

Product Name **MasteringAstronomy**

Course Name **Astronomy 10: The Solar System, Astronomy 20: Stars and the Universe**

Credit Hours **Three (each)**

**Key Results** MasteringAstronomy provides a wide range of activities that cater to diverse learning styles. As a result, both online and on-campus students spend more time on class material and, most important, stay in class. Retention rates for both populations have increased an average of 10 percent.

## Text

*Essential Cosmic Perspective*, 5e, Jeffrey O. Bennett, Megan Donahue, Nicholas Schneider, Mark Voit

## Implementation

Both Astronomy 10 and Astronomy 20 are lecture/discussion courses with class sizes of approximately 50 students, and either held on campus in a planetarium or offered completely online with no required meetings. Neither have prerequisites, both qualify for general education credit in physical sciences, and both are typically taken in the first or second semester of a student's freshman year. Astronomy is one of the top two classes taken at Chabot College by nonmajors interested in transfer. Approximately 20–25 percent of students in the course also take remedial courses in mathematics and English, and a similar population of students are ESL students. Reading skills for some students are significantly limited.

Online homework assignments include a wide variety of MasteringAstronomy resources in an attempt to provide for our students' diverse learning styles. They're designed to last one hour or less, based on MasteringAstronomy's average student time statistics, and include ranking tasks, visual quizzes, tutorial problems, and animated tutorials. Assignments include five to eight questions, plus extra credit opportunities. The animated tutorials are typically allocated more credit as each takes between 10–15 minutes. I also include relevant media links in the assignments. Students are encouraged to suggest additional clips that they think may enhance the assigned questions. Students are not penalized for opening hints in the skill-building and self-paced tutorial questions, and they are given multiple chances at correct answers for every question.

Online reading quizzes for each chapter of our book are created from the available testbank questions and are offered with two chances at each question. Quizzes have 20–25 questions and are designed to take 30–45 minutes. All MasteringAstronomy

assignments are available 24/7, and have relatively gentle late penalties to encourage students to learn—even if they aren't able to complete the work by the deadlines.

Gradebook statistics for homework assignments are used in two ways.

1. I review the results on the day the assignment is due, and problems that have been missed most often, and/or reveal common misconceptions, are then clarified in lecture. I show the statistics to the students (without names) to reinforce that many in a class often make similar mistakes.
2. I use the results to modify the questions—add feedback, hints, or clarifying messages using MasteringAstronomy's editor—for assignment in subsequent semesters.

## Assessments

Students are graded on four elements: online homework, online reading quizzes for each chapter of the textbook, weekly participation discussion/research assignments, and two essay exams. The online homework and reading quizzes are required and administered with MasteringAstronomy.

## Results and Data

Since I've used MasteringAstronomy, I've increased both the length of online homework assignments and the breadth of questions selected for those assignments in response to students' comments that these resources help them learn. Students are definitely working harder, spending more time on their homework and on the quizzes, in addition to the weekly discussion topics. Before using MasteringAstronomy, I used class time for reading quizzes in the on-campus classes, had shorter homework assignments, and assigned animated tutorials on an "all or nothing" credit basis. Now, I have more time for lecture and discussion, have the students doing even more work engaging in key concepts, and have a better sense of what

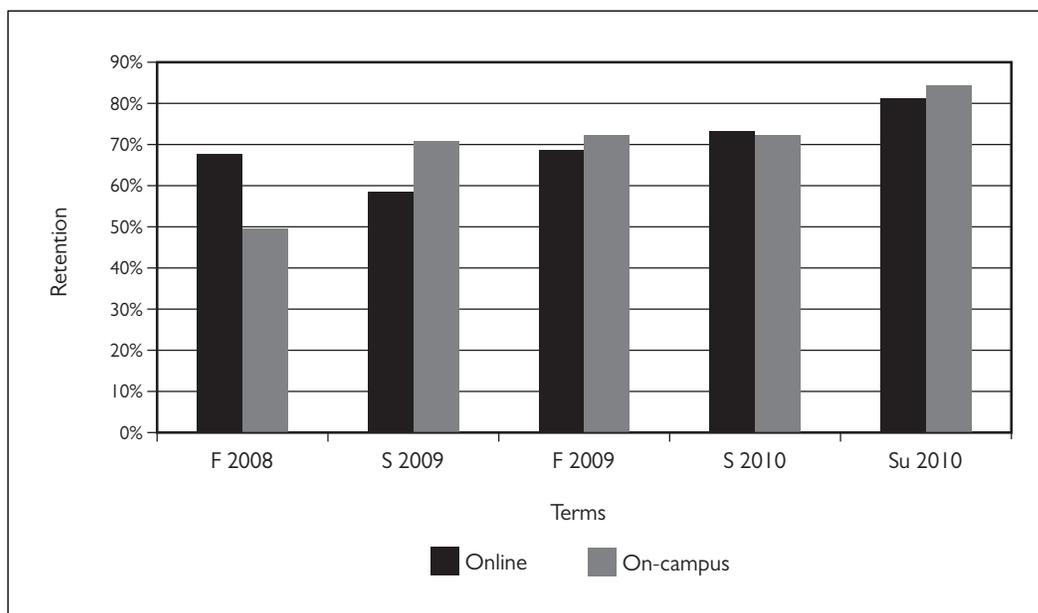


Figure 1. Average Astronomy 10 and Astronomy 20 Online and On-campus Retention Rates, Fall 2008–Summer 2010

they still don't understand through analysis of the program's statistics. Course completion rates (retention rates) in both my online and on-campus classes have increased approximately 10 percent (see figure 1).

### The Student Experience

- *“Fun! These interactive tutorials are very helpful.”*
- *“The tutorials are interesting and I like doing them. I would rather do them than just read and study the book. They add another level to learning Astronomy and I think they are something that should continue to be used.”*
- *“The explanations after solving each question are very useful!”*
- *“The hints are very useful [to coach me] step-by-step [on] how to approach [problems] and help guide me to get the correct answer.”*

### Conclusion

Students in both on-campus and online classes report that the animated tutorials tracked and scored in MasteringAstronomy are the single most effective media resources they use in the class, and that they like those resources even more than they do lectures. Students say that they routinely share the tutorials with friends and family members as they complete the weekly discussion assignments.

Students also report that having two attempts at quiz-question answers helps them to focus on learning by removing much of the stress of a traditional on-campus quiz. They spend time on the quizzes (averaging about 40–50 minutes based on MasteringAstronomy's usage statistics), undoubtedly in open-book mode searching for answers.

Any learning tool that students use and appreciate, that engages them in science outside of the classroom, and that provides me with one-click insight into their learning and misconceptions is a tool I'll continue to use.

*Submitted by Scott Hildreth  
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