

Enhancing Congruence in a Complex Course with a Diverse Classroom

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Introduction

"Climate Change and Biodiversity" is a 7.5 ECTS restricted elective offered to students in three MSc programs at the University of Copenhagen: Biology, Climate Change, and Environmental Science. The course covers the consequences of climate change for biodiversity and human society, primarily through a series of lectures and seminars. While the course remains in high demand, issues with congruence among and between the students and instructors have arisen with increasing frequency in recent years. Particularly, there were disconnects among the students regarding their expectations of the content and difficulty of the course, between the instructors and students regarding workload and communication, and among the instructors regarding consistent, synthetic messaging (Hounsell and Hounsell, 2007). Indeed, in 2023, lack of congruence in the course resulted in particularly poor student evaluations and triggered a reconsideration of how the course was structured.

In previous years, I led the course in a two-week final project module, designed to introduce students to research methods used to assess the impact of climate change on biodiversity. Since 2023, this project has been a case study predicting how climate change may influence the distribution of the Castor Bean Tick, a vector of several human and livestock diseases throughout Europe. In addition to giving the students real-world experience in computational biodiversity science, the project challenges students to synthesize practical and theoretical knowledge in a final report (Guo, et al. 2020). Report evaluations provide not only

summative feedback on performance in the course, but also formative feedback on writing skills that will be essential as students' progress toward the thesis stage of their MSc programs. While the final project phase has generally been an effective capstone assignment, student evaluations of the course through the years reflected a growing dissatisfaction with the distribution of workload during the course (e.g. Figure 1, left). My involvement in the course as an instructor in previous years was also limited prior to the commencement of the project module. As a result, I did not have the same rapport with students that the lead instructors had developed, and synthesis between project instruction and prior lecture and seminar modules was limited.

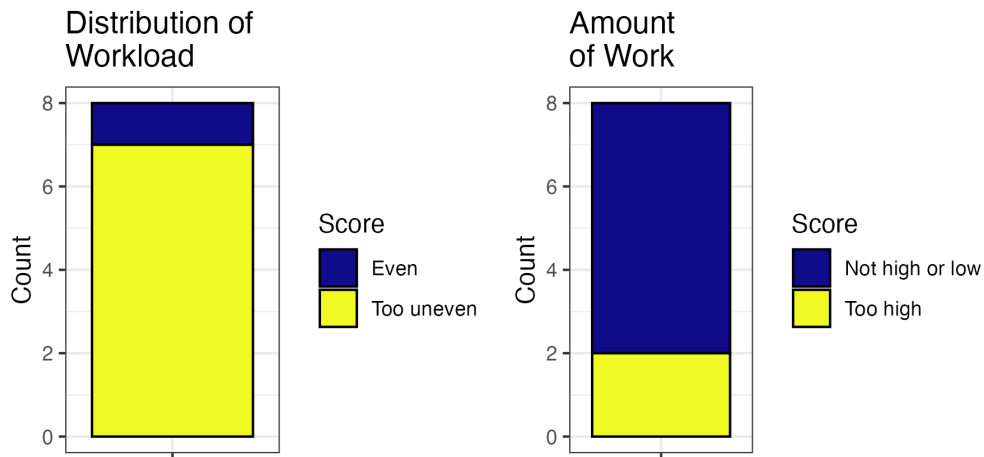


Fig. 1. Student responses from 2023 UCPH course evaluation, Climate Change and Biodiversity

A further complication for congruence in the course was introduced when the pool of students eligible to enroll was broadened in 2021. In addition to students from the natural sciences, the course is open to students from social science disciplines, who enroll in consistently strong numbers. These students, in addition to having been exposed to different discipline-specific modes of thought and communication (Hounsell and Hounsell, 2007), often have less training in quantitative methods than their natural science peers, but more training in formal written communication. This created a mismatch in skill sets and expectations regarding the course workload, with some students finding it adequate, while others found it overly demanding (Figure 1).

