

Online flipped classroom and assignment re-structuring for student engagement

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Our remote classrooms

Feeling of isolation

One-way communication



Losing interests

Students missing

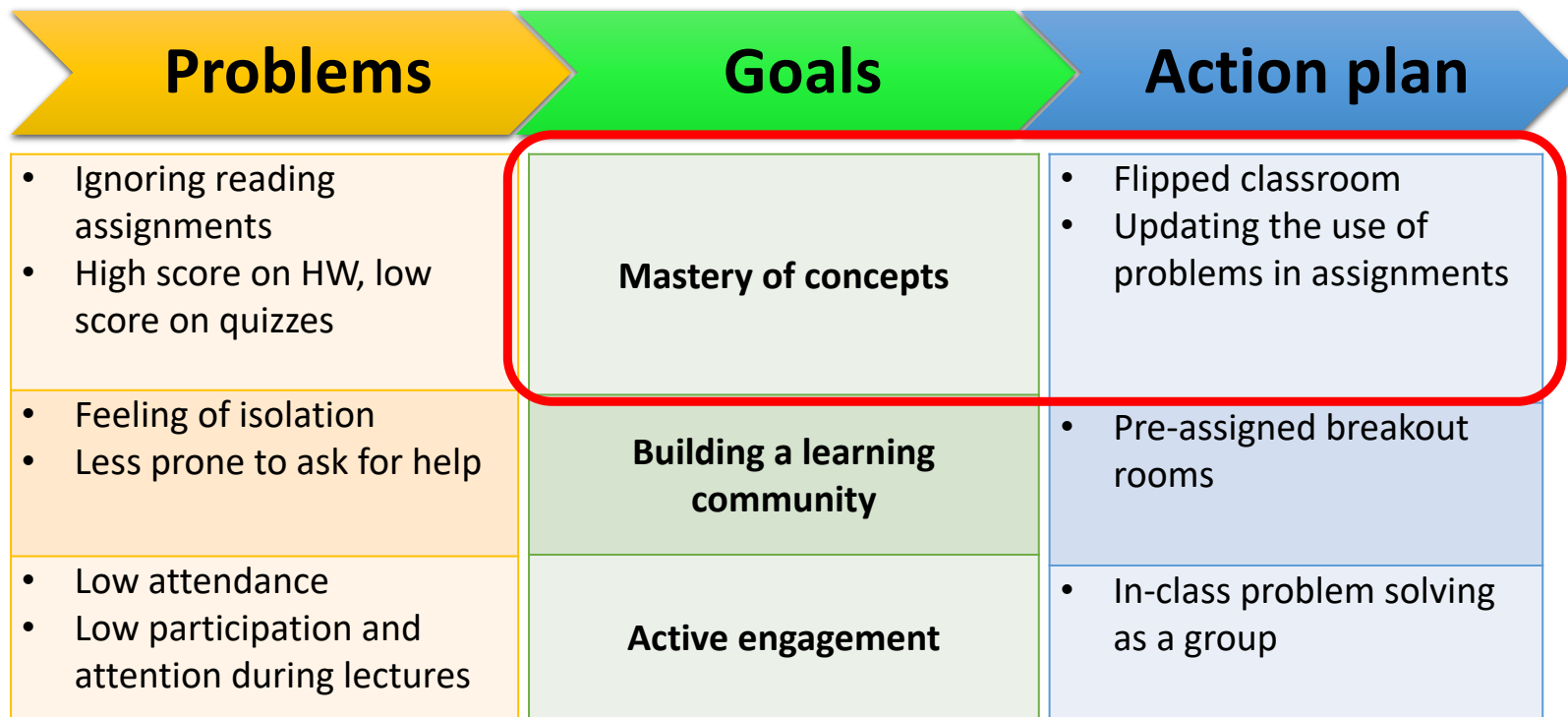
What differentiates SJSU remote education from other online learning?

Learning Community

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



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.

