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Meeting students where they are and freeing up instructor time with OWL

Associate Professor Dan Moriarty has been teaching Chemistry and Biochemistry at Siena College since 2002, and has been the department chair for two years. In addition to upper-division biochemistry courses and a hybrid biochemistry/analytical lab, he also teaches General Chemistry I and II. As an instructor, Dan finds that the biggest challenges he and his General Chemistry students face revolve around math anxiety, student engagement (especially for the students who don't need as much algebra review), and balancing his teaching workload.

COURSES AND PARTICIPANTS

With the exception of a special section created specifically for chemistry and biochemistry majors, most of the students taking the General Chemistry course are non-majors. The department usually offers six sections of the General Chemistry class per semester—all on campus—with the first semester (General Chemistry I) enrolling between 160 and 190 students, and the second semester (General Chemistry II) enrolling a little less, between 130 and 150. Because the students come from a wide array of backgrounds and disciplines, their foundational math and science skills vary considerably.

THE CHALLENGES

They're two of the biggest challenges faced in lower-division science classes: math anxiety and math preparedness. And Dan's classes are no different. Many of his students exhibit a real fear of math and do not have the confidence in their ability to cancel out their units or do algebraic manipulations. "And that, more than anything else, ends up being a real problem for them, and it really ends up hurting them." Because non-majors from a wide variety of backgrounds and skill levels take his General Chemistry courses, Dan has also noticed a wide spectrum of math preparedness. "Some students," he says, "end up being completely bored in the class because we're having to go over a bunch of different examples—they only needed to see it once and they got it. [Other students] see it five times and they still don't get it. So there is a real wide range in my class—and that's not just my class." For Dan himself, one of the biggest challenges is balancing his workload and keeping up with grading so that he can return graded assignments to students early enough to maximize the benefit to them in their studies.



CHALLENGES

- **Many students are math-phobic generally** and weak in algebra skills specifically.
- **A wide variety of math skills levels** makes it difficult to keep all students engaged.
- **Instructors struggle to balance workload** and keep up with grading.

SOLUTIONS

- OWL with Cengage YouBook
- Kotz, John C., Paul M. Treichel, and John Townsend, *Chemistry and Chemical Reactivity*, 8th Edition

RESULTS

- **OWL gives students instant feedback**, giving them the comfort of moving at their own pace and allowing them to home in on the areas in which they need the most review.
- **OWL meets students where they are, regardless of their skill level**, so students can move easily through the skills and concepts they've already mastered and focus on the areas that are more engaging and challenging for them.
- **Automatic grading frees up instructors' time** so they can concentrate on what they do best: teach.

“With OWL, instead of waiting up to a week to see if students got the correct answer on a problem, they can immediately see their results and either move forward or see where they got it wrong and be able to correct it. I think those are two very powerful tools to have in their arsenal.”

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THE RESULTS

Dan has been using OWL for more than five years now and chose the textbook he’s using—Cengage Learning’s *Chemistry and Chemical Reactivity*, 8th Edition—based on the strength of OWL. For example, he appreciates that he can not only see each students’ work, but see what they submitted, how long it took them to submit any given answer, how many times they submitted an answer before getting it right, and a comparison of their scores with the national average. Another great benefit is OWL’s automatic feedback. “The idea of the instant feedback—that the students would work on a problem and that they would know right away whether they got it or they didn’t, and that there would be a way for them to see what went wrong and go back and do it again—that was a really big deal for me,” Dan says. Students say they like the instant feedback too, and the vast majority of students say that OWL has been either very helpful or at least somewhat helpful to them. Dan thinks this is due to the fact that he makes OWL count. “Their OWL grade is 15% of their overall [grade],” he says. “After every exam, I will put up a chart that shows a graph of exam scores versus OWL scores.... There is a very wide continuum of what you’ll score on your exam if you have a 90 or above on OWL. What you will *almost never* see is someone scoring very high on an exam and scoring very poorly on OWL.” Another benefit of OWL is its self-paced nature. “It allows the students to do it at their own pace,” says Dan, “and it allows them to do it whenever they want. But it still puts a deadline on them.”

Finally, Dan notes the way he’s been able to balance his workload with OWL. “It [allows] me to, in a very short period of time, set up a way for the students to check themselves and check on their progress...with a particular topic.” He also appreciates the way OWL grades automatically and flows directly to his grade book. “I didn’t have to sit down and grade the homework, so that freed me up to do other things.”

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