

Maximizing Student – and Teacher! – Success with Online HW Systems

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Online Homework systems provide some clear and immediate benefits to our students, in terms of accessibility, immediate feedback, and supportive pedagogy. And equally we as teachers can gain tremendously from using the system's immediate diagnostic feedback, learning how our students have done, what they have missed, and often why they have made errors. But another set of very significant benefits are available when using the system over multiple terms, as we can use the diagnostics and feedback from prior classes to tune and improve assignments, and demonstrably enhance student learning.

I have used **Mastering Physics** and **Mastering Astronomy** for 7 years now, for general education classes in astronomy, as well as introductory science courses and science/engineering majors in physics. I've found its incorporation into my physics classes to be the single best pedagogical change I've implemented in 23 years of teaching. It has been equally useful in my general education classes in Astronomy, delivering increasingly effective and relevant visual content for students with decreasing skills in reading comprehension that seem to make traditional textbooks even less useful.

I have evolved over that time frame to use the online system for much more than just a homework delivery/scoring tool, and have found applications of the tool into lecture, collaborative group work, remediation, and exam preparation each to offer significant short-term benefits we can enjoy immediately. And the availability of the system, and the student diagnostic data, also allows for longer-term comparison studies that are easy to create, and that provide very rich ground for ideas to grow about how we might improve student success.

Short-Term Success:

- Using the diagnostics to know what to review, and why, for students in (almost) real time. (Physics & Astronomy)
 - Show diagnostics in the lecture (hiding student score/time)
- Using the system in discussion/recitation sections for “group work” (Physics)
 - Group students into teams of 3-4 max.
 - Have one student sign in with their account; entire student team does problems together on one computer.
 - Record team names (paper form, email, or automated feedback)
 - Enter score for other students in team (manually)
- Using the system for collaborative exam review in class. (Physics & Astronomy)
 - Group students into teams.
 - Set assignment time limit (10 or 20 minutes per “round; perhaps 5-10 problems)
 - Show summary diagnostics as they go
- Lecture problems that allow me to demonstrate systems shortcuts (Physics)
- Using the system for Remediation/Extended learning for select students (Physics)

Longer Term Success:

- Using the diagnostics to compare homework, quiz, and exam scores, and focus attention on particular students and on successful student study habits.
 - Caveat: Correlation does not imply causality
 - But correlation can show to the rest of class study techniques that seem to help other students succeed.
- Using the diagnostics from term to term to identify concepts and problems that seemed most difficult for students, and then attempt to enhance student success in later terms by **adding messages, adding hints, or editing the problems.**
- Link in video clips from Khan Academy or other sources, either with messages (using HTML) or into the problem introduction or parts (with Simple Editor)

Other tips:

- Get a **sample student account** set up for your course (with e-book option)
 - Share it with students in syllabus, so that they can try the system and download any necessary plug-ins at the very start of class.
 - Allow students waiting to purchase their book/access code to look at the problems (but not submit for credit)
 - Use it to see exactly what students see in terms of grades and assignments
 - Use it to diagnose claimed system problems from a students' point of view.
 - "Suspend" the account after first few weeks of class.
- Add colleagues with mastering accounts as "TA's" to your course so you can share assignments easily (and provide or ask for help!)
- Network with other users for ideas about how to use the system for your particular courses and teaching styles.
 - Team of faculty colleagues provide honest ideas that they have used
 - Lots of different schools, class sizes, approaches, represented.

Website: <http://www.chabotcollege.edu/faculty/shildreth/mastering>

(Astronomy) Sample userid: chabotastro20 Sample password: spring2013

(Physics) Sample userid: physics4bstudents Sample password: spring2013

Questions/Comments/Ideas? Please email me anytime at shildreth@chabotcollege.edu