

**SOME CREATIVE WAYS TO TEACH BIOLOGY WITHOUT LECTURES**

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**Abstract:** In the world of modern education, technology integration has become a critical element in improving the quality of learning. Current technological developments require teachers to be able to create effective and efficient learning by integrating technology into teaching. Teachers are no longer limited to traditional teaching methods; instead, they can use various technological tools such as computers, smartphones, and virtual reality devices to deepen students' understanding of the course material. Technology integration is not just about adding technological elements to the curriculum, but also a profound transformation in the way students learn and teachers teach.

**Keywords:** teaching method, higher education, encourage participation, integrating technology

Finding new ways to teach a biology course to 20 or even 200 students can be exhausting, and the subject can feel inaccessible to students, especially when lecturing is the primary teaching method. You don't have to toss lectures, but you can incorporate other creative ways to engage your students [2]. We've identified eight ways to make your biology teaching life in high school or higher education more manageable and fun, whether you're teaching biology online or in person!

*Use interactive visuals:* Interactive visuals can bring otherwise complex concepts to life for a biology student. A study by Learning From Science News found that people had an easier time

digesting and engaging with information when visualizing it. “The possibility to access information through clicking, sliding, or zooming-in might provide a more direct and personally meaningful experience of abstract phenomena and thus facilitate comprehension and learning”. One way to use these visuals is through bite-size 3D animation videos. Labster offers many of these, including this free biology animation on YouTube: “Antigen-Antibody Binding - Why are some blood types incompatible?”

*Learn through storylines:* Cognitive psychologist Jerome Bruner’s research suggests that people are 20 times more likely to remember facts if they’re part of a story. Stories are easy to remember because there’s context, and it’s fun. The ease of remembering and level of engagement is why all Labster’s simulations follow a storyline. It’s questionable what the best way to learn about evolution is, but learning with a storyline full of dogs has to be up there! In Labster's evolution simulation, “Evolution: Journey of the canids,” students follow the million-year evolutionary journey of a canid colony as they create random mutations in their DNA.

*Use polls to encourage participation:* The days of pure lecture are ending, as students require more chances to engage. Polling has many purposes, such as checking students’ understanding, breaking the ice at the beginning of class, and, most importantly, making it fun! Using polling can encourage a two-way conversation between instructors and students. Many free options include Poll Everywhere, Slido, and Google Forms [1].

*Relate biology to everyday life:* Biology topics relate to beauty, healthcare, clothing, fuel, and more. Sciencing.com says that biology permeates so many aspects of everyday life, so why not use these examples to teach? Labster's simulation, “Benedict’s Test for Simple Carbohydrates”, teaches students about the structure of simple carbohydrates and how they can test for the presence of simple sugars in food samples. This lab is relevant to students’ daily life who are interested in macromolecules and how they relate to nutrition.

*Utilize team-based learning:* With team-based learning (TBL), students can be introduced to concepts at home and be actively engaged in learning those concepts in class. They can team up to do simulations and answer quiz questions! Labster virtual labs are used with TBL to help students grasp the material and have fun.

*Do interesting experiments:* A biology lesson can be a hands-on experience. Doing interesting experiments can engage students and help them get excited about their learning. Students can extract DNA from fruit like a banana or strawberry, dissect a frog, or examine a fingerprint. Utilize anything that gets their brains going and helps them learn the material.

*Host a virtual field trip:* Virtual field trips allow students to go to environments they might not otherwise have access to, especially if you're online teaching. It’s not every day that students get to use zebras in their learning. With Labster's trophic levels simulation, “Trophic Levels: Grazer vs. predator.” Students will be able to explain the different chains within a food web and relate them to a trophic pyramid by safely guiding a zebra across a crocodile-filled river [3].

*Prep them for a career:* Biological science can help to prepare students for a future STEM career. It’d be helpful to let them pursue that interest by assigning material that aligns with it. Even if they

don't know what they're interested in yet as a future career path, you can help them explore options by aligning lessons with various careers. For example, perhaps your student is interested in pharmacology. Labster has a simulation, Counting Cells: Control the epidemic, where students work as pharmaceutical detectives to identify the link between a new drug and a recent epidemic.

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