Previous

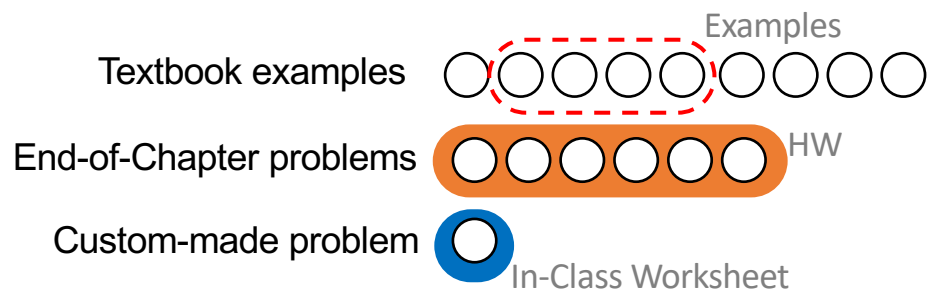
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F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th		
						HW due							HW due								HW due	
																						Active-learning
																						Students' attention

Current teaching (bisynchronous, meeting pattern mode 10)

					Class						Class										Class: Active-learning	
				Video Lecture	HW	WS					HW	WS									HW	WS
F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th		

Updating the use of problems

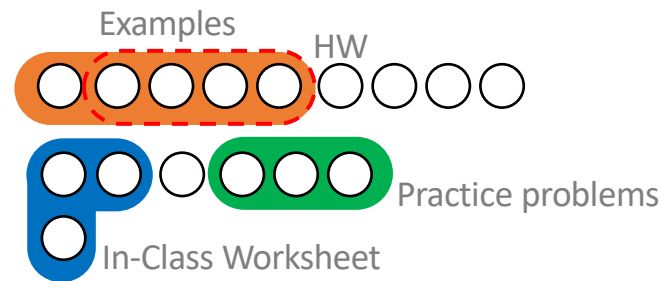
Previous



Problems

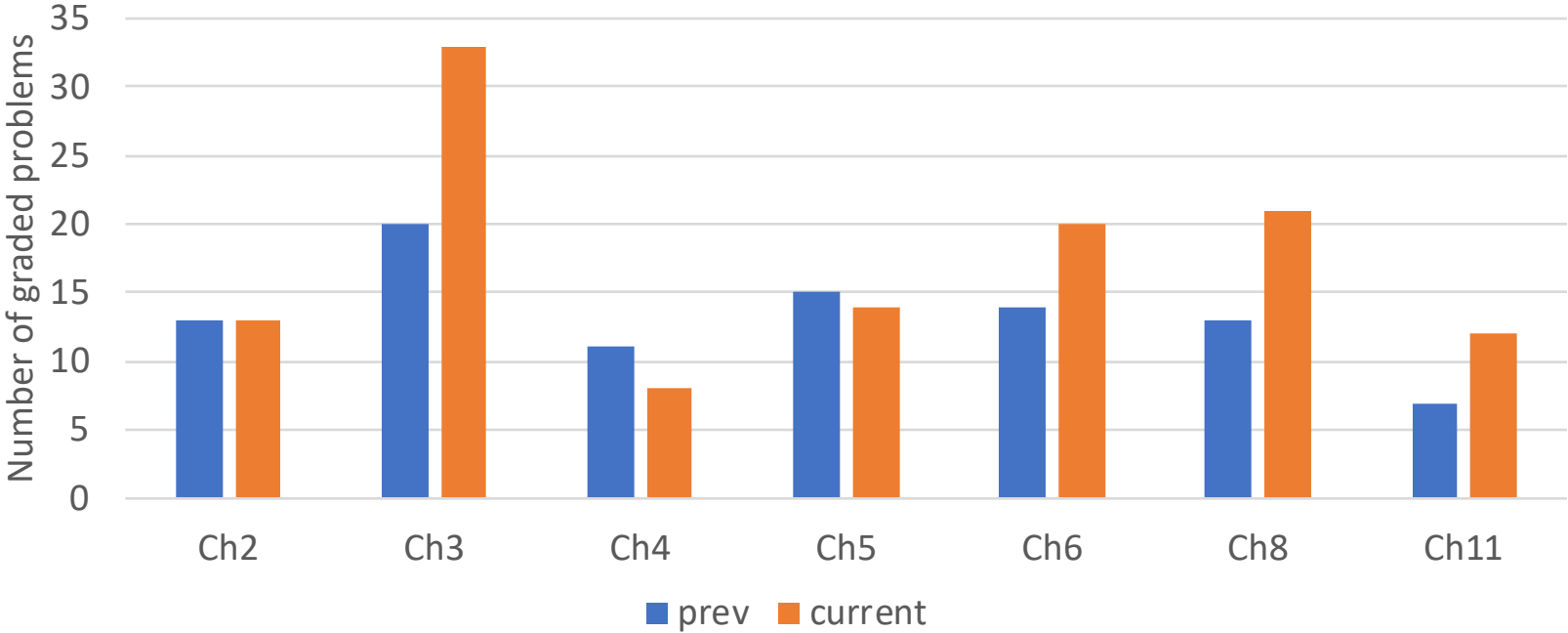
1. Students do not care much about example problems.
2. Possibility of copying solution manuals for homework.

