Teaching Tips/Notes NACTA Journal

Redesigning a flipped classroom for 100% remote delivery

Abstract/Summary/Introduction

This Teaching Tip describes a remote lesson plan and teaching technique adopted in two discussion-based, interdisciplinary food systems and sustainability courses during spring 2020. Both courses commenced using in-person flipped-classroom instruction and subsequently moved online in response to COVID-19 restrictions. Below, we present a flexible framework for a single class period and distill the extemporaneous strategies that preserved and enhanced the quality of discussion in our online learning environment.

Enacting online "flipped classroom" instruction

Our "Food Systems and Sustainability" and "Animal Agriculture and Sustainable Development" classes are medium enrollment courses (25-30 students) that center on in-class discussion. To prepare for class, students are expected to read a pre-assigned scientific article, complete an online quiz and submit a brief pre-class "blog" entry. Although elements of this flipped approach were retained during remote instruction, using *BBCollaborate Ultra*, we adjusted the structure of students' preparation and discussion activities when the course moved online.

Prior to remote instruction, the pre-class blogs were organized into a topic thread and themes used to create a paper handout guiding in-class activities. The iterative social knowledge construction process converged during the face-to-face interactions that relied heavily on the paper handouts, the chalkboard, and informal cues. Three distinct challenges emerged when adapting the lesson plans for remote instruction using *BBCollaborate Ultra* for virtual class meetings: 1) community - encouraging student-student discourse; 2) clarity - conceptually organizing synchronous and asynchronous discussion through *a priori* rather than impromptu management of the discussion; and 3) inclusivity - offering poor-connection-resilient means for dialing-in students to participate in, and takeaway personalized main points from discussion activities in lieu of paper handouts.

Setting the stage before class

Pre-class blogs were discontinued and replaced with three themed discussion prompts as columns in a dedicated Google Sheet (for example, see https://bit.ly/3cFtmha). We invited students to respond to one prompt of their choice prior to class in the row next to their name, knowing that all three prompts would be discussed in class. This jigsaw-type

preparation activity allowed students to co-construct comprehensive understanding of the subject and facilitated sharing, since each student came to class with prior understanding of at least one of the discussion topics. Importantly, we created open-ended prompts with the goal of facilitating meaningful engagement with the scientific texts and scaffolding discussion (Table 1).

Table 1. Types of prompts for pre-class individual assignments.

Goal	**Prompts students to…**
Defining scope	- Define and conceptually map key topics
Making connections	- Reference prior course materials or external sources (e.g., current news) - Share personal experience with topic
Drilling deeper into the text	- Elaborate on a figure, table, or specific section of the text
Thinking critically	- Describe possible methodological issues (e.g., inconsistencies, limitations) - Evaluate conclusions or recommendations of the authors
Reasoning empathically	- Construct arguments for multiple sides of an issue - Consider perspectives of stakeholders not included in the study
Embracing complexity	- Contextualize or individualize take-home messages - Identify logical “next steps” and/or “action steps”

Reaching students at the start of class

We typically started each virtual class using a poll within the *BBCollaborate Ultra* platform. This is a flexible strategy that can serve a variety of instructional purposes (Table 2). The results of the poll can be announced briefly before moving on or used as a transition into a full-fledged discussion. We also conducted impromptu polls during class to maintain engagement.

Table 2. Selected functional types of polls employed at the beginning of online class session.

Function	**Example**
Ice-breaker	“What’s something you did for fun today?”
Reminder	“How are you feeling about turning in your paper next week?”
Check-in	“How are you feeling today?”
Situating discussion	“When you were a child, did your parent/guardian force you to clean your plate?” *For a discussion on food waste*.

After the poll, we communicated the class goals and timeline. Although they varied for each class, we attempted to maintain a similar rhythm (i.e., order of events) to minimize the cognitive energy invested towards logistics and maximize directed thinking and discussion. Although the instructor sometimes offered a brief presentation to situate discussion, we attempted to spend approximately 90% of class time on student-led discussion.

Engaging students in small group discussion

We spent the majority of class time in breakout groups. In randomly-assigned groups of 4 to 5, students worked through the three pre-class prompts to create a group consensus presentation on Google Slides linked to the aforementioned Google sheet (Table 3). The instructional team (i.e., the authors of this teaching tip) rotated from group to group observing—not dominating—discussion and assisting where needed. A TA coordinated timing through the chat box feature.

Table 3. Procedure for breakout group discussion with jigsaw-type pre-class preparation.

Duration	Breakout group activity
10-14 minutes	Prompt 1. With those who responded to Prompt 1 leading, students discuss their thoughts and capture their group consensus using Google Slide.
10-14 minutes	Prompt 2. Repeat procedure above for Prompt 2.
10-14 minutes	Prompt 3. Repeat procedure above for Prompt 3.
3-5 minutes	Wrap-up. Students take a critical look at their slide and add visuals, clean up text, etc. Using the chat box to communicate with instructors, each group indicate at least 1 prompt # and at least 1 spokesperson for sharing with classmates after time in breakout groups ends.

In early adaptation, we experimented with other mediums for constructing and sharing group consensuses (e.g., Google Sheets, course website, Canvas). We selected Google Slides because it accommodates simultaneous collaboration with a range of media (pictures, tables, flowcharts, etc.) and is accessible even with poor internet connection. Prior to each class, we scaffolded collaborative activities by creating a Google Slides presentation for each group (e.g., https://bit.ly/3bMbhN6) with prompt titles, reference photos, partially complete tables and figures, and reference links. This scaffolding was intended to facilitate collaboration and decrease students' cognitive investment in non-discussion activities such as formatting decisions.

Expanding to whole class discussion

Typically, we ended class with a 20- to 25-minute whole class discussion. Concluding breakout groups with a 3-5 minute “wrap-up” segment was instrumental to transitioning successfully from structured breakout groups to the less-structured whole class discussion. Having students select a group spokesperson and prepare their selected slide to share with the class not only models self-evaluative and collaborative skills, but also makes managing the whole class discussion seamless. With Prompt #, Group #, and Lead Person typed in the chat box, the instructor can facilitate sequential discussion of prompts by calling on the groups who volunteered. Students have a rough idea of when they will be speaking and can prepare to share their screen. For us, this additional structure virtually eliminated both the undesirable “dead air time” and the “not everyone at once” moments that occur when it is not clear who will speak.

Closing Thoughts

In creating the framework above, we aimed not only to reproduce the quality of discussion in our in-person course, but also to transcend it—taking full advantage of the new modes of interaction made possible online. We are eager to enact what we learned during more stable conditions and document our methodology and results more formally. In the meantime, we hope that sharing our experience can assist other instructors in the monumental task of engaging students in productive discussion-based science learning online.

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