Teaching Tips/Notes NACTA Journal

Adapting class activities in quantitative wildlife ecology to online learning: lessons from the COVID19 sudden transition

Teaching quantitative wildlife ecology can be challenging. We teach mathematical and statistical skills inside a classroom or computer laboratory to students who understandably would rather be outside following their passion for nature. Instructors of quantitative wildlife ecology employ a wide variety of active learning strategies, including in class activities in cooperative learning settings, to keep students engaged. Many of us had a semester planned full of these fun and engaging activities when the COVID19 pandemic suddenly forced us to transition to online teaching. What happened to all these fun activities in this online transition?

Here I share a case study of how I adapted a classic learning activity in quantitative wildlife ecology to estimate animal abundance to an online setting this past term. In a normal year, we conduct capture-mark-recapture (CMR) in the classroom using small wrapped chocolates in a bowl as proxy for a population of animals. The goal of this exercise was to compare the known number of individuals in the bowl with the estimated number of individuals using CMR quantitative techniques. The group is divided in groups of 3-4 students. Each group has a bowl with a known number of chocolate pieces. A student will close their eyes and pick individual chocolate pieces from the bowl for 30 seconds. These “captured” individuals are counted, marked and returned to the “population”. The students shuffle the bowl including now both mark and unmarked individuals. The student “captures” individuals again for 30 seconds this time capturing marked and unmarked individuals. These captured individuals are quantified and using a simple mathematical equation known as the Lincoln-Peterson index (Lincoln 1930) they estimate (mean and 95% CI) how many chocolate pieces are in the bowl and compares it with the true quantity inside the bowl. At the end of class, each groups shares their results and impressions with the rest of the class. This is a useful exercise to learn how CMR modeling works, its strengths and weaknesses. How can we transition this exercise to an online setting?

PROCEDURE

While the instructor has the option of filming itself conducting the class activity, this then becomes a passive activity defeating the purpose of the active learning exercise. Instead, I modified the exercise to meet the online setting using three strategies.

1. Creative improvisation – I could not provide the wrapped chocolates to the students in an online setting, as the students were at home. Their home setting provided plenty of alternative proxies for animals to choose from. I suggested that the students select the type of item they will use as a proxy for animals following three criteria: the proxy has to be small (multiple items have to fit inside a bowl), they have to have > 30 individuals, and it can be marked in some way (e.g. with a pen or marker). The students ultimately used toothpicks, beans, and a variety of wrapped candy. The students selected their own proxy for animals providing an opportunity for them to be creative, but also bringing some of their own personalities to the class represented by their choice of item.

2. Breakout rooms in lieu of small groups – Meeting in person in small groups was not an option in an online setting. Instead, we used the breakout rooms option in Zoom which worked as an alternative. Students shared their activities virtually with other members of their small group (3-4 students). The instructor had the option of visiting each group to answer questions and provide feedback similar to an in-class setting. After they finished the exercise, a representative of the group shared with the rest of the group the results and impressions of the learning activity.

3. Positive and welcoming environment – A key element for the success of this activity in an online setting was the overall positive and welcoming environment fostered in the class. The sudden transition to full online learning disrupted the normal routine of the students creating stress and anxiety. However, the overall compassionate and welcoming attitude promoted in the class helped students feel comfortable. This was supported by research showing that activities intended to decrease students' anxiety lead to an increase in math performance (Ford et al. 2012).

Unfortunately, there was no formal quantitative evaluation process for the exercise during the online transition. Student evaluations (not yet available at the time of this writing) will provide some formal feedback eventually. Informally, we can infer that the exercise had a long-term positive effect on their learning process because the students referred to it often during class discussions.

Quantitative skills are becoming more relevant in the life sciences. Yet, there is some consensus that students in the life sciences get inadequate quantitative training (Barraquand et al. 2014). While, there is little empirical guidance on how to appropriately teach quantitative topics to students in the life sciences (Aikens and Dolan 2014), active learning exercises in group settings are shown to be useful for quantitative learning in other fields (Freeman et al. 2014). The COVID19 sudden transition to online teaching was a challenge, but also provided an opportunity to, informally, experiment with alternative teaching setups. Creative improvisation, group learning through breakout groups, and a positive and welcoming environment can be key components of successful teaching strategies in online teaching on normal years or during global crisis.

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