The best flip: student-focused designs for flipped classrooms

Miti Mazmudar
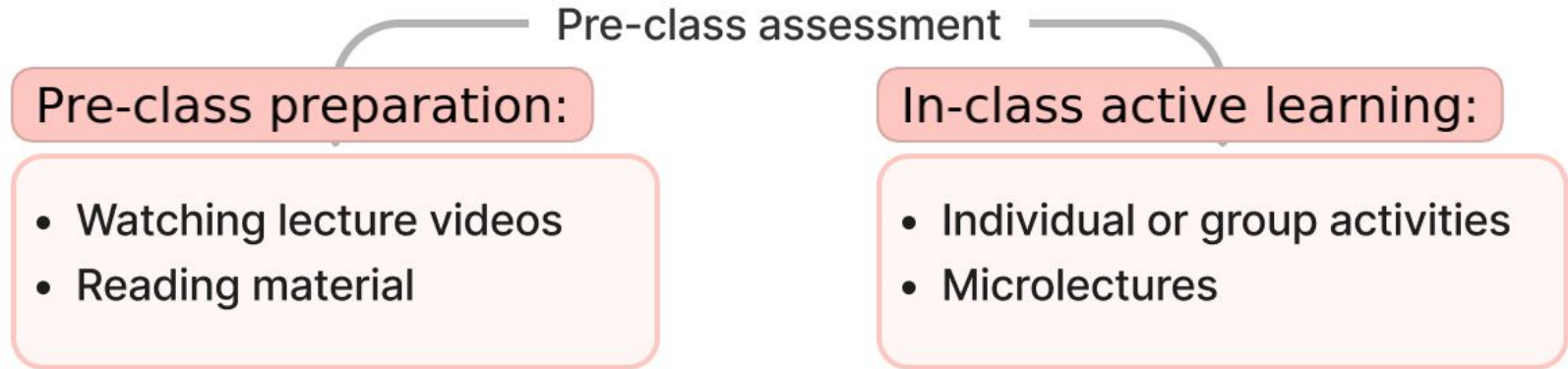Cheriton School of Computer Science

Flipped classrooms

"Flipped teaching alters traditional instruction so that deeper levels of learning can take place in class rather than rely on homework" (Lundin et al., 2018)

Research questions

1. What are **core design elements** for successful flipped classrooms (FCs)?
2. How do successful FCs require **an implicit partnership** between facilitators and students?
3. How can FCs be designed for **explicit partnerships?**

Flipped classroom design elements

- Quantitative analysis comparing design elements in flipped, traditional classrooms (van Alten et al., 2019)

Pre-class assessment

Pre-class preparation:
- Watching lecture videos
- Reading material

In-class active learning:
- Individual or group activities
- Microlectures

FC design elements & student performance, satisfaction

1. Flipped classrooms improve student performance (moderate +ve) and satisfaction (weak-moderate +ve) over traditional classrooms.

To retain this advantage wrt. student satisfaction:

2. FCs should include: pre-class preparation, pre-class assessment and in-class active learning.
3. FCs should be flipped for the duration of the entire course.

Implicit partnerships in FCs

1. Managing time for pre-class preparation and assessments.
2. Participating during class activities.
3. Consistently engage in points 1 and 2 throughout the term.
4. Convey these expectations at the start of the term (and repeat them as necessary).

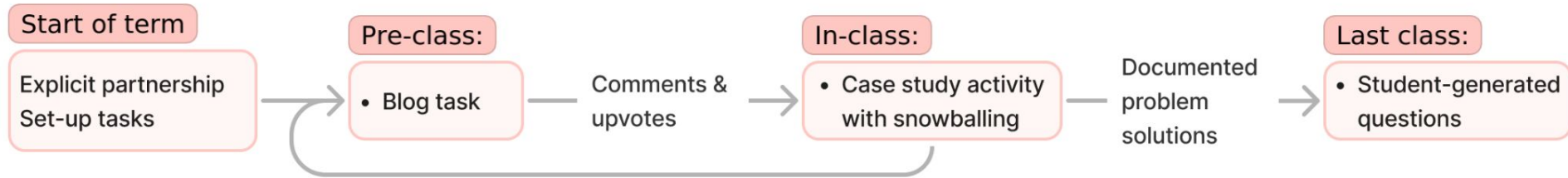# Explicit partnerships in FC: Example 1

Social annotation tools for student-generated content in class

Pre-class:
- Read material on social annotation platform.
- Assessment: Annotate text, upvote.

