

## MasteringA&P

School Name San Antonio College, San Antonio, TX  
Course Name Anatomy and Physiology I  
Course Format Face-to-face

**Key Results** According to data from the pilot semester, students in the study who attempted more MasteringA&P homework had higher exam averages than students who attempted fewer MasteringA&P homework. In addition, findings showed a higher success rate after implementation of MasteringA&P.

**Submitted by**  
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**Course materials**  
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### About the Course

The Alamo Community College District comprises five schools: San Antonio, St. Philip's, Palo Alto, Northeast Lakeview, and Northwest Vista. All of the colleges offer associate degrees, certificates, and licensures in occupational programs that prepare students for jobs, as well as arts and science courses that transfer to four-year colleges and universities. Total enrollment is more than 64,000 for all colleges, and is more than 20,000 at San Antonio College. In the Alamo Colleges system, approximately 80 percent of students attend part-time, and 60 percent identify as Hispanic. The persistence rate from fall 2014 to fall 2015 for full-time students was 66 percent and 51 percent for part-time students.<sup>1</sup>

Thomas Yingst is a full-time adjunct at San Antonio College, who has been teaching Anatomy and Physiology (A&P) in a face-to-face format for six years. His teaching interest is in using multimedia-oriented content in lectures and labs. He also has taught Biology and Microbiology at the school.

Anatomy and Physiology I is the first part of a two-course sequence. The course presents the structure and function of the human body, including cells, tissues, and organs of the following systems: integumentary, skeletal, muscular, nervous, and special senses. Emphasis is on the interrelationships among systems and the regulation of physiological functions involved in maintaining homeostasis. The course fulfills a Life and Physical Sciences requirement. Elementary Algebra and Integrated

Reading and Writing are prerequisite courses, and it is recommended that students have taken Introduction to Chemistry.

The course is offered both face-to-face and online, and students are required to also take a concurrent one-credit lab. The majority of students who take this course are planning to enter the nursing program. Other students are pursuing degrees from any of the allied health fields, including physical therapy, occupational therapy, physician assistant, pharmacy, dentistry, and optometry. To be considered for the nursing program, students must complete A&P I and II with a C or better. But because acceptance to the program is so competitive, students should earn at least a B to increase their chances of acceptance.

Course learning objectives in spring 2015 addressed critical thinking, communication, empirical quantitative skills, and teamwork. In addition, Yingst followed the Human Anatomy and Physiology Society<sup>2</sup> learning outcomes, which were designed to provide guidance to educators teaching a two-semester undergraduate course in human anatomy and physiology. Beginning in fall 2015, the course learning objectives were changed to reflect the Texas Higher Education Coordinating Board's learning outcomes.

Following are the learning objectives for the period of this study (spring 2015):

- Develop a vocabulary of appropriate terminology to effectively communicate information related to anatomy and physiology.
- Recognize the anatomical structures and explain the physiological functions of body systems.
- Recognize and explain the principle of homeostasis and the use of feedback loops to control physiological systems in the human body.

<sup>1</sup><http://dashboards.alamo.edu:8080/dashboards/?guestuser=guest&dashID=132&c=0>.

<sup>2</sup><http://www.hapsweb.org/>.

*Student learning outcomes were tagged to the applicable questions in MasteringA&P so Yingst could run a diagnostic report of the progress made on each student learning outcome, along with the score, reporting on either the class as a whole or individual student performance.*

- Use anatomical knowledge to predict physiological consequences, and use knowledge of function to predict the features of anatomical structures.
- Recognize and explain the interrelationships within and between anatomical and physiological systems of the human body.
- Synthesize ideas to make a connection between knowledge of anatomy and physiology and real-world situations, including healthy lifestyle decisions and homeostatic imbalances.
- Demonstrate laboratory procedures used to examine anatomical structures and evaluate physiological functions of selected organ systems.
- Interpret graphs of anatomical and physiological data.
- Demonstrate information literacy skills to access, evaluate, and use resources to stay current in the fields of anatomy and physiology.
- Approach and examine issues related to anatomy and physiology from an evidence-based perspective.
- Communicate clearly and in a way that reflects knowledge and understanding of the human body and demonstrates the ability to adapt information to different audiences and applications.

## Challenges and Goals

San Antonio College uses a measure called the Progressive Grade Rate (PGR). The PGR calculates the number of students earning Cs or higher divided by the number of students in the class after the census date. Yingst's main goal was to improve success rates, thereby improving the PGR.

