ILLUSTRATIONS

Using exam reflections to augment learning

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Gorres-Martens BK. Using exam reflections to augment learning. Adv Physiol Educ 44: 501–504, 2020; doi:10.1152/advan.00028.2020.—While teaching, learning, and assessment should undoubtedly encompass more than just focusing on student exam scores, exams are a pervasive assessment tool at many academic institutions. This paper describes a newly developed exam reflection assignment, which is a tool to assist students in successful exam experiences throughout the course. The exam reflection is described and compared and contrasted to other types of exam reflections.

INTRODUCTION

Numerous faculty use exams to assess students in the classroom. In addition to providing a score to the instructor to formulate the students’ course grade, completed and graded exams can further be utilized by the students as a valuable learning tool. This paper describes a newly developed exam reflection assignment, which is an in-class, individual assignment completed by each student during the first class meeting after the exam and involves correcting one’s mistakes and a self-assessment. The exam reflection assignment is a beneficial experience for students because it informs students of the content areas in which their comprehension is lacking (i.e., questions answered incorrectly) and allows students the opportunity to relearn the material. It encourages students to self-assess their exam preparation technique and time spent preparing, and it guides students to think about their needs for future learning. Thus the exam reflection involves cognitive monitoring and development of one’s metacognition.

In 1979, John Flavell coined metacognition and cognitive monitoring as a new tool for developing one’s cognitive skills (3). Flavell describes metacognition as analyzing and assessing one’s own cognitive process for a greater understanding of future learning. Furthermore, Flavell includes developing a “strategy” as an important part of the metacognitive process to achieve the underlying cognitive and knowledge acquisition goals.

While a variety of tasks may be used to stimulate metacognitive skills (5, 6, 8, 9), students feel that exam reflections can help them improve their study habits and exam scores (4). While previous studies describe and report the benefits of the exam reflection (1, 4, 7), these studies do not emphasize the “strategy” component of the metacognitive process in their exam reflection, and these reports utilize the same exam reflection after each exam throughout the course. Therefore, the information included in this paper describes an exam reflection assignment that heavily focuses on the “strategy” component and also includes a series of different exam reflections to use throughout a course for the continual building of one’s metacognition.

The exam reflection assignment described in this paper is completed during the first class meeting after each exam in the course, ~2–3 days after the students take the exam. The instructor may want to have students complete the assignment within 5 days of taking the exam. Completing the assignment soon after the exam gives students feedback and time for reflection and relearning while the content and exam experience can easily be recalled by the student. Therefore, the faculty member needs to grade all of the exams in a short period of time. The exam reflection assignment occurs during class time to govern independent work on the assignment. This independent work is crucial for the student’s own assessment and reflection because one main outcome of the assignment is to improve the students’ future exam experience, and the students will complete future exams independently.

To incentivize quality work and effort on the assignment, the students are given a score on the assignment, which will contribute to the students’ overall course grade. However, the exam score does not change. The dates when the exam reflections will occur are given to students in the syllabus, so the students are well aware in advance when these in-class “point opportunities” will occur. Any allowance or disallowance for make-up work for the exam reflection assignment is also included in the syllabus.

The Exam Reflection Assignment

The exam reflection consists of two parts. Briefly, Part I asks the students to correct the mistakes made on the exam, and Part II asks students to self-assess their progress in the course. The exam reflection assignment can be used for exams that assess both content-based knowledge and critical-thinking skills. The exams can include any type of questions (i.e., multiple choice, true/false, short answer, essay, etc.). The instructor explains the assignment at the beginning of class and projects the instructions on the class viewing screen so the students can refer to the instructions throughout the class period. Then the graded exam that only contains the overall exam score and the number of points missed on each question, but not the correct answer, is handed back to each student so the student can begin working on the assignment.

The following bullet points are shown on the instructions to students (Fig. 1). The comments below the bullet points in italics are not shown to students, but serve as further explanation and detail for the instructor.
General Directions

- Please use a pen/pencil that is different than what you used for the exam.
- Work independently on this assignment.

Part I Directions

- For each question that you missed points on, write the following two items:
  1) The correct answer.
  2) A reflection on your thought process as to why you chose your original, incorrect answer.

