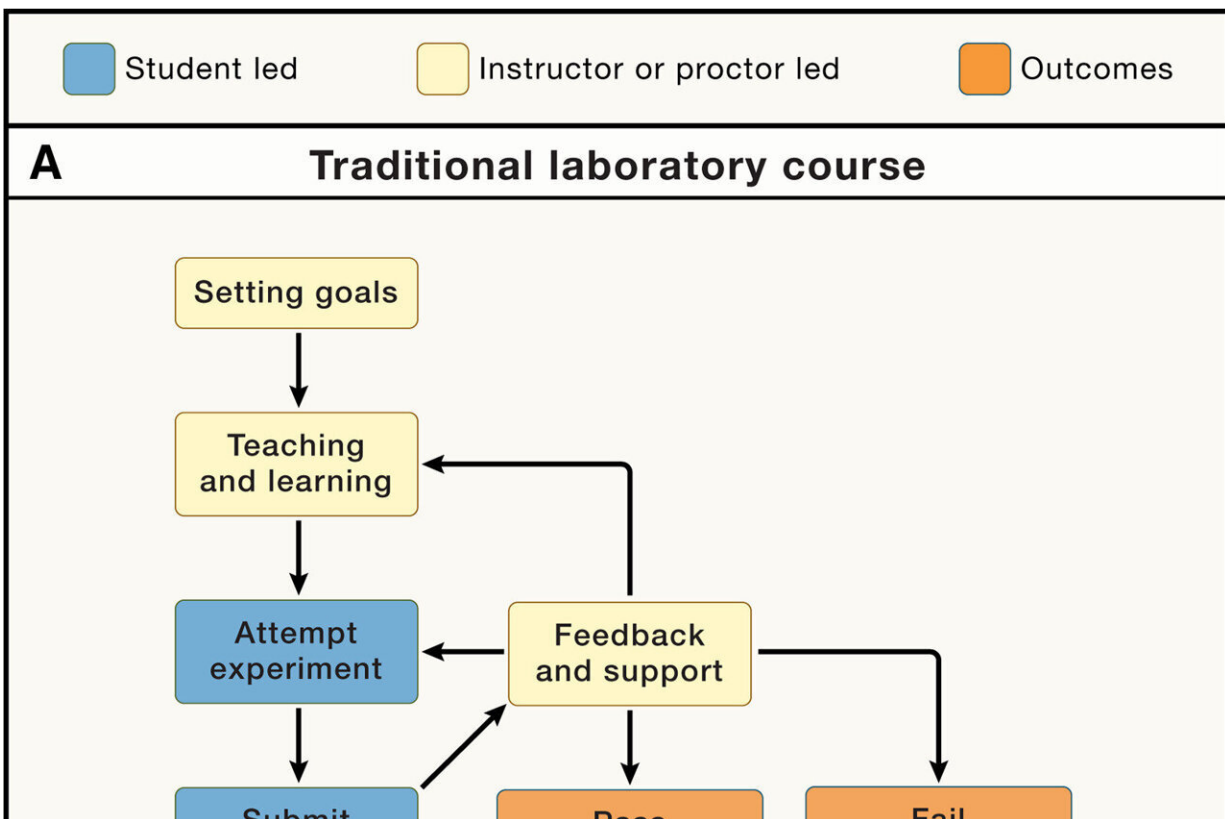


# Scientists help students vanquish a Catch-22 in acquiring research experience

June 11 2024, by Rachel Sauer



The conceptual workflow of a traditional laboratory course compared with the MCDB SkillsCenter course. Credit: *Cell* (2024). DOI: 10.1016/j.cell.2024.04.017

In a new [publication](#), in the journal *Cell*, CU Boulder scientists detail how the SkillsCenter allows students to gain credentials in basic to advanced research skills

It's an unfortunate truth of higher education that students are not exempt from a classic Catch-22: You need research experience to gain research experience.

"Undergraduates participating in research is a key variable for enhancing their persistence in STEM professions," explains Zachary Hazlett, a Ph.D. candidate in the University of Colorado Boulder Department of Molecular, Cellular and Developmental Biology. "But to gain access to opportunities in research is not the most straightforward. For a lot of students, these things aren't baked into their undergraduate degree plan."

