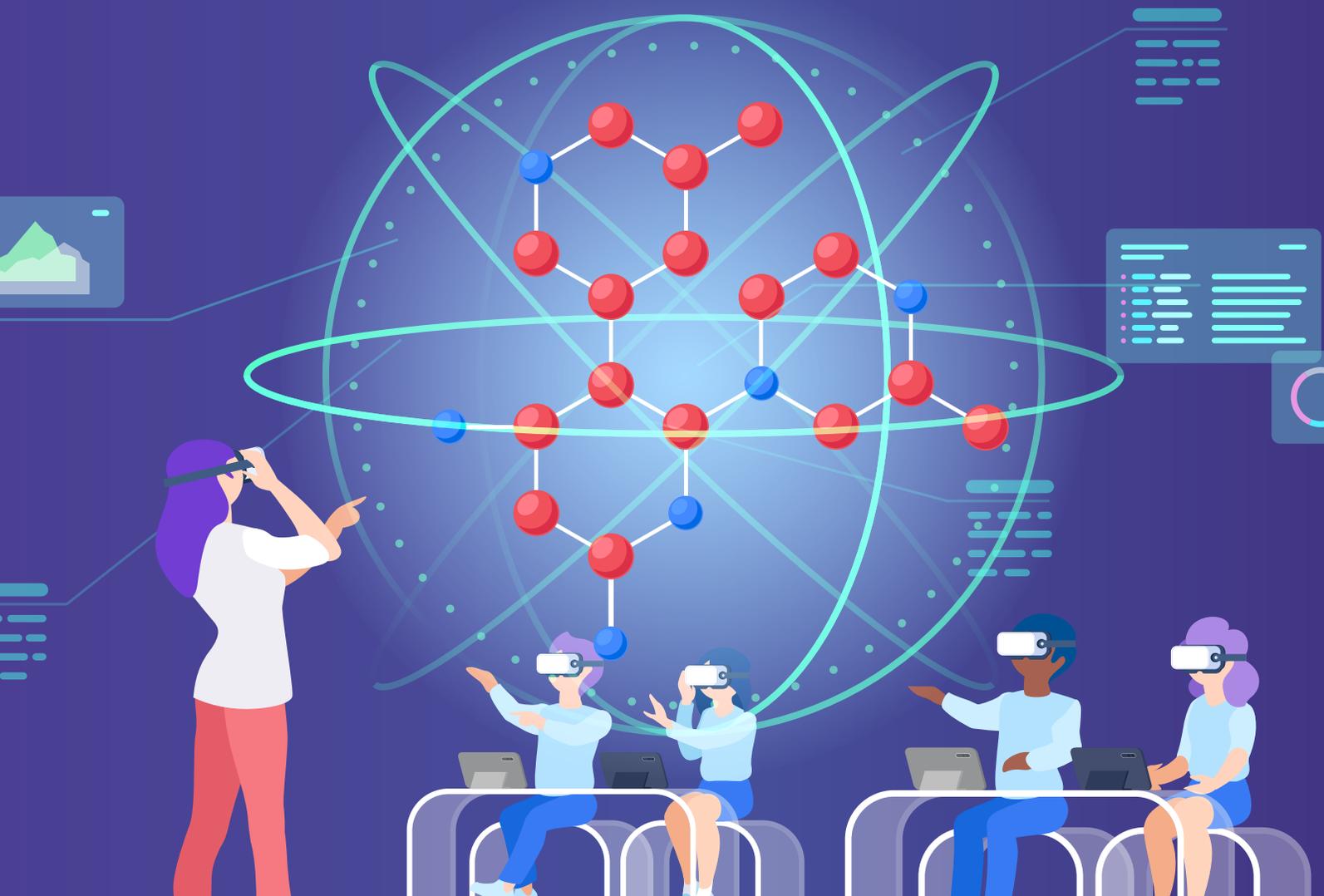


Explorelearning®

# The What, How, and Why of Virtual Labs and Simulations



