

Tech Tools for Teachers: Bring Learning Alive! Simulations for the Classroom

The author introduces us to free online tools for teaching abstract concepts.

There are often concepts that can be very abstract and therefore difficult to teach. This is especially true when teaching certain science concepts. Students cannot physically see an atom's structure or that there are positive and negatively charged particles that create lightning. Is there a way that we can help our students understand this better in a more concrete way? Absolutely! There are many resources available online and the best part is that many of them are FREE! Today we will explore two excellent websites that can help bring learning alive.

But I'm not a science teacher...

There is a major push in education now to focus on test scores. In many districts, this means a magnifying lens hovers over literacy and math. Unfortunately, there are only so many hours in the day and that often means cutting other subjects like art, music, science, and social studies. To compensate, many teachers are forced to cover these subjects within their reading block as "non-

fiction reading." Students that struggle with reading are feeling cramped with even more time focusing on a subject that is already painfully difficult. Students get frustrated, teachers have to deal with behavior issues, other students do not receive the attention they deserve, and the consequences only continue.

Fortunately, there are ways for teachers to incorporate science in to the reading block without making it entirely text-based. The tools in this article do not only benefit science teachers but can be used in literacy, math, and social studies. These tools are interactive and exciting, and to top it off, this is a great way for (even very reluctant) teachers to easily incorporate technology into their lessons.

PHET Simulations

<https://phet.colorado.edu/en/simulations/category/new>

This free website with science and math simulations is a wonderful resource from the University of Colorado at Boulder. It's broken down into several science disciplines such as physics, biology, chemistry, and earth science, and a math section allows students to simulate a graphing calculator, build fractions from objects, and calculate area with an area builder (see Figure 1).



Figure 1: Here is a preview of one of the math simulations. As you can see, students can use a cake to create fractions using a real-world context.

Some simulations on the PHET website will work on PC/Mac only, while others are available for ChromeBooks and for iPads/tablets. From the link provided above, you can search for simulations by device (see the menu on the left side of the screen) to find those that will work on devices that have access only through a browser. In Figure 1, you will see two options for running the simulation: “Download” or “Run Now!” This particular

simulation is then available only on devices that run Java (a PC or Mac). As you can see in Figure 2, those that will run on a tablet or ChromeBook will give a third option in orange called “Run in HTML5.”

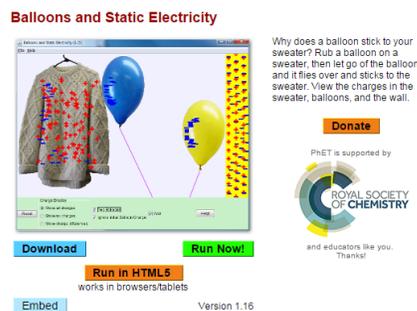


Figure 2: Some simulations give the option to run in HTML5, which means they are tablet and ChromeBook friendly.

CK-12 Simulations

<http://interactives.ck12.org/simulations/>

Another great resource for simulations is the CK-12 website. You will need a login to access the site, but it's free and you can sign in with another account such as Facebook, Twitter, Google, or Microsoft Live. If you do not have an account with one of those sites, you can create a new one with an email address.

Many of these simulations can tie into any subject as they use real-world problems to discuss science concepts. There are also simulations that focus on problem-solving. For example, Horse and Cart discusses

forces and motion. Students can change the angle of the cart, the mass of the horse, and the mass of the cart itself to see how those factors will work together and affect the speed at which the horse can travel. This could also be tied to a study about traditional ways of life or history of farming tactics. Students could also use this simulation to discuss how modern inventions have made our lives easier.

The real-world context of these simulations makes it easy to help students understand how science concepts are all around us. A lightning simulation (see Figure 3) shows how the charges in the clouds and ground come together and create a lightning bolt. It also shows how a lightning rod can reduce the impact of a strike to a building. When I have taught this concept, the students commented that they always wondered about the function of the rods on rooftops.



Figure 3: Lightning simulation.

Simulations can help students make sense of the world. The CK-12 simulations website can help students understand concepts as simple as how doorbells work to more complex means of designing roller coasters. Students can explore the science behind their favorite games like Angry Birds through a simulation called Projectile Motion that shows the relationship between the angle of a cannon and the speed/distance the projectile can travel.

Conclusion

PHET and CK-12 are just two examples of the many free online simulations that can be tied in with just about any subject. With many schools going 1:1 with ChromeBooks and iPads, it is helpful to find that many of the simulations found here can run through a web browser. Integrating technology is exciting for students and adds another dimension to learning. When our students are engaged and excited about learning, our jobs as teachers become more enjoyable.

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