Instructors can help students improve their metacognitive awareness and future exam performance by analyzing an exam after it has been taken.

Post-Test Analysis: A Tool for Developing Students’ Metacognitive Awareness and Self-Regulation

Michelle V. Achacoso

Examining test performance with students is a practice that is done in a variety of ways in college classrooms. Many times instructors return exams and go over the correct responses during class. Another common way students receive feedback on exam performance is to check their scores on course management systems, such as Blackboard, or to go see the teaching assistant during office hours. What is important is that at the postsecondary level, it is up to individual students to figure out why they performed a certain way on an exam. After looking at the score, most students put the test out of their mind and move on to the next academic task. However, analyzing one’s performance provides a great opportunity to improve on future similar tasks. Explicitly teaching students to analyze their test performance can help them to better assess the understanding of their own cognitive process, or what is known as metacognitive awareness (Flavell, 1979). This means that when students become aware of what they do and do not know about specific content, they develop greater metacognitive awareness. This type of awareness can be helpful in fostering self-regulated learning in college students.

I developed a method to help my students understand their performance on an exam (Exhibit 15.1). The first step is to have them predict their exam score. I do this to help the students learn to gauge how well their perception of performance correlates with their effort. In the literature, this comparison is called calibration of performance. In general, there appears to be a positive relationship between an accurate calibration of performance
and achievement (Lin, Moore, and Zabrucky, 2001; Zabrucky and Moore, 1996). I use this method to help students become aware of their own perception of performance when they later compare their actual performance.

Next I have students rate their effort in studying for the exam on a scale of 1 to 10. At this point, students have a measure of perception of performance and effort. The first two steps in this process help students become conscious of their perception of performance and effort, and this will soon be juxtaposed with reality when the exams are returned. Consider a 2×2 matrix of “effort and performance” (Figure 15.1). It makes sense that students who

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### Exhibit 15.1. Exam Feedback Questions

**Before you see your exam:**
1. Please predict your score: (0–100 percent)
2. How much effort did you put into preparing for this exam?
   
<table>
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<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low effort</td>
<td>Moderate effort</td>
<td>High effort</td>
<td></td>
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</tbody>
</table>
3. How long did you study for the exam?
4. List the specific strategies you used to study for this exam.
5. What did you find easiest for you on the exam? Why?
6. What was most difficult for you on the exam? Why?

**After you see your exam score:**
7. Now that you have seen your exam, how do you feel about your performance? Was your prediction correct?
8. Did you experience the illusion of knowing? Why or why not?
9. Determine the level of Bloom’s Taxonomy of the Cognitive Domain for each question.
10. Determine the percentages of right or wrong responses for each level of Bloom’s.

<table>
<thead>
<tr>
<th>Percentage Correct</th>
<th>Percentage Incorrect</th>
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</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
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<td>Application</td>
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<td>Analysis</td>
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<td>Synthesis</td>
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<td>Evaluation</td>
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</table>
11. Determine the source of each test question: book, lecture, or both.
12. Determine the percentage of right or wrong responses for the book, lecture, or both.

<table>
<thead>
<tr>
<th>Percentage Correct</th>
<th>Percentage Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book</td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td></td>
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</tbody>
</table>
13. On the next exam in this class, would you change any of the strategies you used or the amount of time you spent studying? Please be specific.
14. Can you suggest anything else I as your instructor could do to help you to prepare for the exam?

*Source:* Developed by Michelle Achacoso, University of Texas Learning Center, 2004.
put in low effort do not perform well on an exam. Likewise, students who put in high effort perform well. Students who put in low effort and attain high performance are, more or less, anomalies. Certainly it happens, but this is not the group I am concerned about here. Students who put in high effort and do not perform well are students who are clearly struggling. This post-test analysis was designed to help these particular students.