Annotations & upvotes →

In-class:
- Microlecture content
- Small-group activities e.g. respond-react-reply.

Used in flipped classrooms (Miller et al., 2018) and online teaching (Biro, 2021).

Explicit partnerships in FC: Example 2

- Use a blog task as student-generated pre-class preparation (and assessment), for an in-class case study.
- Documented problem solutions serve as formative assessment for the in-class case study, and students can use these to generate exam questions.

Start of term	Pre-class:		In-class:		Last class:
Explicit partnership Set-up tasks	• Blog task	Comments & upvotes	• Case study activity with snowballing	Documented problem solutions	• Student-generated questions

In-class: case study activity

Students (case leads paired with case followers):

- Students engage in a <u>small-group case study activity</u>, <u>snowballing</u> to address the LO questions for this week, using the post content as a guide.
- Each topic group snowballs a <u>documented problem solution</u> (to the LO questions) and presents / submits it.
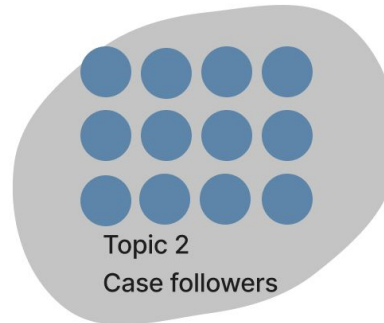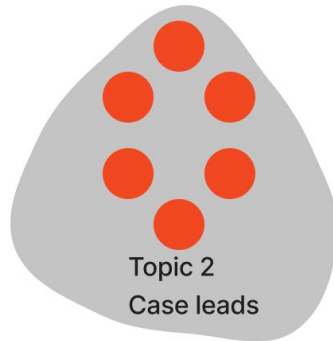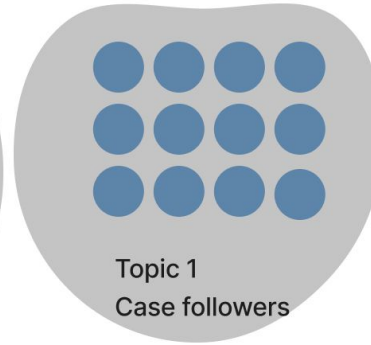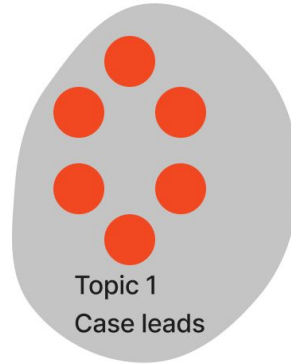
In-class: case study activity

Students (case leads paired with case followers):

- Students engage in a <u>small-group case study activity</u>, <u>snowballing</u> to address the LO questions for this week, using the post content as a guide.
- Each topic group snowballs a <u>documented problem solution</u> (to the LO questions) and presents / submits it.

Instructor:

- Explain relations between pre-class blogpost content and in-class LO questions.
- Address difficulties across groups (can assign group roles to case followers, TAs), deliver a microlecture if necessary.
- Ensure groups have sufficient time to address LO questions.
- Summarize key points from documented problem solutions presented by groups.