In addition, San Antonio College has been measuring and reporting on a standard set of student learning outcomes (SLOs) for a few years. However, in fall 2015, the school decided to use the Texas Higher Education Coordinating Board learner outcomes, which will make it easier to compare and track outcomes. Because of the administrative requirements, Yingst also sought a way to gather SLO information in a format that facilitated reporting and analysis.

In 2014, Yingst saw a presentation by a colleague who used online content and homework assignments. The data showed a trend of improved course outcomes. Since Yingst was using paper-and-pencil homework at the time, he made a decision to adopt MasteringA&P to deliver online resources and homework in spring 2015. He believed that the automatic feedback would benefit students, and that he could use the gradebook reporting to monitor student progress and gather required SLO data.

## Implementation

For spring 2015, the semester in which MasteringA&P was piloted, all quizzes, the three exams, and the final comprehensive exam were administered in MasteringA&P, and question content primarily came from the Pearson test bank.

Yingst gave two types of MasteringA&P homework assignments. MasteringA&P chapter homework assignments were generally given after the content was covered in class. A mix of question types were included (but no fill-in-the-blank questions). He also required Knewton Adaptive Follow-Up (AFU) assignments that were automatically generated for each student based on performance on chapter (parent) homework. Students tested out of an Adaptive Follow-Up assignment by scoring 80 percent or higher on the related MasteringA&P parent homework. Homework questions did not use any test bank questions, since those were reserved for quizzes and exams.

Because of the SLO reporting requirements, Yingst also worked with Pearson to map the MasteringA&P homework questions with the school's SLOs. SLOs were tagged to the applicable questions in MasteringA&P so Yingst could run a diagnostic report of the progress made on each SLO, along with the score, reporting on either the class as a whole or individual student performance.

Yingst wanted to evaluate the impact of MasteringA&P. To do this, he engaged in this initial study to begin to test and measure the relationship between (1) student engagement with online homework and resources and (2) student exam and course performance. To begin to measure how his students engaged with the online homework, Yingst collected data related to MasteringA&P assignments that he believed would be helpful for and aligned to the learning outcomes of the course. He started collecting data during the spring 2015 pilot with a goal

*Yingst started collecting data during the spring 2015 pilot with a goal of continuing to study additional semesters to better understand the performance and changes in learning and course outcomes.*

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#### Assessments

300 points	Exams and lab practicals
100 points	Comprehensive final exam
100 points	Quizzes
100 points	MasteringA&P homework
100 points	Group project
100 points	Lab reports (group)

#### Results and Data

An analysis of the required MasteringA&P chapter and Knewton Adaptive Follow-Up assignments was conducted for the spring 2015 A&P I course. For this study, to derive a homework participation score, a skipped homework was considered to be one with a recorded score of 0, and an attempted homework was considered to be one with a recorded score of 1 or higher. The exam average is the average of all exams, including the comprehensive final exam. For the spring 2015 semester, there were 15 MasteringA&P chapter and 5 Adaptive Follow-Up homework assignments.

An analysis of student participation in the MasteringA&P homework showed the following:

- Percent of students who attempted all of the chapter assignments: 50%
- Percent of students who attempted all of the Knewton Adaptive Follow-Up assignments: 56%
- Percent of students who skipped five or more of the total MasteringA&P assignments: 18%
- Mean number of MasteringA&P chapter assignments skipped by all students: 1
- Mean number of Knewton Adaptive Follow-Up assignments skipped by all students: 1

