

MasteringA&P

School Name University of Houston, Houston, TX
Course Name Human Physiology
Course Format Lecture

Key Results Students who used MasteringA&P to complete extra-credit homework earned significantly higher exam scores than students who did not use MasteringA&P.

Submitted by

Chad Wayne, Instructional Associate Professor

Course materials

Human Physiology: An Integrated Approach, Silverthorn

About the Course

The University of Houston is a public, four-year university serving approximately 40,000 students. The majority of students attend the university full-time, and approximately 40 percent receive Pell Grants.¹

Human Physiology is an upper-level biology elective course. It is a lecture course, with lab taken separately. Approximately 65 percent of the students who take the course are biology majors, 80 percent are juniors or seniors, and the majority plan to go into health or biological science fields. The course covers the integrated treatment of bodily functions from molecular to organismic levels. Course content is divided into four units:

- Plasma membrane and membrane transport, cell signaling, electrical signaling, the neuron, and the synapse
- The nervous system and muscles
- The cardiovascular and respiratory systems
- The renal, digestive, endocrine, and reproductive systems

Challenges and Goals

Associate Professor Chad Wayne wanted to address several challenges in his course, including student performance and withdrawal rates. He also sought to encourage more academic independence and content retention, as some students did not know how to study and were solely depending on lecture to prepare for tests.

Wayne believes that required homework is a poor way to assess understanding of course content, that students tend to see homework as busy work to finish as quickly as possible, and that they aren't motivated to use it as a tool to learn. On the other hand, he notes that students always ask for extra credit. Unlike required homework, students tend to see extra credit as a bonus opportunity—when given the opportunity to use extra credit for practice, he feels they tend to learn from it.

Implementation

Prior to fall 2011, Wayne did not include a MasteringA&P extra-credit option in his course. No homework was assigned, and final grades were determined by four exams. It was only after his students requested more practice problems to prepare for exams, in addition to end-of-chapter review questions, that he adopted MasteringA&P, which he chose in part because it requires neither extra lecture time nor hands-on grading.

He set up the program so students could work at their own pace. The program's automatic grading and immediate feedback enable his students to identify information they know from what they don't, develop critical-thinking skills, and make conceptual connections—all of which help improve their performance in the course.

Starting in fall 2011, Wayne offered a MasteringA&P extra-credit homework option for each unit of 200–300 questions that includes videos, tutorials, multiple-choice, true/false, and fill-in-the-blanks. Questions are randomized, and students have up to three attempts per question, with a minor penalty per attempt. The assignment is open until the morning of the applicable exam, and there is no time limit. His goal was for students to think through questions, not guess.

Students can add one extra point to each unit exam by earning at least 50 percent on an extra-credit MasteringA&P assignment, plus an additional point for every 10 percent earned above that

¹2013 Texas Public Higher Education Almanac, *Texas Higher Education Coordinating Board*, p. 43.

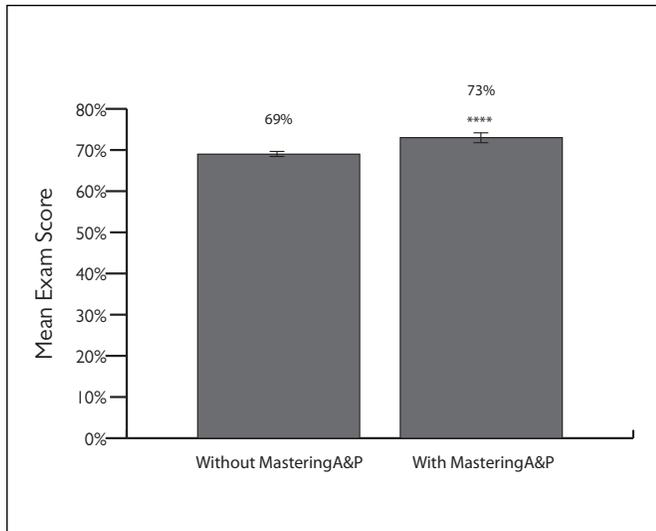


Figure 1. Mean Exam Scores for Students Not Offered MasteringA&P ($n = 812$) and Students Who Did MasteringA&P Extra Credit ($n = 605$)
Error Bars = Standard Error, Significance **** $p < 0.0001$

to a maximum of five points for each exam. Students who earn less than 50 percent do not earn any extra credit.