Interventions

To constructively realign the course (Biggs, 2003; Biggs, 1996), careful planning and coordination among instructors was needed. The lead instructors and I met several times, and with the Globe Institute Head of Teaching and Education, to plan for restructuring the course. We conversed regularly during the course to make sure our objectives and messages were aligned. The most essential change to the course was to integrate the practical instruction and final project components of the course more fully with the planned stream of teaching. Specifically, Thursday afternoons were dedicated to teaching the analytical skills necessary to complete the project while generating products that would be used in the final project during supervised “lab time”. Lab time enabled the instructors to evaluate students’ progress through the course and provide formative feedback on the analysis component of the project. I also added a peer reviewed writing assignment (a first draft of the final report introduction) early in the final project instruction stream using the new Feedback Fruits tool in Absalon. This assignment was designed to establish expectations for written work, provide formative feedback on writing, and spread the work required to write the final report more evenly throughout the term. Furthermore, research has shown that both giving and receiving peer feedback on writing improves students’ writing performance (Huisman, et al. 2018). Syllabi for 2023 and the revised 2024 course are supplied in Appendices I and II, and instructions for the peer review assignment are in Appendix III.

To further enhance congruence between instructors and students and among students, one of the lead instructors also had the students take the lead in creating a course Code of Harmony. The Code of Harmony was further intended to collaboratively establish norms for the classroom, thereby giving the students a sense of control over their environment and investment in adhering to the code (DiClementi and Handselman, 2005). The students worked together to answer four questions: 1) “What are the key elements of a good learning environment?” 2) “What does ‘active participation’ mean? Can it be measured?” 3) “What are your expectations from teachers?” and 4) “What are your expectations from peers?” The Code of Harmony was then further developed and finalized

in an open discussion in which all the students and instructors participated until everyone reached a consensus. This document is supplied in Appendix IV.

Outcomes

The interventions we enacted for the course took considerable time to set up, but the lead instructors and I agreed it was worth the investment in terms of improved congruence, reaching learning outcomes, providing opportunities for enhanced formative feedback, and student and instructor well-being. These improvements were seen by all three instructors (the two leads and me) in post-course discussion and expressed in student course evaluations. Frequent instructor meetings during the course helped enhance congruence and ensured that all instructors could be consistent with messaging to the students and better fold content from different modules of the course into their own teaching. As the person responsible for final project instruction, I felt that the content was much better integrated with the course and that I was able to establish a better rapport with the students over the course of the term. It was also much less disruptive to my other duties to have instruction spread out instead of concentrated into two intensive weeks. Figure 2 shows 2024 student course evaluations indicated a larger proportion of students who felt the coursework was evenly distributed throughout the course and that the amount of work was appropriate, compared to 2023 (Figure 1). One student said, “I like the buildup [sic]. First practical project and after a report to understand what you’ve done.” Still, one another student did suggest “It would be nice to spread out the workload of the report a little more... it may be useful if teachers could advocate that it is a good idea to as much work on the report as possible along the course period.”

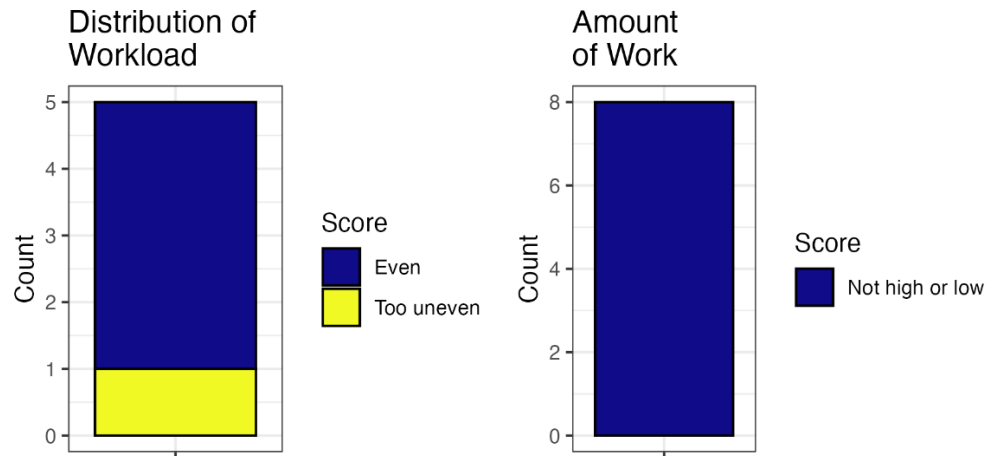


Fig. 2. Student responses from 2024 UCPH course evaluation, Climate Change and Biodiversity

