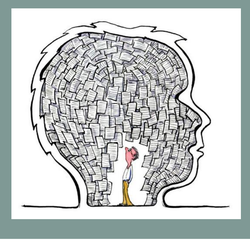

To think or not to think? Promoting metacognition and reflection in an upper level animal ecology course

Emily Cornelius* and William Karasov

*Forest and Wildlife Ecology, University of Wisconsin-Madison

Introduction

Multiple choice question tests are the most widely used assessment in college-level courses, despite this, this type of questioning generally falls flat as a means of assessing student understanding and mastery of the material. In our upper-level animal physiology course, the MC aspect of the exam generally has an average of about 65% amongst our students and across years.

Therefore, we were interested to see whether student grades and attitudes are positively impacted when students are encouraged to reflect on exam performance (exam wrapper) and revisit exam questions (turning back in multiple choice questions after the exam for partial credit). Further, on the exams, we used those multiple choice questions (3-4 questions) that most students get incorrect each year and asked students to explain their reasoning after they answer. We hoped that this would help us to identify misconceptions about course material and improve our teaching of those concepts in future years (data not shown here).

At the end of the course students were asked to reflect on these two interventions and answer questions regarding their utility and whether they think these interventions impacted their mastery of course material. All results and data collected from this project will help to inform assessment writing and curriculum planning for future semesters of this course.

TAR Questions

1. When student metacognition and reflection are encouraged, do exam scores improve as the semester continues?
2. Do students believe that metacognitive interventions impact their learning of the material?

Teaching interventions

- Early in the semester, students were asked to complete a pre-survey to collect demographic data
- Based on previously validated exam wrappers (Carnegie Mellon), we tailored one for our TAR questions (intervention 1; "reflection")
- We gave students the opportunity to have four multiple choice questions regraded for half-credit back (intervention 2; "corrections")
- Students were encouraged to complete both interventions after each exam, however they were optional
- An end-of-course survey was distributed to each student, which included questions on course attitudes and the two interventions

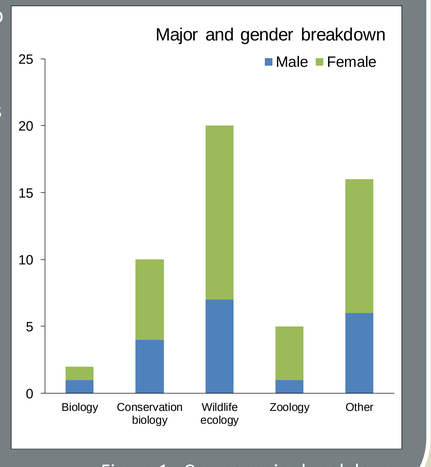

Figure 1 . Course major breakdown

Methods and intervention structure

- Physiological animal ecology (FWE 401) is an upper level ecology course
- The course consists of three midterms and one final exam (cumulative)
  - Students complete 14 calculation-type problem sets for completeness
- After each exam, students had the option to complete exam corrections (for partial credit back) and an exam wrapper (Carnegie Mellon; Lovett 2013), which here I term "reflection"

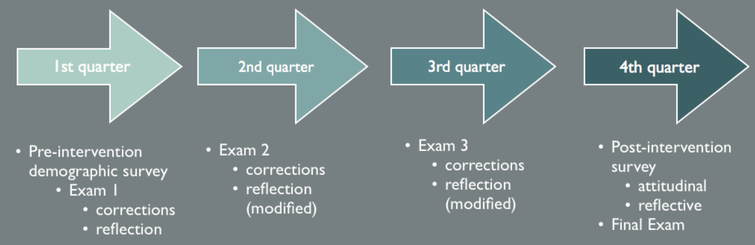

Figure 2 . Timeline of course interventions

References and acknowledgements

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- Nilson, L.B. 2013. Creating self-regulated learners. Stylus publishing, Virginia.
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Selected findings and conclusions

End of course survey results

- At the end of the course students were asked, "Did the exam reflection or completing the exam corrections impact your score on the next exam?". While we had a wide-range of responses, we did not see a correlation between believing or not believing this and change in exam score (figure 3)
- We also did not see a relationship between the idea that exam corrections helped students to retain information and final exam score (figure 4)

Impact of interventions on course grade

- When investigating the impacts of total number of interventions completed on
  - The change in exam score from the first exam to the third exam, we did not see a strong pattern (figure 5)
  - Final exam score, we did not see a strong pattern (figure 6)
- Despite not seeing a strong impact of the interventions on course grades, we do have qualitative data that shows that post-exam reflection positively impacted study skills and that students did see the benefit in completing these two interventions
- Future analyses will investigate student course attitudes across multiple years

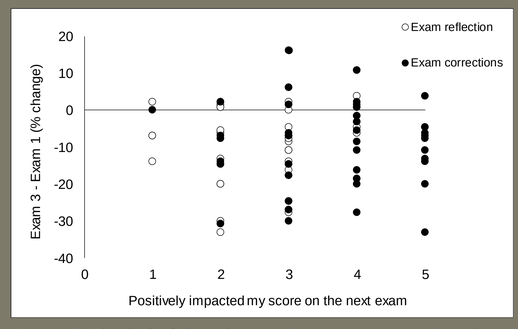

Figure 3. The belief that the two interventions positively impacted exam score and the actual change in exam score.

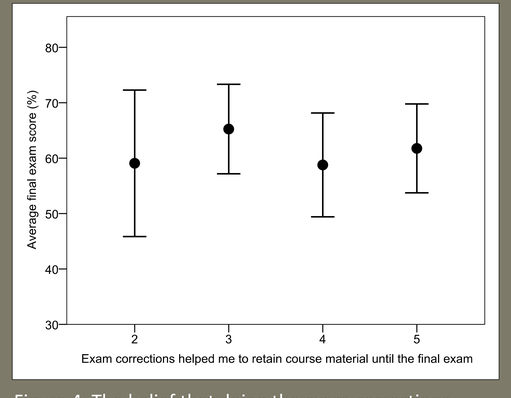

Figure 4. The belief that doing the exam corrections helped students to retain material until the final exam.

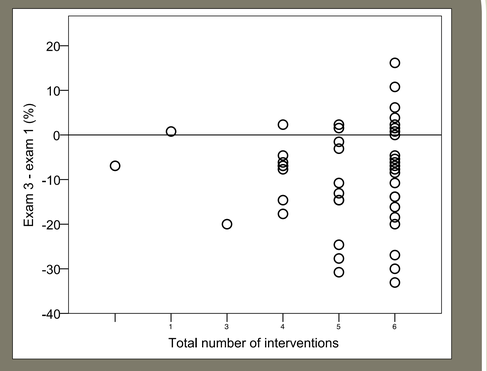

Figure 6. The change in midterm score versus the total number of interventions students completed.

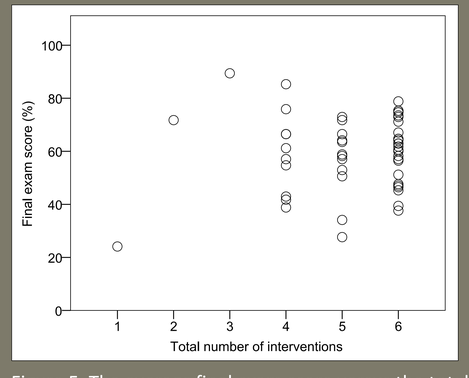

Figure 5. The average final exam score versus the total number of inventions students completed.