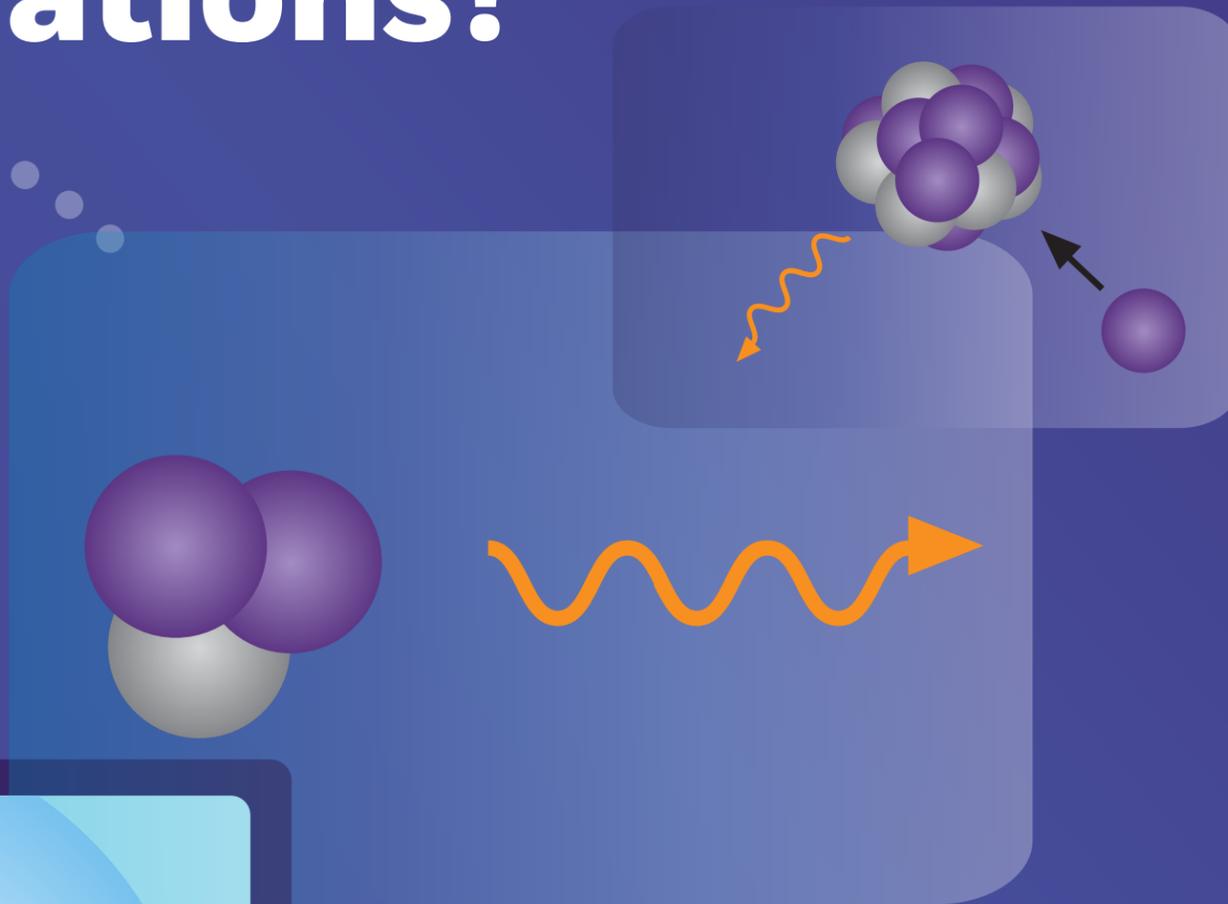
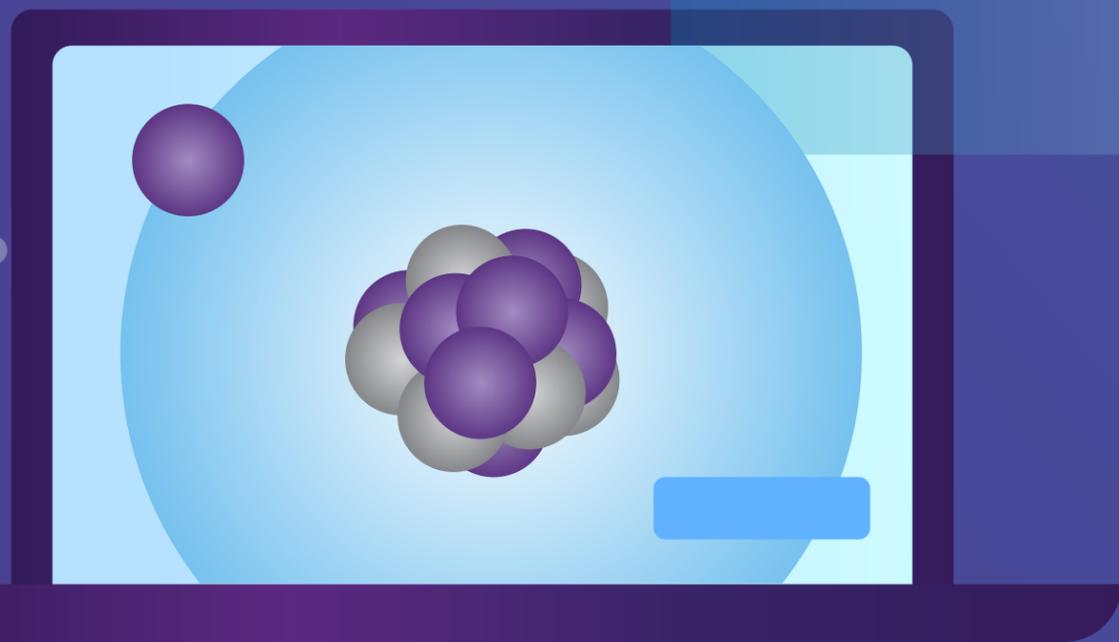
# What are virtual labs/simulations?