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.

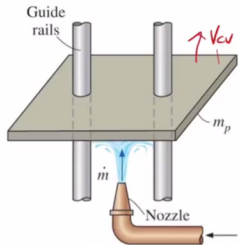
HW as a proof of online learning

Lecture Video

Homework problem

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.



Handwritten solution:

$$\Sigma F_y = \dot{m}_r V_{2,r} - \dot{m}_r V_{1,r}$$

$$V_{1,r} = V_j - V_{cv}$$

$$\dot{m}_r = \rho V_{1,r} \cdot A$$

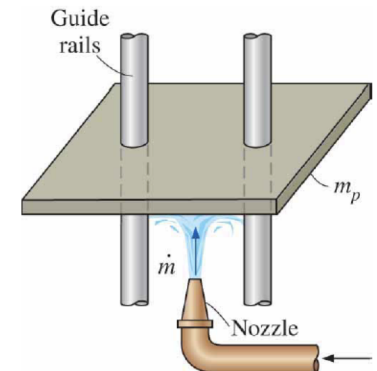
$$-W = -\rho V_{1,r} \cdot A \cdot V_{1,r}$$

$$m_p g = \rho (V_j - V_{cv})^2 A$$

$$V_j - V_{cv} = \sqrt{\frac{m_p g}{\rho A}}$$

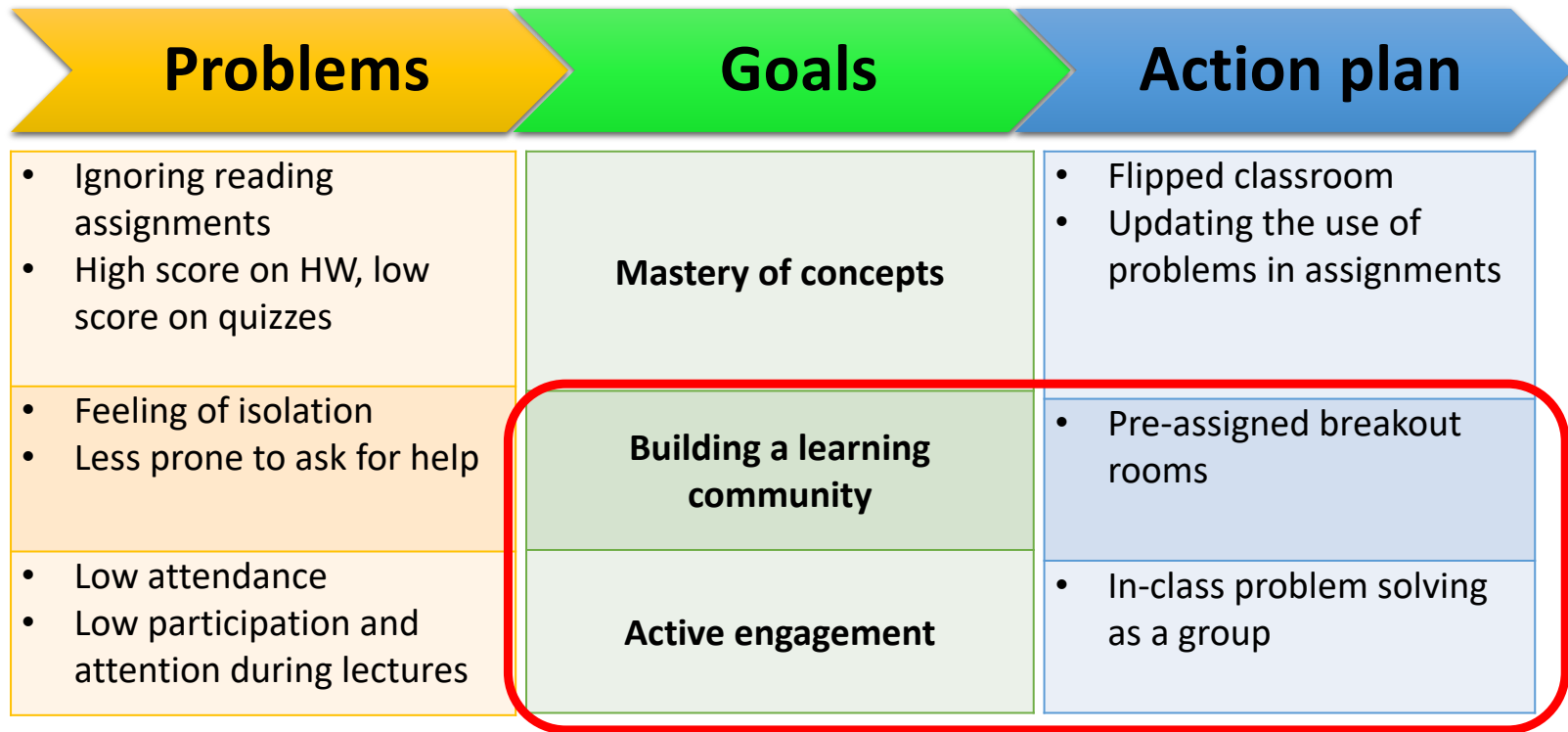
$$V_{cv} = V_j - \sqrt{\frac{m_p g}{\rho A}} = \frac{\dot{m}}{\rho A} - \sqrt{\frac{m_p g}{\rho A}}$$

