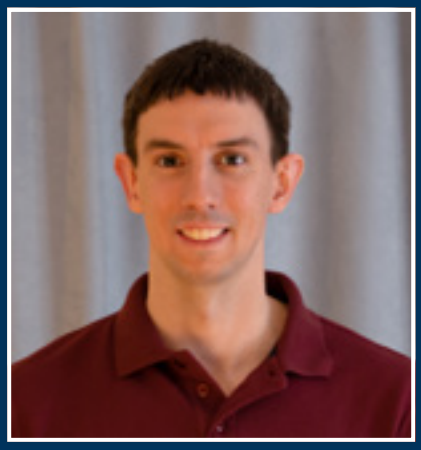

CHALLENGES

- **Maintaining assessment consistency** across sections is difficult given the potential grading variations of 20+ general chemistry teaching assistants.
- **Lab preparedness and safety are jeopardized** when paper pre-labs are used year after year, offering opportunities for students to copy answers.
- **Some students are not up-to-speed on the mathematics** required in chemistry.

SOLUTIONS

- LabSkills PreLabs for General Chemistry offered in OWL (Online Web Learning), a leading online learning system

RESULTS

- **Automatic grading of LabSkills exercises** assures grading consistency across all sections.
- **LabSkills PreLabs for General Chemistry engages students with interactive** demonstrations, practice exercises, and quizzes that help them prepare for "live" labs by becoming familiar with instruments, safety procedures, and techniques. Randomized questions ensure that students do their own work.
- **Problem-specific feedback allows students to get one-on-one assistance that improves understanding** of concepts, skills, and mathematical calculations. Ability to repeatedly try problems answered incorrectly provides skill-building practice.

SUCCESS STORY

Colin Henck, M.S.

Undergraduate Laboratory Coordinator, Chemistry — University at Albany, SUNY

LabSkills PreLabs for General Chemistry Offer Students a Virtual Experience

Some students can't define "column chromatography" or "titration," let alone know how to demonstrate them, but they're everyday terms to Colin Henck. Colin oversees the general and organic chemistry teaching labs at University at Albany (UAlbany), State University of New York, where he has worked since 2005. This year, chemistry students take the online LabSkills PreLabs for General Chemistry course to familiarize themselves with what they'll be doing in "live" labs. Offered in OWL, a leading online learning system for chemistry, LabSkills consists of hundreds of interactive resources that contain all the common techniques, instruments, calculations, and safety advice for general and organic chemistry. According to Colin, LabSkills has made a big difference in students' preparedness in terms of understanding how to conduct experiments and doing the necessary mathematics.

COURSES AND PARTICIPANTS

The chemistry labs accommodate more than 1200 students each semester. The vast majority are traditional students — biology majors — who take chemistry as a requirement. Many experiments can be dangerous, and Colin was attracted to the LabSkills virtual format that allows students to safely become familiar with procedures before attempting the real experiments. If they don't complete the pre-lab exercises (including a safety quiz) prior to the lab, they are not allowed to perform the experiments, although there is an opportunity to make it up.

"Our Cengage Learning support team was very helpful in getting LabSkills set up," says Colin. "I was nervous that there would be glitches, but there has not been a single example of the system grading a student's response inaccurately."

THE CHALLENGES

As coordinator, one of Colin's major responsibilities is to assure consistency — in instructional delivery, instructional content, and grading — across 40 general chemistry sections and 25 organic chemistry sections each term, all of which are taught by different teaching assistants (TAs).

Students' lab preparedness is also an ongoing concern. Previously, pre-lab exercises were on paper, and Colin couldn't be certain if students worked on their own. "We used the same paper pre-labs year after year and some students may have just copied answers. Those students would get absolutely nothing out of the exercises," he says. Safety issues aside, some students also struggle with mathematical preparedness, and calculations play a significant role in chemistry.

"LabSkills has made a big difference in the students' preparedness for executing and understanding live lab experiments. Students are better prepared for setting up the experiments and performing the required math."

Colin Henck
Undergraduate Laboratory Coordinator, Chemistry,
University at Albany, SUNY

To learn more about this and other digital solutions provided by Cengage Learning, visit:

www.cengage.com/DiscoverDigital

THE RESULTS

With LabSkills PreLabs for General Chemistry, students enter the lab prepared and maximize the use of their time. "Reading about procedures is not as effective as actually doing them," says Colin. "It's one thing to read about titration, but it's another thing to be able to perform a virtual titration. Students get a lot out of being able to do an experiment virtually." LabSkills engages students with interactive demonstrations, practice exercises, and quizzes that help them get up to speed on key concepts and the mathematics used in the experiments. They learn about the science behind the labs, instruments, safety procedures, and techniques, and get feedback along the way. "The TAs tell me that LabSkills has made a big difference. Students know how to set up their experiments and they are better at the math," says Colin.

He continues, "LabSkills is efficient. We don't have TA office hours at 2 a.m., but students can use LabSkills at 2 a.m. and the computer can teach them. Some students may answer incorrectly the first time but they immediately obtain feedback. In my opinion if they are taking the time to learn how to solve the problem, then they are engaged in studying, and that's a good thing."

Randomized exercises assure that students do their own work, and performance has improved. "Every student's question is a little bit different, so there is little chance of copying. Students have to understand what they're doing," he says. "The detailed feedback on students' answers is not generic — it's specific to the values used in the randomized problem. We have found that this helps students tremendously in improving understanding. In addition, students can access all of their LabSkills work from previous experiments, try questions again, and receive feedback. It's a perfect way to study, and our students are good at studying. It's a skill that we teach them well."

For instructors, the LabSkills database includes thousands of questions. "Customization is important because everybody does their labs differently; for instance, we don't always use the same equipment," says Colin. "You can fit LabSkills to your lab manual exactly."

Automatic grading streamlines the teaching and assessment process for Colin and the teaching assistants, and assures consistency across all sections. "There is no grading bias. Instructors can set up the number of attempts allowed when students get a wrong answer — I allow eight. The total possible points that a student can get is the same in all 40 general chemistry sections. Having that consistency is helpful in a large university like this."

Students evidently see the benefits of virtual LabSkills PreLabs. Says Colin, "In the first few weeks, some students don't take the safety quiz seriously, and get annoyed when we don't allow them into the lab if they fail to take or pass the safety quiz. Despite the strict deadlines, 80% of the 800 students we surveyed last year said that they liked LabSkills and thought it was beneficial. That's an impressive score."

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