I then have students list the specific learning strategies they used to study for the exam. Answering this question is key to helping a student develop more complex critical-thinking skills like analysis, synthesis, and evaluation. Students who use rehearsal strategies to simply memorize information might not be able to perform tasks that require a more complex level of cognitive functioning. For example, a student might put in a lot of effort (8 or 9 on the scale) studying for an exam, but he or she may simply rely on reviewing note cards and repetition. If the demands of the exam push the student to apply or analyze the material, rote memory devices might not be sufficient for the task at hand. A student might well need to use a more complex elaboration or organizational strategy to make the necessary connections to be ready for the exam.

Next I ask students what were the easiest and the most difficult aspects about the exam and why. I ask this question to learn whether perhaps there was a problem with the exam itself. Perhaps I asked a question in a vague manner or designed a poorly written question. This gives the student the opportunity to express such a grievance.

Next I have the students talk about their affective response to the exam after they see their score. It helps students to have a place to talk about their performance. Contrary to what might be expected, students were rarely inappropriate with expressing their feelings to me. In fact, more often than not, they were particularly hard on themselves if they did not live up to their own expectations.

I next have the students compare their score with their prediction and decide if their prediction was correct. Here students get to assess if they calibrated their performance properly. I also ask them if they experienced the illusion of knowing (Glenberg, Wilkinson, and Epstein, 1982). Students who experience the illusion of knowing feel confident that they performed well on an academic task, only to find out after completing a task that there was a gap in their understanding.
Helping a student identify this phenomenon when it occurs is particularly important for the development of the metacognitive skills of the student. Someone who experiences the illusion of knowing is generally sure that they knew the answers to an exam. The reality is that a student might have learned the information well enough to recognize terms on a multiple-choice test, for example, but the cognitive demands of the exam may have gone beyond the level of recognition.

At this point in the analysis process, I ask the students to identify the level of Bloom’s “taxonomy of educational objectives” (Bloom, 1956) used in each question on the exam. I also ask them to calculate the proportion of items they answered correctly or incorrectly at each level of Bloom’s classification. I do this to see if the students are preparing at the appropriate cognitive level to meet the demands of the exam. They may have been tested at the application level but only studied to perform at the knowledge level. It is easy to recognize something but much harder to understand, explain, apply, or analyze a complex concept. Accurate knowledge assessment is critical to developing metacognitive skills (Everson and Tobias, 1998). If students do not have an understanding of what they do and do not know, it is impossible for them to make needed repairs in their knowledge.

After conducting a Bloom’s analysis, I also have the students determine the source of each question: book, lecture, or both. I ask them to do this to determine where they might need to focus more of their attention for future exams. If they are skipping class and much of the exam comes from the lectures, this is a signal to come to lecture. In the same vein, students can also check to see if they need to be reading the book more carefully.

Next I ask students if they would make any changes in strategies or perhaps in the amount of time they will spend studying for the next exam. Asking this question helps students find the appropriate attribution for their performance. For example, if students believe they have control over the outcome, they are more likely to be motivated to make a change. Of course, it is easy to blame an instructor or the exam itself for a failure in performance. This question helps students realize the role they play in their own grades. As a consequence, students were less likely to argue about a grade with me after going through this process.

Finally, I asked for any suggestions they had about helping them prepare for the next exam. Students generally gave constructive feedback on what I could do to help. They did not say things like “just tell us what is on the test.” I would always try to integrate their feedback during the next review to show them that I took their feedback seriously.

Post-test analysis helped me to accomplish three important outcomes in my teaching: First, the process helped to increase metacognitive awareness in my students. By the end of the semester, they were able to monitor and make changes in their strategy used when studying for exams. Students improved in their performance. The class mean on each exam increased as the semester progressed. Second, motivation increased due to making more
appropriate attributions about exam performance. Students could see how their effort and strategy used were directly related to performance. Third, “grade groveling” was kept to a minimum during my office hours, and the adversarial relationship between the instructor and student was definitely minimized. The students saw that I was willing to listen to their opinions, incorporate their feedback, and change my approach to help them learn.

References


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