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.

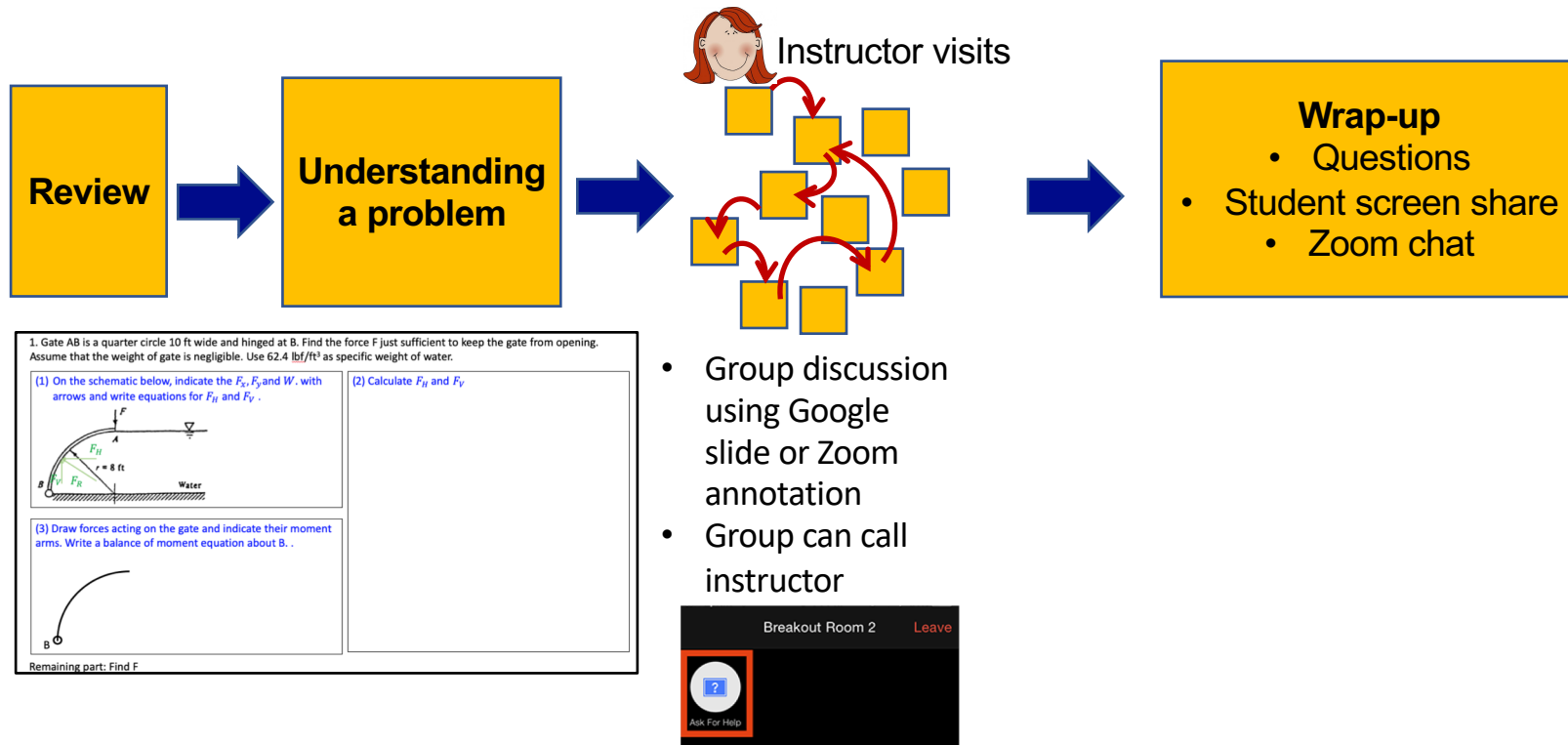


- Students take example problems seriously
- Motivated to watch lecture videos
- Students actually uses homework problems to study

