

Product Name **MasteringMicrobiology**
 Course Name **General Microbiology**
 Credit Hours **Three**

Key Results MasteringMicrobiology enabled additional content coverage and provided insight into students' mastery of course material.

Text

Microbiology: An Introduction, 11e, Gerard J. Tortora, Berdell R. Funke, and Christine L. Case

Implementation

General Microbiology introduces students to the diverse world of prokaryotic and eukaryotic microbes and viruses, their importance in the biosphere, and their roles in human and animal disease. The course is taken by microbiology and veterinary science majors, as well as by pre-med, pre-pharmacy, and pre-nursing students. Some students concurrently take a separate, one-credit lab.

I believe it's important to provide different types of resources to address diverse learning needs. I adopted MasteringMicrobiology when it was introduced in 2010 because I saw how its step-by-step approach could help students better grasp course content as they progress through the course. Students particularly benefit from its interactive feedback and embedded multimedia tutorials.

I focus on the comprehension questions in MasteringMicrobiology to help students develop the kind of critical-thinking skills they need to analyze information and work through a problem.

I assign weekly MasteringMicrobiology homework that includes approximately 20 primarily animation questions. Homework takes 1–2 hours to complete; I do not set a time limit. I see homework as a vehicle to review and reinforce what students have read in the textbook and heard in lecture.

I use the diagnostics in MasteringMicrobiology to determine what problems students are struggling with, and then discuss those concepts in the following week's lecture.

Assessments

68 percent Exams (four)
 17 percent MasteringMicrobiology homework
 15 percent Clicker participation/written activities

Results and Data

An evaluation of student data from spring 2010, fall 2011, and fall 2012 shows that MasteringMicrobiology homework grades are an indicator of student performance in the class—final course grades increase as the MasteringMicrobiology scores increase (table 1). Knowing this enables me to monitor student performance throughout the semester and help students to progress as needed to succeed in the course.

Final Course Grade	Average MasteringMicrobiology Homework Scores		
	Spring 2010	Fall 2011	Fall 2012
A	94%	94%	95%
B	89%	91%	93%
C	86%	86%	87%
D	79%	79%	77%
F	51%	54%	51%

Table 1. Average MasteringMicrobiology Homework Score by Final Course Grade, Spring 2010, Fall 2011, Fall 2012 (Spring 2010 $n=225$, Fall 2011 $n=377$, Fall 2012 $n=369$)

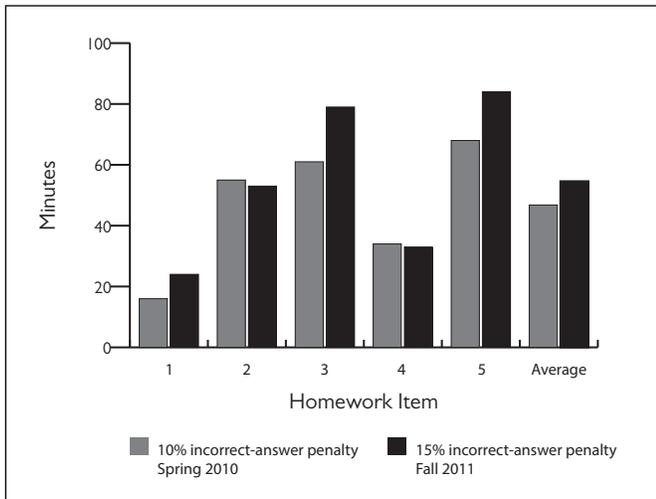


Figure 1. Minutes Spent on MasteringMicrobiology Homework Items 1–5 with a 10 Percent Incorrect-Answer Penalty and with 15 Percent Penalty, Spring 2010–Fall 2011

At the end of spring 2010, I surveyed students and asked if they would have studied more to answer MasteringMicrobiology homework questions correctly in fewer attempts if the penalty for each wrong answer was greater. Fifty-five percent of students agreed or strongly agreed to the statement. As a result, I changed my 10 percent incorrect-answer penalty to 15 percent for the following semester.

I compared the first five items assigned from the spring 2010 semester, which carried a 10 percent penalty to the same items from the fall 2011 semester, which carried a 15 percent penalty. The average score was about the same for each item, however, students spent an average of 19 percent more time—from 46.8 minutes to 54.6 minutes—working on the problems after the penalty increase (figure 1).

There are slight differences in the questions in each assignment for the two semesters. However, diagnostic analysis indicates that students generally spent more time on the problems before answering, which may indicate that they were reading the text, reviewing the content, or watching the animations prior to answering.

The Student Experience

Responses from spring and fall 2010 student surveys indicate that students feel overwhelmingly positive about the use of MasteringMicrobiology.

- In spring 2010, 90 percent of students responded that MasteringMicrobiology was somewhat or very helpful to their understanding and retention of course content (figure 2).

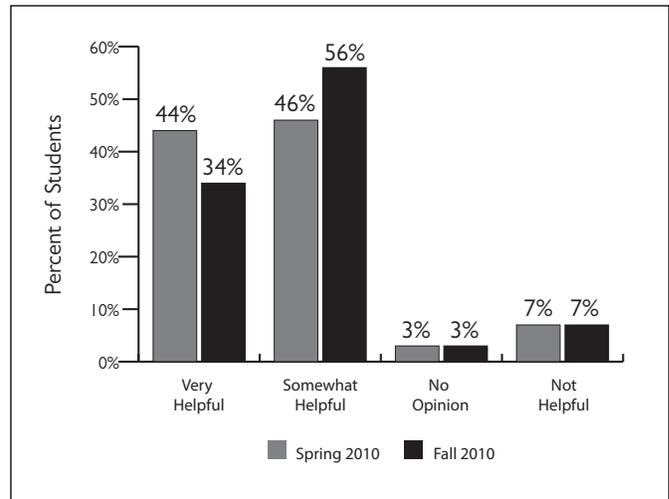


Figure 2. Average Student Response to the Question: How helpful are MasteringMicrobiology assignments to your understanding and retention of microbiology subject matters? (Spring 2010 $n=197$, Fall 2010 $n=317$)

- In fall 2010, 89 percent of students responded that MasteringMicrobiology was somewhat or very helpful to their understanding and retention of course content (figure 2).
- In spring 2010, 91 percent of students recommended that MasteringMicrobiology be used in the class moving forward.
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Conclusion

Students must succeed in this course in order to move forward with their educational goals, but there is too much content to cover in one semester. Now I can assign some content using MasteringMicrobiology and confirm via the program's diagnostic features that the students have successfully mastered the content. I use the time saved in lecture to focus on higher-level concepts.

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