Group organization: Blogtask

Topic 1
Case leads

Topic 1
Case followers

Topic 2
Case leads

Topic 2
Case followers

Group organization: case study activity
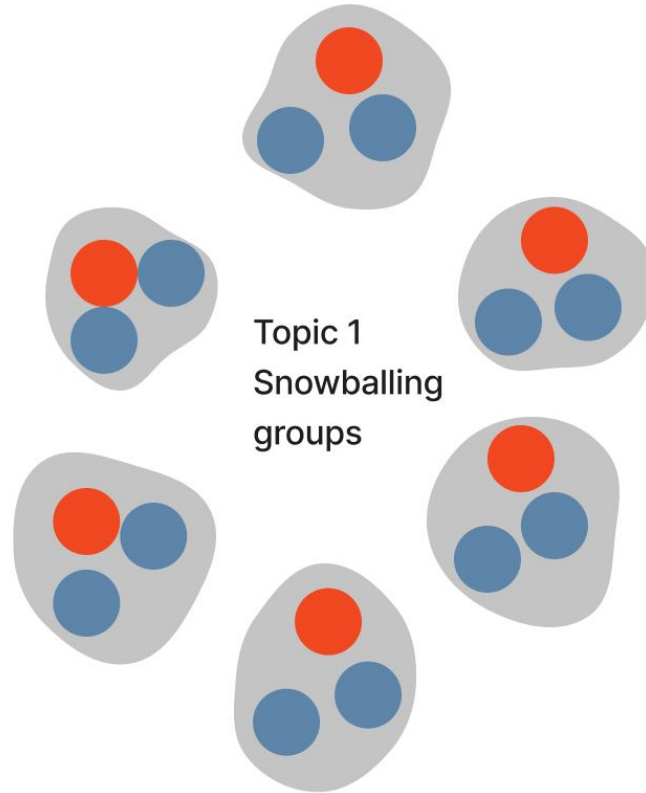
Topic 1
Snowballing
groups

Pre-class preparation: Blogpost

Case leads:

- [1st week] Post topic title to forum.
- Collaborate with pair case lead to develop the post for this week's class.

Case followers:

- [1st week] Pick a blogpost topic to "follow" per module.
- Read the updated post before this week's class.
- Comment on that post, using sample blogpost comments as a reference.

Pre-class preparation: Blogpost

Case leads:

- [1st week] Post topic title to forum.
- Collaborate with pair case lead to develop the post for this week's class.

Case followers:

- [1st week] Pick a blogpost topic to "follow" per module.
- Read the updated post before this week's class.
- Comment on that post, using sample blogpost comments as a reference.

Instructors / TAs:

- Approve topics.
- Grade post on a fine-grained rubric.
- Identify any potential roadblocks that should be addressed before in-class activity.

Instructors / TAs:

- Grade comments by case followers on a coarse-grained rubric.

14

Question sets

- Derived from LOs of the course.
- Blogpost questions (3-4):
    - Should benefit from discussion.
    - Blogpost should follow the sample in structure.
    - Each question is answered by a pair of case leads.
    - Answer to the last question will lead to steps for the in-class case study.
- Case-study questions (4-5):
    - Should be progressively difficult - "apply" to "create" Blooms taxonomy levels.
    - Should be answerable within the hour by peer instruction + snowballing.

Start of term stage

Students (out-of-class):

- Sign up to be a case lead (for a topic) in one of the modules.
- Go through rubrics, sample materials.
- Partner with the instructor for a successful fliipped course.

Instructor (in class):

- Introduce LOs.
- Convey expectations for an explicit partnership (time management, active learning).

Instructor (out-of-class):

- Present blogpost, comments rubrics.
- Present sample blogtask, comments.
- Setup a communication channel among case leads.

Research questions answered

1. What are **core design elements** for successful flipped classrooms (FCs)?
    a. <u>Pre-class</u> preparation, pre-class or in-class assessment of the learned content, and <u>in-class activities</u> interleaved with micro-lectures.
2. How do successful FCs require **an implicit partnership** between facilitators and students?
    a. Re-orient their learning approach in terms of <u>managing time</u> for pre-class preparation / assessment and <u>participating</u> in class activities, consistently throughout the term.
3. How can FCs be designed for **explicit student partnership?**
    a. FC instructors can use <u>pre-class preparation</u> to develop in-class activities in tandem with students, in an FC design.
    b. Two examples: soliciting students' questions / opinions for in-class content through social text annotation platforms, transforming an individual blog task assessment into a student-driven in-class case study activity.