Solving the problem of teaching



Class time for group worksheet sessions



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

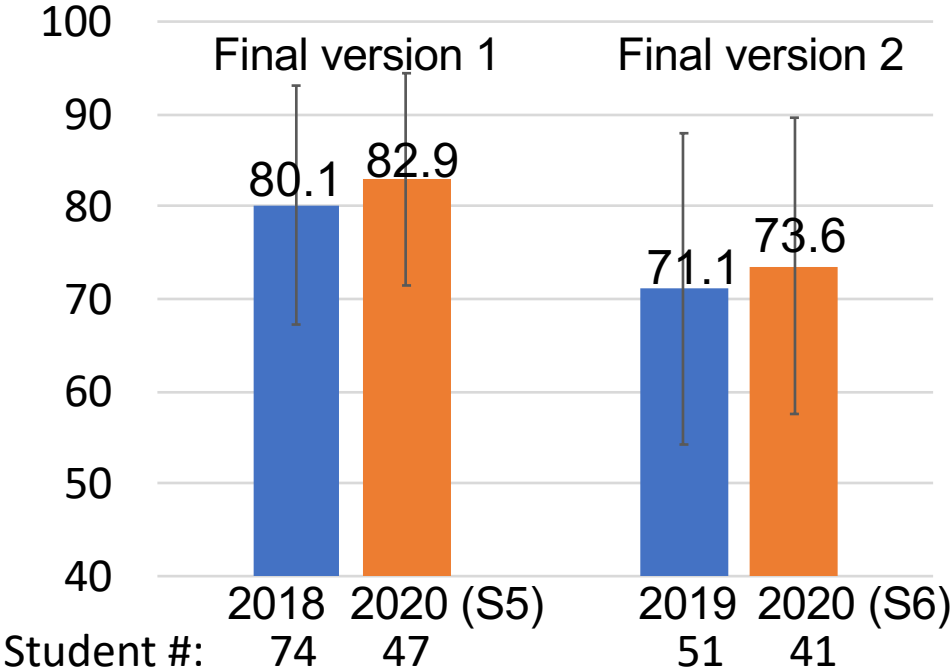
Class participation over time



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

Learning outcome comparison

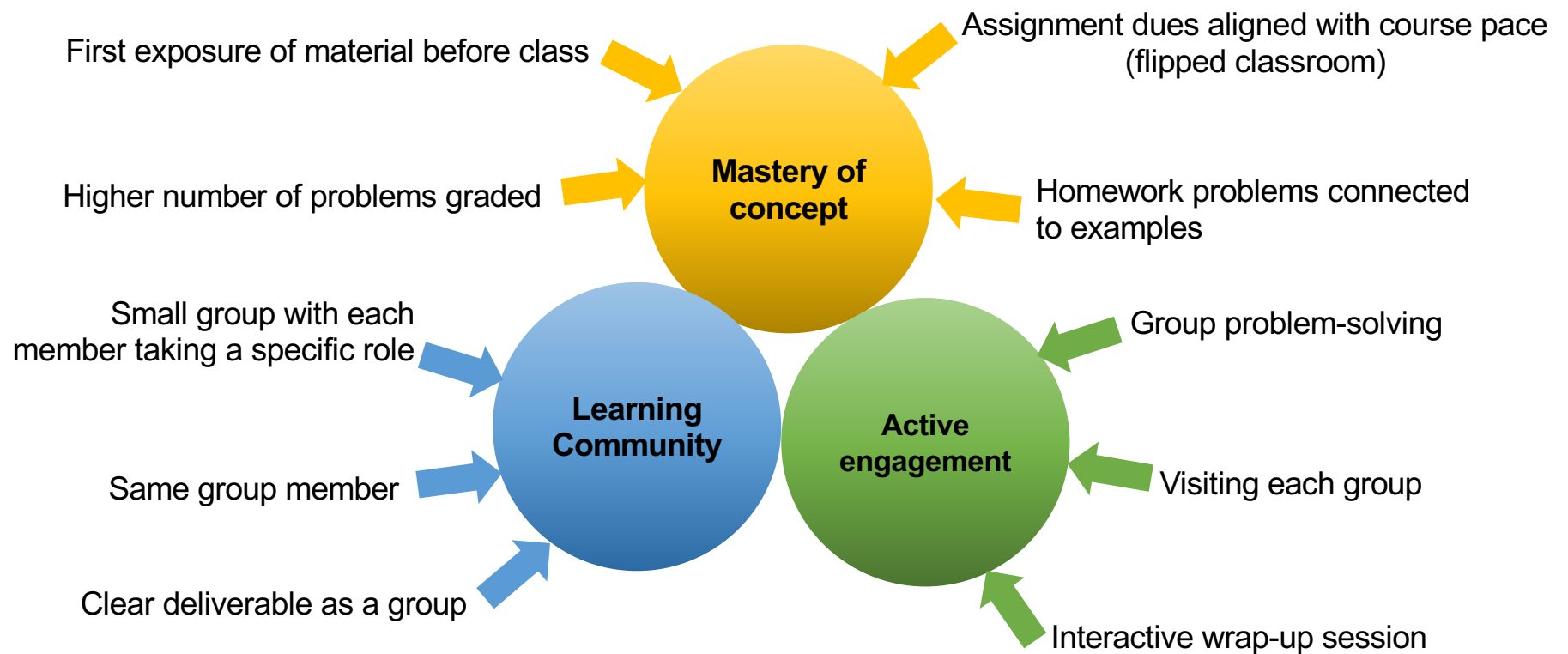
Average final scores



*Error bar indicates one standard deviation

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

Summary



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?

Setting up pre-assigned breakout room

1. **Require registration** on the class zoom meetings

Edit "My Meeting"

Topic: My Meeting

When: 12/29/2016 02:00 PM

Duration: 1 hr 0 min

Time Zone: (GMT-7:00) Pacific Time (US and Canada)

Recurring meeting

Registration: Required

2. Download the **meeting report after the first class** to obtain the student emails

- Profile
- Meetings
- Webinars
- Recordings
- Settings
- Account Profile
- Reports**

Reports > Usage Reports > Meeting

Meeting Report [Report Queue](#)

Include reports that failed to generate results

Report Type	Scheduled Time	Start Time	Topic	Meeting ID	Generate Time	
Registration Report	Oct 7, 2020 07:30:00 PM	Oct 7, 2020 07:15:26 PM	FA20: ME-111 Sec 06 - Fluid Mech	914 4898 5679	Oct 7, 2020 09:41:19 PM	Download
Registration Report	Sep 30, 2020 07:30:00 PM	Sep 30, 2020 07:16:25 PM	FA20: ME-111 Sec 06 - Fluid Mech	914 489		

	A	B	C	D
1	Pre-assign R	Email Address		
2	room1	test1@xxx.com		
3	room1	test2@xxx.com		
4	room2	test3@xxx.com		
5	room2	test4@xxx.com		
6	room3	test5@xxx.com		
7	room3	test6@xxx.com		

3. Upload **.csv file for pre-assigned breakout room**
4. Ask students to keep using the same email they used on the first class