So, students seeking research-focused internships, jobs or higher education opportunities after graduation are often inconsistently prepared with the necessary skills and experience. Hence, the SkillsCenter.

As detailed in *Cell* the SkillsCenter is a modular research skills training course that allows students to "gain training and micro-credentials in the laboratory skills of their choosing."

In other words, Hazlett says, "What if there was a bridge, something between the classroom and these research spaces that can allow students to gain that necessary experience? That can help equip them to enter those spaces both confidently and competently?"

## **Module-based curriculum**

The SkillsCenter, which is open to students of every major, emerged, in part, from a recognition that [undergraduate students](#) have often gained research experiences "by cold-calling faculty members and saying, 'I'd like to work in research, are there any opportunities in your lab?'" Hazlett says.

Understandably, faculty often ask what their previous experience is, and if a student doesn't have any, they have to hope they'll get lucky and find a faculty member willing to teach them.

So, faculty and graduate students in the Department of Molecular, Cellular and Developmental Biology, led by Professor Michael Stowell, began researching and discussing alternative means by which undergraduate students could gain the training and experience they need to gain these critical professional development opportunities.

Based on the principle of "learning by doing," they designed a module-based curriculum in which modules are scaled by skill level, with appropriate prerequisites, and students can learn at their own self-directed pace.

In fall 2021, the first 10 students enrolled in the for-credit SkillsCenter course, working through skills such as lab safety, pipette operation and calibration, centrifugation, buffers and stocks preparation, autoclave sterilization and more.

Today, the course offers training in the laboratory basics as well as advanced training techniques such as polymerase chain reaction, protein expression and purification and various forms of microscopy.

"The course has been designed very carefully," Hazlett says. "We've done our best to build a laboratory space that mimics a traditional research space. Students working in the SkillsCenter gain the experience

of what it would be like to be a member of a laboratory research group—in charge of maintaining their space, scheduling equipment, restocking materials, etc.

"The training modules themselves mimic something a trainee would encounter, with resources to help them and guide them in their conceptual understanding and procedural competence."

Lab proctors—who are the course instructor, graduate students in the department and a number of undergraduate students who previously took the course—provide on- and off-site guidance for students and assess their work.

## **Learning the scientific process**

Through six semesters, SkillsCenter has grown and evolved from the original 10 students to nearly 100 per semester. The lab space is now open from 9 a.m. to 5 p.m. Monday through Friday thanks to increased staffing, and students can work on their modules when their schedule allows.

"It is very important that we have trained lab proctors, and that we instruct our students very carefully on how to engage in this course," Hazlett says. "Students are instructed that they are responsible for seeking out the resources and guidance they need, and we make sure they know how to access the supports they need."

Each module requires a certain number of tasks that students complete and submit to proctors for review. Proctors monitor students' work through each module, give feedback and assess their progress through the scientific process—from hypothesis through notes and observations to interpretation of results.

After completing a module and passing all its required tasks, students receive a certificate for each skill, "so they can collect these certificates and put those skills on their resumes," Hazlett says, adding that he and his colleagues are working with ORCID and digital badge organizations to create digital credentials that students can display to future employers.

"We also want to embed students' raw data into those badges, so if an employer wants proof of their skills, they have direct evidence of students' technical proficiencies."

Hazlett and his colleagues also are building a network of industry and academic research lab partners to "create an ecosystem for training STEM students. Many students often excitedly explain to me how they have convinced faculty researchers to let them join their labs because of the experiences they have gained in the SkillsCenter."

**More information:** Zachary Hazlett et al, The SkillsCenter: Creating scalable research opportunities for STEM students, *Cell* (2024). [DOI: 10.1016/j.cell.2024.04.017](https://doi.org/10.1016/j.cell.2024.04.017)

Provided by University of Colorado at Boulder

Citation: Scientists help students vanquish a Catch-22 in acquiring research experience (2024, June 11) retrieved 21 June 2024 from <https://phys.org/news/2024-06-scientists-students-vanquish.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--