**In the broadest terms, virtual labs are on-screen or online simulators that help test ideas and observe results.** Researchers and students alike use them to perform experiments to either study a variety of outcomes, or to obtain a desired result.

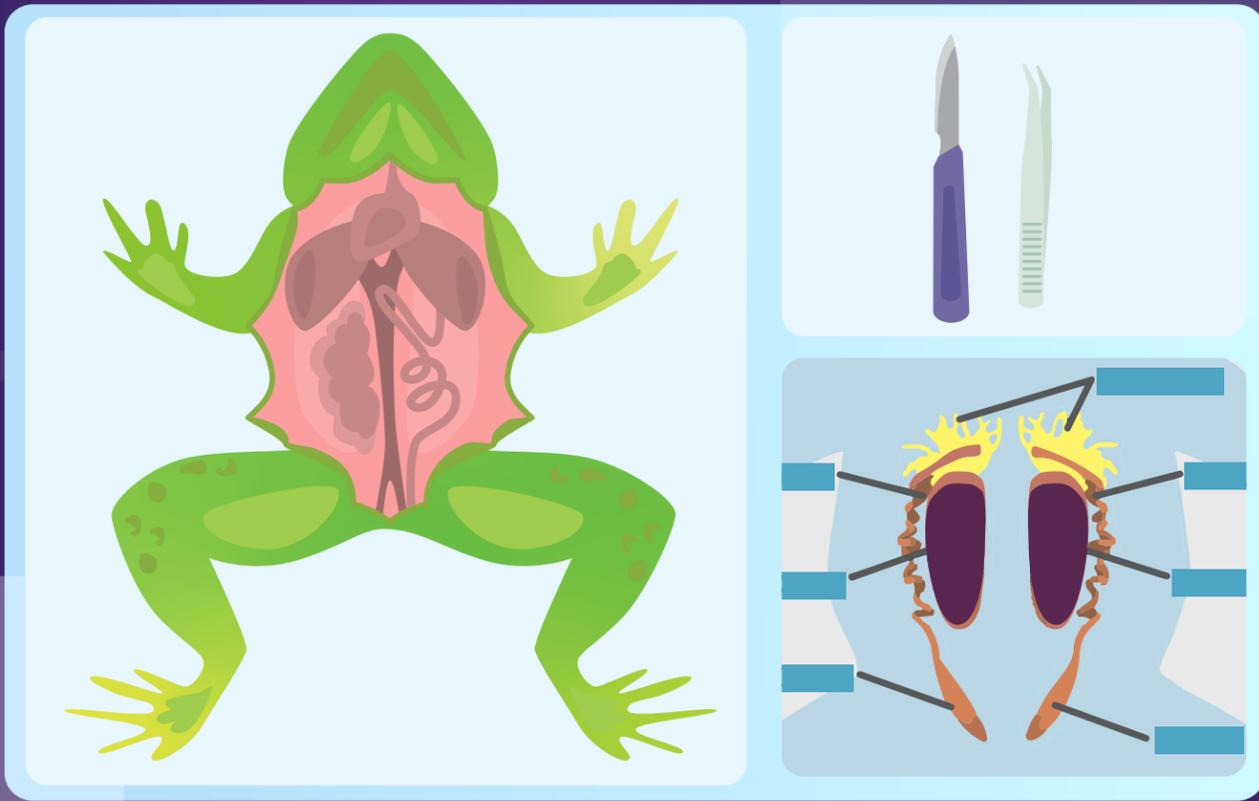
There are many kinds of virtual labs, which range from simple video animations with limited interaction and variables, to 3D experiences that recreate as much of a physical experience as possible on screen.