Assessments

100 percent Exams (four)

Results and Data

Data was collected over the course of four years. Students who did not complete the course were not included in the results.

- A total of 1,647 students were in the study: 905 students were not offered MasteringA&P, 742 students were offered MasteringA&P extra credit.
- Of the students who were not offered MasteringA&P, 90 percent completed the course.
- Of the students who were offered MasteringA&P extra credit, 92 percent completed the course.
- Of the students who had extra-credit opportunities, 89 percent had recorded activity in MasteringA&P.

Analysis of exam scores for students who did MasteringA&P extra-credit assignments indicates that they had a significantly higher exam average than did students who were not offered MasteringA&P (Figure 1). Students who were offered MasteringA&P but did not earn extra credit were not included in the analysis.

In addition, data for students taking the course for the first time and students repeating the course for the second or more times was evaluated. For both first-time and repeating students,

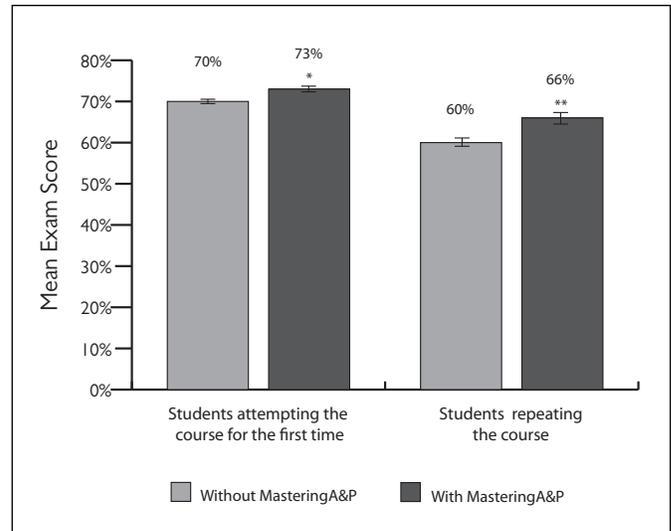


Figure 2. Mean Exam Scores Based on MasteringA&P Extra-Credit Participation and Course Repeat (without MasteringA&P: First Time, $n = 721$; Repeat, $n = 91$ / with MasteringA&P: First Time, $n = 571$; Repeat, $n = 34$)
Error Bars = Standard Error, Significance * $p < .05$, ** $p < .01$

those using MasteringA&P had significantly higher exam scores. However, the gap in mean exam scores for students who were repeating the course using MasteringA&P compared with repeating students who were not offered MasteringA&P ($p = 0.002$) was larger than for students taking it for the first time with MasteringA&P compared with first-time students not offered MasteringA&P ($p = 0.02$) (Figure 2). Although repeating students still had lower exam averages than students taking the course for the first time, results indicate that MasteringA&P could help these students do better in the course.

The Student Experience

MasteringA&P extra credit continues to be offered to students. In fact, the participation rate has increased over subsequent semesters—students talk with each other on campus and tell others that the way to succeed in the course is to do MasteringA&P extra credit. Students like that they can work at their own pace and obtain feedback that helps them focus their efforts.

Conclusion

The question that Wayne was studying was whether or not students who regularly completed homework performed better on exams than students who did not. Evaluation of participation and performance rates shows that the majority of the students participated in extra-credit work and that exam scores have increased. Wayne plans to continue to study and evaluate the data and will report more findings in the future.