Examples include:
- you thought the answer you chose was correct because _______
- you forgot to include _______ in the answer
- you studied the material but couldn’t remember the answer
- you didn’t study that material
- the material wasn’t in your notes
- you guessed
- anything else

Part II Directions

- Describe your study strategy. Will you keep the same study strategy? Will you change your study strategy? If so, how will your study strategy change?
  (For use after the first exam.)
- Did your score improve from the first exam or not? Why do you think your score did or didn’t improve?
  (For use after the second exam.)
- Thinking about your 3 exam scores, what has helped you be the most successful?
  (For use after the third exam.)
student is able to make the appropriate correction. When students are allowed to work together, they tend to ask their neighbor for the correct answer, but they do not learn or understand why the answer is correct, even when the instructor asks the students to explain the answer rather than give the answer. While peer-to-peer learning is an extremely useful tool in the classroom, in this context, peer-to-peer learning remains challenging for the students.

Part I directions.

• For each question that you missed points on, write the following two items:
  The correct answer.
  A reflection on your thought process as to why you chose your original, incorrect answer.

Examples include:
- You thought the answer you chose was correct because _________________.
- You forgot to include ________________ in the answer.
- You studied the material but could not remember the answer.
- You did not study that material.
- The material was not in your notes.
- You guessed.
- Anything else.

The students are informed that points will be awarded for giving the correct answers, and points will be deducted from their assignment score if the correct answer is not given. This encourages the students to take the assignment seriously, give their maximal effort, and learn the correct information. For the reflection on why the students chose their original, incorrect answer, the instructor should again clarify that students should write about their thought process and not justify why the correct answer is correct. For the reflection portion, points are only deducted if the student does not write a reflection and not for the reason the student got the answer wrong. This encourages honesty from the students, which will help them with Part II of this assignment.

Part II directions. Part II includes a question (or questions) that stimulates the students to reflect on their overall exam experience and plan a course of action for future learning. The questions for Part II will change for each exam the student takes throughout the course. The questions can also differ based on the type of course.

After the first exam, the following question can be used:

• Describe your study strategy.
• Will you keep the same study strategy?
• Will you change your study strategy?
• If so, how will your study strategy change?

After the second exam, the following question can be used:

• Did your score improve from the first exam or not?
• Why do you think your score did or did not improve?

After the third exam, the following question can be used:

• Thinking about your three exam scores, what has helped you to be the most successful?

Other questions may include the following:

1) What classroom and/or laboratory activities helped you the most? What classroom and/or laboratory activities helped you the least?

2) What do you think helped you the most to prepare for the exam? You may discuss anything during class that we did together or outside of class that you did on your own.

3) What, if anything, do you think you will do differently when preparing for the next exam?

DISCUSSION

While several previously published papers describe the use and benefits of the exam reflection for building one’s metacognition (1, 4, 7), the present paper provides additional information on a newly developed exam reflection. The exam reflection described in this paper adds value to the field because it includes a series of questions to use throughout the course. Thus the students are not completing the same exam reflection assignment throughout the course, as described in previous papers (1, 4). Rather, the series of exam reflections described in this paper aims to maximize the building of one’s metacognition. The series of questions also emphasize the “strategy” component originally included in Flavell’s description of metacognition (3).

While the idea of the exam reflection is certainly not new, many published reports describing the exam reflection do not require the students to correct the questions missed on the exam (1, 4). The exam reflection described in this paper not only requires students to find the correct answer to the questions they missed and gives students the opportunity to relearn the material, but the students also need to provide a reflection on their thought process as to why they chose the original, incorrect answer, thus providing another level of metacognition. In fact, Everson and Tobias (2) suggest that students need to understand what they got wrong and why they got it wrong to analyze their former study strategy and plan an improved study strategy.

Many instructors likely agree that exam scores should not be the only focus of teaching and learning, and the exam reflection assignment admittedly focuses on the students improving their exam scores. However, the assignment also makes students aware of the content and skills they are lacking (where they missed points) and gives the students another opportunity to learn the material and/or skills. Additionally, exams and exam scores are a pervasive assessment tool at many academic institutions. If exams are being used in the classroom to assess students and to formulate the students’ grades, then the exam reflection assignment is a justified and reasonable tool for teaching and learning. After experiencing the exam reflection assignment, students often express their appreciation for having this time in class dedicated to helping them understand the content they missed. They also become more self-aware of the effort they are putting in and what they need to do to improve. However, exams and the exam reflection assignments should not be the only assessment tool and assignment in the classroom. Rather, exams and the exam reflection assignment, if used, should be incorporated into a classroom with a variety of learning and assessment techniques.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author.
AUTHOR CONTRIBUTIONS

B.K.G.-M. conceived and designed research; prepared figures; drafted manuscript; edited and revised manuscript; approved final version of manuscript.

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