Results of experiments done through virtual labs can be saved, compiled, and studied to see how and why the results came out as they did.

In education, virtual labs present a viable alternative to physical labs—they require no dedicated space or expensive (or dangerous) chemicals and equipment. Experiments can be run as many times as necessary for students to develop conceptual understanding of the topic, and to answer the questions posed by the instructor. These simulations can be teacher-led, used completely independently, or implemented in a hybrid model. And most only require internet access and a subscription to the product to use.

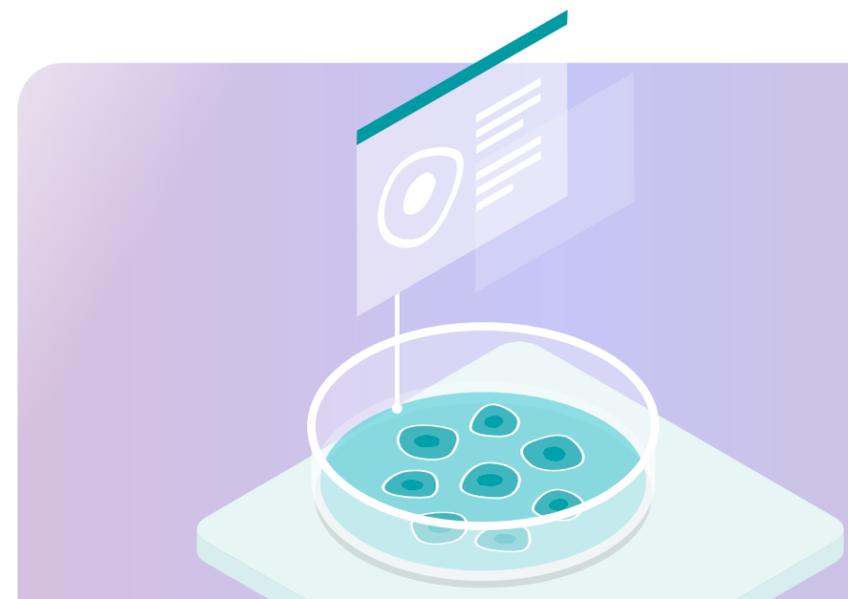


# How virtual labs work



**Virtual labs are a flexible way for teachers to introduce students to a variety of topics and concepts. While they can—and often do—take the place of a traditional lab, virtual labs can also be used to enhance instruction.**

