

Product Name **MasteringBiology**
Course Name **Biological Principles**
Credit Hours **Four**

Key Results In a study conducted over two semesters, students who used MasteringBiology consistently outperformed students who were not using MasteringBiology.

Text

Biology, 8e, Neil A. Campbell and Jane B. Reece

Implementation

Georgia Institute of Technology offers two sections of Biological Principles each fall. Both sections comprise approximately 185 students, are cotaught by the same team of instructors, use the same syllabus, and use identical exams. Course content is organized into five modules: Evolution, Ecology, Metabolism, Genetics, and Molecular Medicine. The first four modules conclude with a one-hour exam. We use a mix of interactive tutorials, activities, and test bank questions for homework assignments.

In fall 2009, we conducted a study to test the effects of various interventions and learning enhancements. We repeated the study in fall 2010 and received nearly identical results.

For the study, students in both sections of Biological Principles were assigned MasteringBiology homework worth a total of up to five percent of their course grades. Students in the first section were assigned MasteringBiology homework for modules 1 and 3; students in the second section were assigned MasteringBiology homework for modules 2 and 4. At the end of the semester, we compared the mean exam scores of each section to determine whether the section with MasteringBiology assignments for a given module outperformed the section not given MasteringBiology assignments.

Assessments

40 percent	In-class exams
25 percent	Final exam
25 percent	Laboratory
10 percent	Group activities
5 percent	MasteringBiology (extra credit)

Results and Data

There was no significant difference in overall midterm exam score averages between the two fall 2009 sections ($p = 0.248$). However the section that was assigned MasteringBiology homework consistently outperformed the section that was not assigned MasteringBiology homework in each of the four modules. This outperformance resulted in a small (2.65 points per module), but significant effect of MasteringBiology assignments on mean exam scores ($p < 0.001$). See figures 1 and 2.

Repeating the experiment in fall 2010 yielded similar results. See figures 3 and 4.

The Student Experience

In a fall 2009 survey ($n = 232$), 90 percent of the students surveyed reported that MasteringBiology “increased my understanding of the course material.” Furthermore, 84 percent of the students surveyed reported that “MasteringBiology positively impacted my exam scores,” and that they “would recommend it to other students taking this course.”

Student comments included the following:

- “I wish every class had this type of study aid.”
- “[MasteringBiology] provided sound reinforcement to concepts out of the book and set up a good base for me to understand deeper concepts in lecture.”
- “MasteringBiology provided the tools I needed to get a better grasp on more-difficult concepts. I could actually see the processes happening in videos and activities.”

“We adopted MasteringBiology as a way to engage students and motivate them to work harder. One of the benefits that we most appreciated was the program’s ability to automatically grade homework and provide instant feedback.”

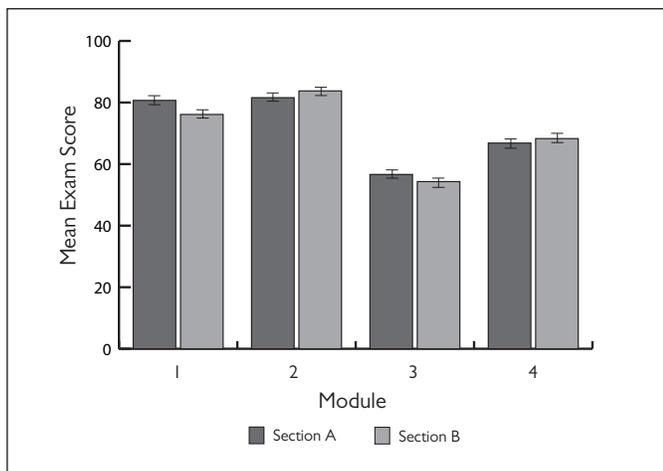


Figure 1. Midterm Exam Scores by Section, Fall 2009

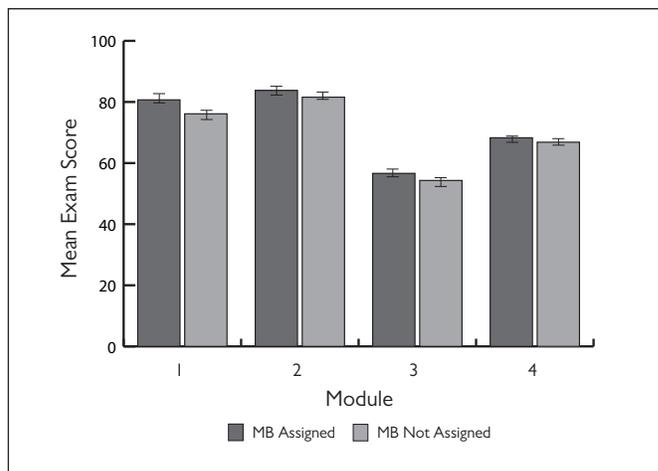


Figure 2. Midterm Exam Scores by Product Use, Fall 2009

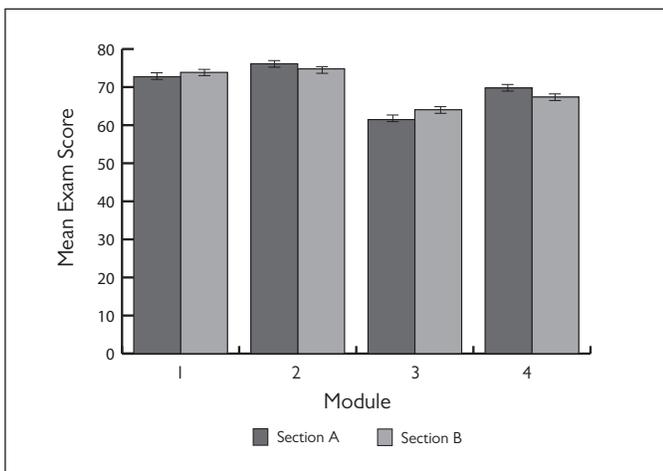


Figure 3. Midterm Exam Scores by Section, Fall 2010

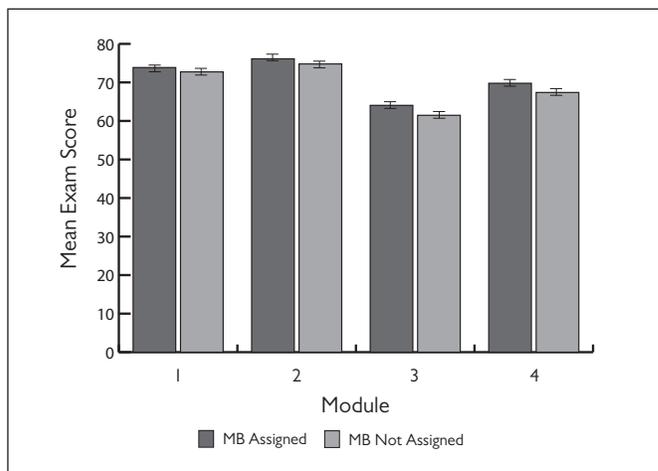


Figure 4. Midterm Exam Scores by Product Use, Fall 2010

Conclusion

We have fully integrated MasteringBiology into the Biological Principles course beginning with the fall 2011 semester. We’ve

adopted a “flipped” classroom model, which motivates students to engage in the content outside of the classroom, thereby enabling richer discussion and activities during class time.

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