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Improving Metacognition with Pre- and Post-Exam Reflection Exercises (Academic Advising)

Kyle E. Conlon and Lauren E. Brewer
Stephen F. Austin State University

BACKGROUND/MOTIVATION

We teach psychology at a large southern university of approximately 13,000 students. Many of our students, especially freshman and first-generation students, possess ineffective study strategies that, understandably, lead to considerable frustration. They attend class, take careful notes, ask questions—do all the things we encourage them to do—and yet still underperform on their exams, leading them to ask, "What am I doing wrong?" When we ask students about their study strategies, we tend to find that they (1) rely on poor strategies (e.g., highlighting) and (2) lack insight into why their strategies aren't working. Hence, we were motivated to create short pre- and post-exam reflection exercises to help students gain metacognitive awareness into their own study strategies.

NUTS & BOLTS

The pre-exam reflection exercise was designed for students to reflect on their exam preparation strategies and to identify obstacles to their studying (Table 1). The post-exam reflection exercise was designed for students to reflect on their exam performance and to determine whether it was necessary to change their study strategies for the next exam (Table 2). Fifty students (38 women, M_{age} = 21.10) across three psychology classes consented to participate. Each student completed four exams yielding 200 discreet observations in which a student could have completed no reflections (n = 154), pre-exam reflections only (n = 18), post-exam reflections only (n = 8), or both pre-and post-exam reflections (n = 20). For this study, we compared exam grades for students who completed both pre- and post-exam reflections to exam grades for students who completed neither pre- nor post-exam reflections. Participation was voluntary and students were informed that they could withdraw from the study at any time without penalty. In exchange for their participation, participants were entered into a raffle for one of three $100 gift cards. These gift cards were distributed at the end of the semester after final grades were submitted.

Contact information: Kyle E. Conlon (conlonke@sfasu.edu) and Lauren E. Brewer (brewerle@sfasu.edu), Stephen F. Austin State University

Table 1. Pre-Exam Reflection Exercise

Items on the Pre-Exam Reflection Exercise (Administered 1-3 Days before Exam)
How much time have you spent studying for this exam? _____ hours _____ minutes
How many days before the exam did you start studying? _____
Please indicate the extent to which you have used each of the following activities to prepare for this exam, using the scale provided: 1 Never, 2 Rarely, 3 Sometimes, 4 Often, 5 A Lot 1. Reread your notes 2. Read the textbook or assigned readings 3. Rewrote your notes 4. Highlighted information in the textbook 5. Reviewed highlighted information from the textbook 6. Memorized definitions through repetition (e.g., flashcards) 7. Reviewed figures and tables in the textbook 8. Used a study guide or learning objectives 9. Made up your own examples to understand the material or apply it to everyday life 10. Used concept checks or chapter-end questions to test your knowledge 11. Studied with a friend or study group
Please indicate your agreement with each statement, using the scale provided: 1 Never, 2 Rarely, 3 Sometimes, 4 Often, 5 A Lot 1. I had music on while studying. 2. I had the television on while studying. 3. I had roommates, friends, or family members around while studying. 4. I responded to text messages, e-mails, or social media notifications while studying.
Please indicate your agreement with each statement, using the scale provided: 1 Strongly Disagree, 2 Disagree, 3 Neither Agree nor Disagree, 4 Agree, 5 Strongly Agree 1. I feel prepared for this exam. 2. I am confident that I understand this material. 3. I allotted enough time to study for this exam. 4. I think I will do well on this exam. 5. I care about how I perform on this exam.
What study strategies do you think have best prepared you for the first exam? Why?
What, if anything, has interfered with your studying?
On average, how many hours of sleep each night did you get this week?
How much have you exercised in the last week? _____ hours _____ minutes
Based on your preparation, what numeric grade do you think you will earn on this exam? (1-100)

What letter grade do you think you will earn on this exam? (A-F)

Table 2. Post-Exam Reflection Exercise

Items on the Post-Exam Reflection Exercise (Administered 1-3 Days after Exam)

How did you perform on the first exam?

1	2	3	4	5
Much worse than expected	Worse than expected	As expected	Better than expected	Much better than expected

Please indicate your agreement with each statement, using the scale provided:

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

1. My test score is an accurate reflection of my study effort.
2. My test score is an accurate reflection of my knowledge of the topics tested.
3. I made good use of the time provided during the exam.
4. I experienced text anxiety before or during the exam.
5. I experienced a mental block while taking the exam.
6. I was concerned that other students would finish before me.
7. I crammed for this exam.
8. My performance on this exam is indicative of how smart I am.
9. I can perform better on the next exam.
10. I am willing to change my study habits for the next exam.

Which part or parts of the first exam were easiest for you? Why?
Which part or parts of the first exam were most difficult for you? Why?
To what do you attribute your grade on the first exam? In other words, why do you think you performed the way you did?
Are you planning to prepare differently for the second exam? If so, what changes will you make?

- If you plan to make changes in your studying, how, specifically, do you plan to implement these changes?

OUTCOMES AND LESSONS LEARNED

The exam scores of students who completed both pre- and post-exam reflections (M_{grade} = 86.60, SD = 11.01) were significantly higher than exam scores of students who did not complete the reflections (M_{grade} = 76.97, SD = 12.31) $t(172) = 3.57$, $p < .001$. Additionally, for each student the number of exam reflections completed was positively correlated with exam average ($r = .42$, $p = .03$) and with final course grade ($r = .50$, $p = .01$).

Our goal was to create brief reflection exercises to help our students gain insight into the effectiveness of their study strategies. More recently, we've begun to share these exercises with our academic advisees, some of whom consider dropping or avoiding classes due to poor performance. Although our specific guidance depends on the advisee, we generally encourage them to apply the exercises to the exams in the course or courses in which they're struggling. We also try to review their responses with them to foster their metacognitive awareness (e.g., "I see

you're highlighting your notes and rereading the text; why do you think these strategies aren't working?," "So you felt prepared for this exam but underperformed; why do you think this happened?"). These exercises, which could be used by any academic advisor, jumpstart a discussion with advisees about *how* to study, which often gives them a renewed sense of hope and perspective for overcoming obstacles in their courses. In some cases, we'll share specific articles from the metacognition literature (e.g., Putnam, Sungkhasettee, & Roediger, 2016) that dovetail with the use of these exercises. We typically meet with advisees once a semester for course selection, but we both have an open-door mentoring policy and encourage (and sometimes require) follow-up meetings with advisees, particularly those who are struggling and would benefit most from these exercises. Our experience suggests that advisees (1) generally possess poor insight into their studying (2) express surprise that their strategies aren't as effective as they believe (or as research shows) and (3) through these exercises are forced to think through their study habits in a way they might not otherwise. We're hopeful that improving advisees' metacognition extends beyond the classroom to help improve their grades, motivate them beyond initial struggles, and prevent dropout.

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