- **As pre-lab exercises.** Before undertaking an actual experiment, students can learn about the equipment, processes, and safety measures through a virtual lab—cutting down on physical lab time and the potential for damage or injury.
- **As visual aids.** Virtual labs can help students understand complex concepts and to “picture” things like atoms, DNA strands, and electrical currents.
- **To refresh knowledge or reinforce concepts.** Virtual labs can help students reflect on and remember previous material and pave the way for new learning. Taking students through a virtual lab can show teachers what students have retained and if they are ready to continue exploring a topic.
- **To check knowledge.** Performance on a virtual lab experiment can show teachers if students really understand a topic.
- **To prepare students for online assessments and further online learning.** Digital literacy is becoming more and more important as more state assessments move online, and online education becomes more and more commonplace.
- **As a replacement for traditional lab work.** Whether it is a lack of space, equipment, or time, virtual labs can indeed take the place of traditional labs entirely. They can also give students experience in exploring topics that are impossible to recreate in physical labs—nuclear reactions or evolution, for example.



# Why virtual labs?



**Virtual labs can offer educational experiences that are simply not possible, or are prohibitive, in traditional classroom settings. Virtual labs offer:**

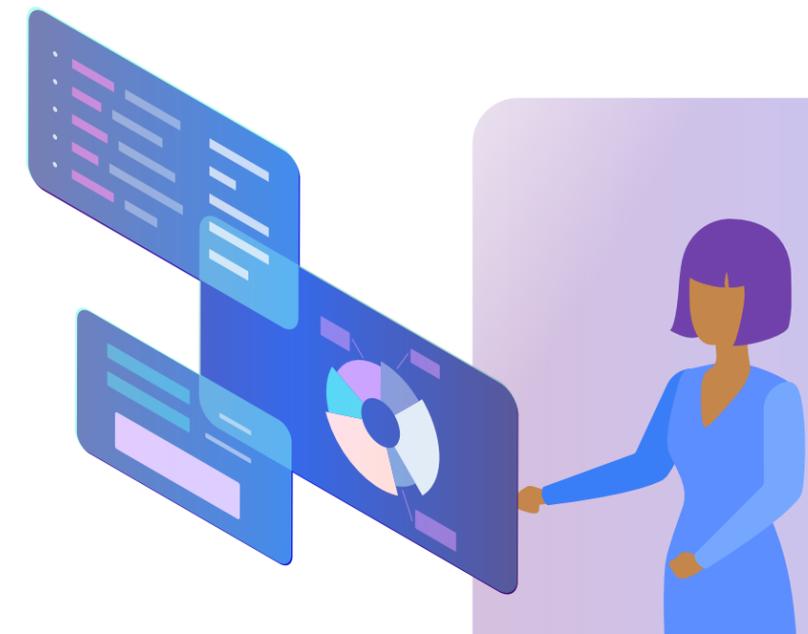
**Flexibility.** Students, teachers, and schools are not bound by schedules or physical locations when using virtual labs. They can be accessed anywhere with an internet connection and completed at times that work best for students and teachers.

**Safety.** With virtual labs there is no need for costly equipment or potentially dangerous chemicals. In a virtual lab students can't injure themselves or others, or break equipment. And the best virtual labs show students how equipment can be used properly—setting them up for safety and success when and if they are in a traditional lab.

**The ability to try, fail, and try again.** It doesn't matter, except in time, whether a student runs an experiment one time or 20 to get the desired result. With each experiment, students can manipulate variables, run the experiment, and immediately see the results. And with each experiment, students learn more about the concept being studied and the scientific method in general.

**Immediate feedback.** And whether a student grasps a concept immediately or is struggling mightily, teachers will know. With the ability to monitor what students do every step of the way—instead of just seeing the end result—teachers can guide students appropriately.

**A level playing field.** With the flexibility and ability to try as many times as necessary to succeed offered by virtual labs, struggling students can catch up to their classmates in their own time and in their own way. No one is the last one in class trying to get the “right answer,” Teachers can intervene as much or as little as necessary, and results can be studied along the way to see how instruction can be improved or changed for a student.





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