About the Course
The University of Hawaii System includes 10 campuses and dozens of educational, training, and research centers across the Hawaiian Islands. As the public system of higher education in Hawaii, the system enrolls more than 52,000 undergraduate students.

Introduction to Biology II is the second course in a two-semester sequence for life science majors. It is a three-credit lecture course, with a separate, concurrent lab. Both the lecture and lab courses use MasteringBiology. Topics covered include the anatomy, physiology, and systematics of plants and animals; behavior; and ecosystems, populations, and communities. This study encompasses only the lecture portion of the course.

Challenges and Goals
Large course enrollments make it difficult for Lecturer Justin Walguarnery to identify before the first exam students who are struggling or at risk. He believes that students need timely feedback to help identify the concepts they need to work on and resources to help guide them through the learning process. He implemented MasteringBiology to provide his students with immediate feedback and automatic grading while they do their homework, so they know where to focus remediation efforts.

Implementation
In fall 2013, Walguarnery used MasteringBiology for homework, with the goal of helping students review course concepts and prepare for exams. He gave three exams and assigned eight MasteringBiology homework assignments during the semester.

Walguarnery assigned a postlecture MasteringBiology assignment for each chapter covered. Assignments were posted at the end of each week on the topics covered during that week and consisted primarily of activity questions. Assignments were untimed, and students had until the end of the following week to complete them.

Assessments
40 percent Final exam
40 percent Exams (two)
15 percent MasteringBiology
5 percent Attendance

Results and Data
Data for the fall 2013 semester were analyzed, looking primarily at the course performance of students who attempted MasteringBiology homework assignments versus students who skipped one or more assignments (which was considered to be an assignment with a score of zero).

Figure 1 shows that students who skipped two or more out of eight MasteringBiology homework assignments earned statistically significantly lower exam averages than did students who attempted all the homework assignments.

The results of the analysis show the following:

- The average number of MasteringBiology homework assignments skipped was 1.8.
- Thirty-five percent of students attempted all of the MasteringBiology homework assignments and earned an average homework score of 92 percent.
- Forty-four percent of students skipped three or more MasteringBiology homework assignments and earned an average homework score of 47 percent.
The Student Experience

Student feedback on MasteringBiology has been positive. Comments include:

- “I liked the MasteringBiology homework assignments. They helped me prepare for the exams.”
- “I liked how [Walguarnery] made use of MasteringBiology for homework. It was a good and different way to do homework, compared to other courses.”
- “I liked MasteringBiology best.”
- “The online homework was easy, and helped with the understanding of the lesson.”

Conclusion

Large class sizes can make it difficult to identify students who are struggling, to understand what concepts they are struggling with, and to provide remediation in a timely manner. While motivation can impact student performance, having resources available for students to learn at their own pace and on their own time can be critical to the learning process.

Exam data show that students who put the effort into doing MasteringBiology homework tend to have significantly higher exam scores than do students who skip MasteringBiology assignments, and that the number of homework attempts may be a better indicator of success than Exam 1 performance.