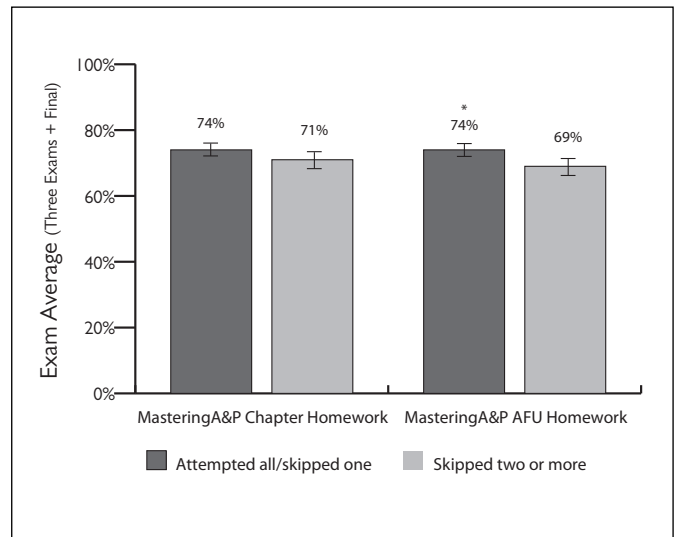


Figure 1. Exam Average by MasteringA&P Homework Participation, Spring 2015 (MasteringA&P chapter homework, attempted all/skipped one:  $n = 60$ , skipped two or more:  $n = 24$ ; MasteringA&P Knewton Adaptive Follow-Up homework, attempted all/skipped one:  $n = 65$ ; skipped two or more:  $n = 19$ )  
Err Bars = Stand Err; \* $p < 0.05$

Student data was then grouped based on scores from participation in MasteringA&P homework. The MasteringA&P chapter assignment questions were the same for each student, but since Knewton Adaptive Follow-Up questions are generated based on what individual students missed on the parent homework, the questions differed from student to student. For this reason, the analysis separated chapter homework participation scores from Knewton Adaptive Follow-Up homework participation scores, and then looked at the average of all exams administered during the semester (Figure 1).

For students who attempted all or who skipped 1 of 15 MasteringA&P chapter homework assignments, the exam average was higher ( $M = 74\%$ ,  $SD = 12\%$ ,  $N = 60$ ) than for students who skipped two or more of the 15 assignments ( $M = 71\%$ ,  $SD = 12\%$ ,  $N = 24$ ), but not a statistically significant difference.

For students who attempted all or skipped one of the five Knewton Adaptive Follow-Up assignments generated based on individual gaps in knowledge, the exam average was higher ( $M = 74\%$ ,  $SD = 12\%$ ,  $N = 65$ ) than that of students who skipped two or more Adaptive Follow-Up assignments ( $M = 69\%$ ,  $SD = 9\%$ ,  $N = 19$ ); it was statistically significantly higher with  $p < .05$  using the one-tailed  $t$ -test with equal variance.

Since one of Yingst's goals was to improve the Progressive Grade Rate, he compared course grades for fall 2014 (when MasteringA&P was not in use) to spring 2015 (when MasteringA&P was in use). Because he taught four sections in the spring and only one section in the fall, there was a lower number of students represented in the fall data. Still, initial findings showed that the percentage of students earning a C or higher increased in spring 2015 (Table 1). Student success rates will continue to be monitored to see if that trend holds in future semesters.

	Fall 2014*	Spring 2015**
A, B, or C	68%	74%
D or F	32%	27%

Table 1. Success Rates, Fall 2014 and Spring 2015

\*1 section without MasteringA&P \*\*4 sections with MasteringA&P

The study's findings do not account for the unmeasured influence of variables that can impact student performance, such as motivation. However, based on the performance of Yingst's students, those that attempted more MasteringA&P homework assignments had higher exam averages than students who attempted fewer MasteringA&P assignments, and the semester in which MasteringA&P was used had a higher rate of students earning an A, B, or C. Further research is needed to test what the initial data seems to suggest is a relationship between attempting MasteringA&P assignments and exam performance. Yingst plans to continue to evaluate exam and course outcomes in upcoming semesters, and will collect and report on SLOs.

## The Student Experience

Yingst reported that students generally feel positive about MasteringA&P. He said that for the most part, students initially are not excited about the required work, but those who do it are happy with the results. Once students understand that the MasteringA&P assignments help them learn and prepare for exams, he believes, they see the benefit of putting in the time and effort.

## Conclusion

To ensure that student learning outcome requirements were being met, and in an effort to increase success rates and student learning in A&P I, Yingst implemented MasteringA&P in spring 2015, and used it to track SLOs and to offer interactive homework and personalized remediation to his students. He has started to evaluate the data from his course, and will continue to do so in future semesters. In addition, by using the SLO diagnostic feature, he is able to more easily track SLO data for both administrative reporting and to ensure that students are achieving the course learning outcomes required by the state of Texas.

Implementation and results case studies share actual implementation practices and evaluate possible relationships between program implementation and student performance. The findings are not meant to imply causality or generalizability within or beyond these instances. Rather, they can begin to provide informed considerations for implementation and adaptation decisions in other user contexts. For this case study, mixed-methods designs were applied, and the data collected included qualitative data from interviews, quantitative program usage analytics, and performance data. Open-ended interviews were used to guide data collection.