The new peer feedback exercise, which required students to write a first draft of the project report introduction (due the second week of the term) and submit three peer reviews of classmates' submissions (due the third week of the term), was also useful. While the assignment was not directly graded, it did count toward the evaluation of the course participation grade (25% of final grade, in combination with final oral report) and I emphasized that it was designed to help them pace writing the final report and get feedback. Only students who submitted a draft were asked to provide feedback, to increase the likelihood participatory students would receive responses. Every student registered in the course submitted a draft; 19 of the 32 students provided all three peer reviews, 8 students provided two reviews, and 2 students provided 1 review. The students agreed this was a worthwhile exercise and wanted it to be implemented more broadly. In one student's course review, they wrote "[t]he digital feedback tool worked quite fine so maybe just expand the use of it thus covering more of the content of the report."

Students generally expressed that they understood and appreciated the project component of the course in their evaluations. One respondent wrote: "I also really liked our project as a concept because too many courses at KU are just listening to lectures for an entire block until an exam. So having something to work towards that wasn't so abstract was very nice." Although students tended to agree on the value of the project component and how much course time it should occupy, several students

agreed they would have preferred more lecture content, either instead of or in addition to the final project. Additionally, several students expressed a desire that the project be even more fully integrated with the lectures.

Finally, creating the course Code of Harmony was valuable, not just for the document it created, but as an opportunity to create dialog and enhance congruence among and between the instructors and students. It is useful to be reminded as an instructor that students have valid expectations regarding the structure of instruction (e.g. including breaks for coffee and questions), and suggestions regarding the establishment of a good learning environment (e.g. enthusiasm and openness). It is true that this exercise was not universally positively received; in one student evaluation, they said “Class contract was also a bit stupid when it is only an 8 week [*sic*] course.” However, the contrary opinion was also expressed “One of the best courses I have had!! Very nice and safe space you made in class.” As an instructor, this class seemed much more open, collaborative, and engaged than in previous years. In my opinion, the Code of Harmony exercise contributed materially to this atmosphere, and I plan to implement it in future courses if I am able.

Outlook

The goals for improving the course were generally met (i.e. enhancing congruence among students and instructors and spreading the workload of the course more evenly), as reflected in our improved course reviews and through my discussions with the lead instructors. However, I identified several opportunities to further improve Climate Change and Biodiversity with minimal additional outlay of effort or time on the part of instructors or students. The smallest change would be to include one very specific discussion point in the Code of Harmony exercise—what time class starts. Throughout the term, there was an ongoing lack of congruence regarding whether instruction was to begin and 9.00 or 9.15. A second small but invaluable change would be to add “Apply scientific writing skills to generate a synthetic final project report” in order to prepare students for our expectation that the project report is an essential deliverable for the course.

At a broader scale, there is still room for improvement in how the course is organized and drawing connections between seemingly disparate elements of the course. First and most clearly, the project instruction modules could be even more evenly spread across the term. Within the project instruction modules, more callbacks could be made to lecture and seminar modules in the course. This will require a little additional consideration of lecture positioning in the schedule, for example, moving the Vector-Bourne disease lecture before the start of the project instruction stream. The lecture introducing the project case study can also be built up to include more theoretical and empirical information on spatial disease ecology and the methods that are used to understand how ecology affects human disease risks. These adjustments will not only enhance the congruence of course content but also provide students with a more enriching learning experience through a clearer understanding of the complicated ways climate change influences biodiversity, and ultimately human well-being.

References

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