

Flipped Course Design Allows Flexibility in Meeting Student Needs During Covid-19

Introduction

Soil Nutrient Relationships is a 4-credit course in the Department of Agronomy and Horticulture at the University of Nebraska – Lincoln. The course serves juniors and seniors with a major or minor in Agronomy, and the overarching goal is for students to be able to formulate an evidence based nutrient management plan that considers economic, environmental, and social aspects.

The course adopted a flipped design in the Spring of 2017 (Keck et al., 2021) and the instructor(s) have found that the flipped design framework enabled the course to rapidly pivot and adapt to the ever-changing policies, classroom conditions, and student needs during the Covid-19 pandemic.

Flipped Course Design Prior to Pandemic

Prior to the pandemic, the course was designed with the following activities:

1. Independent content learning. On Mondays, students completed reading or watched pre-recorded lecture content on their own.
2. In-person lecture. On Wednesdays, the instructor spun off from the content learned independently with a lecture and large-group discussion over application of the content.
3. In-person lab. On Wednesday or Thursday, multiple sections of 20 to 24 students met for 2-hours to work on skill building (e.g., designing a soil sampling plan, practicing fertilizer calculations) activities and the development of their integrated nutrient management plan in small groups.
4. In-person discussions. On Fridays, students met in the lecture room to work on problem solving and small case studies through discussions with 3 to 4 of their peers. These discussions were facilitated by instructors.
5. Group project. Outside of class time, students worked in groups of 3 to 4 to develop an integrated nutrient management plan for a location of their choosing. The project accounts for 25% of course assessment.

Flipped Course Design During Pandemic

Having the flipped design prior to pandemic meant that most course content was already independent; this enabled instructors to make on-the-fly judgements about how to spend the time interacting with students during the pandemic. As instructors, some key decisions were made about using the limited face time (in person or virtual) with students. The two main decisions were:

1. Activities should prioritize problem solving over content review – this decision is grounded in prior findings that lower-level learning can be done independently but analytical, problem solving, and application types of learning are best done with instructor's guidance.
2. If students and instructors could focus on one specific activity in-person, it should be centered around calculations. This decision was based on teaching team experience of trying to help with (or grade) student calculations when the instructor(s) cannot see the work and mistakes.

As such, the course design for 2021 was updated with no in-person lecture meetings. The previously in-person Wednesday lectures on content application were modified to be recorded and disseminated to students, i.e., transitioned to independent (asynchronous) learning. The previously in-person Friday discussions were changed to a web-conference format with groups of 3 to 4 students discussing case studies in Zoom breakout rooms with instructors moving between rooms to facilitate.

With the essence of the course shifted online, students were free to choose their level of interaction with instructors and content. The varied levels of interaction increased both flexibility and accessibility for students, many of whom were eager for the opportunity to work independently and remotely to focus on their farming operations or other part-time jobs across Nebraska. Students generally settled into one of the following levels of interaction:

1. In-person lab. In 2021, about 80% of students enrolled in the course elected to attend in-person lab. These students still did independent content learning and weekly Zoom for small-group discussions.
2. Web conference lab. In 2021, about 15% of students attended scheduled lab meetings via Zoom. These students still did independent content learning and weekly Zoom for small-group discussions.
3. Full independent learning. In 2021, about 5% of students would check in with peers and instructors via email or Zoom only periodically (they did not attend lab or small-group discussions) and did all activities independently on a regular basis. An additional 20% of the class opted for full independent learning for one or two weeks at some point during the semester due to illness or their work schedules (e.g., planting field crops).

As instructors, we facilitated independent, flexible, and accessible learning as much as possible by providing students with:

- A textbook as the central focus of content learning. The University library assisted in providing necessary sections via e-reserve at no cost to students.
- Additional resources such as state fertilizer guides as PDF files through Canvas.
- Short videos showing example calculations.
- Short videos discussing application of course content.
- Freedom to choose their working groups and do groupwork on their own schedules.
- A consistent schedule for reading, meeting, and assessment.
- Online exams that were accessible for a 24-hour period (quizzes were open for several days).
- Flexibility for attending lab in-person, via Zoom, or not at all in any given week.
- Access to the question sets used in lab and discussion regardless of attendance.

Take-Away

Having the course already designed as flipped prior to the pandemic and having the course grounded by textbook content allowed maximum flexibility to serve the different needs of all learners and use the limited meeting times for problem solving activities. Being flexible with student needs was a top priority. Surveys at the end of the course appeared to show no difference in ability to achieve learning outcomes or appreciation of course content across the available learning modes. All modes helped in achieving the outlined goal and objectives of the course. All students contributed to their group project regardless of attendance at regular lab and discussion activities (interaction level).

Flexibility continues to be important as Covid-19 issues continue to develop and evolve. All instructors and institutions would benefit from being proactive and having alternatives for independent learning on hand. Since March 2020, there have been multiple times where the whole class was shifted online (e.g., University closure due to Covid-19 or weather, instructor illness, etc.) and times that a student opted to be independent for a week or two. The existing course resources have allowed the flexibility to adapt to these situations without excess burden on students and/or instructors.

Even though no student has been completely independent for the duration of the course, it seems possible that the infrastructure exists to make this course fully online and independent in coming years. Instructors will continue with the hybrid and hy-flex modes currently offered.

References

Keck, M., M. Mamo, M. Sindelar, C. Speth, & S. Brown. (2021) Student perception of engagement and learning in a flipped soil nutrient management course. NACTA Journal 65:368-374.

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