanding a problem
- Instructor visits
- Wrap-up
  - Questions
  - Student screen share
  - Zoom chat

The process repeated for each concept/problem (total 3-4)
Strategies for building a learning community

- 3 people in a group with clear responsibility (file manager, spokesperson, quality inspector)
- Each group had mixed level students.
- Asked for a communication plan outside of class meetings.
- Same members for a month

Zoom pre-assigned breakout room (set-up in the beginning of the semester)

1. **Require registration** on the class zoom meeting
2. **After the first class**, download the **meeting report** to obtain the student emails
3. Upload .csv file for pre-assigned breakout room
4. Ask students to keep using the same email they used on the first class
Class participation over time

*WU students not included in the analysis (2 in Section 5)
Learning outcome comparison

Average final scores

Student #: 74 47 51 41

Final version 1

Final version 2

*Error bar indicates one standard deviation

**WU students not included in the analysis (2 in Section 5 and 2 in 2019 class)
Summary

Mastery of concept
- Assignment dues aligned with course pace (flipped classroom)
- Homework problems connected to examples

Learning Community
- First exposure of material before class
- Higher number of problems graded
- Small group with each member taking a specific role
- Same group member
- Clear deliverable as a group

Active engagement
- Group problem-solving
- Visiting each group
- Interactive wrap-up session
Potential future discussions

• Suggestions or feedback on my analysis
• Further ideas on pedagogy related studies
• Better grading strategies
• Setting up pre-assigned breakout rooms
• Proctoring procedures
• Please email me crystal.m.han@sjsu.edu
Thanks for listening!
Questions?
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3. Upload [.csv file for pre-assigned breakout room](#)

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