**Simulations, online labs, apps:**

\*Be aware that some simulations presented in larger lists rely on older versions of programs, e.g. Flash, & will no longer run. Some are working on updating the simulations while others are not. Some of these are free while others require purchasing for a classroom.

**General**

Zooniverse

This is the only site on the list which allows anyone to contribute to **real** citizen science projects. Anyone with a computer (or phone) can contribute to real scientific research. The tasks require no prior knowledge or special skills, they provide you with a short tutorial. A nice casual introduction to research or for students with an interest in various STEM topics. Free.

<https://www.zooniverse.org/>

**K-12/K-12+**

STEMscopes

K-12 simulations, you will need to sign up to use them, but they do have lessons/curricula aligned to NGSS

<https://www.stemscopes.com/simulations/>

STEM Sims

K-12+, simulations of lab experiments & engineering design projects, lessons/curricula, you will need to sign up (15 day free trial)

<https://stemsims.com/>

Explore Learning – Gizmos, Reflex, Frax, Science4Us

Grades K-12, simulations for math & science, free sign up (although they do have more elaborate lesson plans, etc. available for a fee & the free Gizmos (grades 3 – 12) will change each semester), do align them to NGSS, math & science topics available

<https://www.explorelearning.com/>

The Concord Consortium

Free interactive STEM activities, K-12+, chemistry, earth & space science, math, physics, etc.

<https://learn.concord.org/>

**Varied ages**

Smithsonian Science Education Center

Free online & downloadable simulations, mostly K-middle school, frankly adorable

<https://ssec.si.edu/game-center>

They also have an online weather lab for grades 5 – 8.

<https://ssec.si.edu/weather-lab>

3M Young Scientist Lab

Free interactive for elementary – middle school, mostly focusing on designing something based on a challenge.

<https://www.youngscientistlab.com/teachers/interactives>

Java Lab

Free virtual simulations & labs. Range from about elementary school+. Physics, chemistry, biology, math, etc.

<https://javalab.org/en/>

LabXChange Library

Free, have lots of options, even experimental design option. Elementary school+, biology, physics, chemistry, math, etc. They have collected a lot of simulations done by the Concord Consortium, etc, so they’re all in one place.

<https://www.labxchange.org/library>

Stellarium

Free online planetarium-style software which allows you to see what the sky looks like any day, any time, any location. Does not come with activities. Good for most ages and family stargazing. They also have a phone app version, but it’s paid.

<https://stellarium-web.org/>

Line Rider

Free physics app based on energy & motion. Maximize a toboggan rider’s time.

<https://www.linerider.com/>

Chrome Music Lab

Create music & learn the science behind it – good for STEAM. Free.

<https://musiclab.chromeexperiments.com/Experiments>

Research Quest

Grades 6-8, free virtual museum research investigations. Mostly ecology/paleontology.

<https://researchquest.org/>

InqITS Virtual labs

Middle school+, physical science & life science virtual labs, not free (but has free trial)

<https://www.inqits.com/labs>

McGraw-Hill Virtual Labs

Upper middle school+, virtual labs in biology, chemistry, & physics, not free.

<https://www.mheducation.com/highered/virtual-labs/search>

NOAA

Online weather resources for middle – high school.

<https://www.weather.gov/owlie/science_kt>

General Chemistry Simulations

Free chemistry simulations, including an interactive periodic table. Middle school+.

<http://employees.oneonta.edu/viningwj/sims/>

The Physics Aviary

Free virtual physics labs, upper middle school+.

<https://sites.google.com/view/thephysicsaviary/all-labs>

The Science Bank

Online dissection resources, sorted by animal. Some free, some not.

<https://thesciencebank.org/pages/online-dissection-resources>

The Science bank also runs a lending library with models for dissections with various animals & organs available. Their aim is humane alternatives for science education.

<https://thesciencebank.org/index.php?route=information/information&information_id=7>

NOVA labs

Upper middle school+, looks to be free with a signup, various topics & educator guides available.

<https://www.pbs.org/wgbh/nova/labs/about/>

BioMan Biology

Free virtual biology labs, ~middle school, high school.

<https://www.biomanbio.com/index.html>

NCTM Illuminations

Free interactives, middle-high school, math

<https://illuminations.nctm.org/Games-Puzzles.aspx>

Pivot interactives

Not free ($5-$10/student/educational term), middle school – college, biology, earth & space science, chemistry, environmental science, physics, lab/simulation

<https://www.pivotinteractives.com/educators-and-students>

cK-12 Exploration Series

Free simulations of physics & chemistry topics, middle school/high school+.

Includes games based on the concepts.

<https://interactives.ck12.org/simulations/chemistry.html>

<https://interactives.ck12.org/simulations/physics.html>

NC BioNetwork

Lab safety tutorial, interactive, free

<https://www.ncbionetwork.org/iet/labsafety/>

PhET interactive simulations

Free online simulations suitable for middle school through college, possibly for elementary school with some adaptation. Subjects: Physics, Chemistry, Math, Earth science, Biology

<https://phet.colorado.edu/en/simulations/browse>

PrepMagic

Help with creating STEM content, lots of simulations, probably middle school/high school.

<https://www.prepmagic.com/>

Project Noah

Mostly based on nature. Publish your nature photos to learn about wildlife.

<https://www.projectnoah.org/>

Cell Homeostasis Virtual Lab

Free lab about cell homeostasis. It walks you through the steps.

<http://video.esc4.net/video/assets/Science/Biology/Gateway%20Resources/cell%20homeostasis%20virtual%20lab%20-%20activity/index.html>

The Biology Corner

Free interactive biology simulations & worksheets, include some lesson plans, etc. ~high school

<https://www.biologycorner.com/>

AACT (American Association of Chemistry Teachers)

Free chemistry simulations, high school+

<https://teachchemistry.org/classroom-resources/simulations>

Virtual Biology Lab (ETSU)

Free virtual biology labs, ~high school+.

<https://virtualbiologylab.org/site-map/>

Royal Society of Chemistry

They have an aspirin & titration simulation. Free

<https://virtual.edu.rsc.org/>

Mixed Reception

Free virtual murder mystery, appropriate for high school chemistry classes

<https://chemcollective.org/mr/index.php>

Codecademy

Free to sign up, classes have different pricing. Learn to code.

<https://www.codecademy.com/>

Learn.Genetics

Free high school/college labs & simulations for genetics, evolution, botany, neuroscience, ecology, etc.

<https://learn.genetics.utah.edu/>

Virtual Labs (NMSU)

Free, high school+, mostly chemistry/biology virtual labs.

<https://virtuallabs.nmsu.edu/index.php>

Chem Collective

High school+ free virtual chemistry labs

<https://chemcollective.org/vlabs>

Jon Darkow Sims

These are computational models for biology & ecology, probably high school/college+, free

<https://sites.google.com/site/biologydarkow/home?authuser=0>

PraxiLabs

Some labs available with the free account. Mostly high school/college, biology, chemistry, & physics.

<https://praxilabs.com/>

Central State U virtual labs collection

The Phet labs do appear here, but there are also collections of simulations, etc. in Merlot, etc. Physics, chemistry, biology, ecology, engineering, math, ~high school+

<http://www.centralstateopenlearning.org/virtual_labs.html>

Olabs

Free interactive simulations & labs/lab videos for high school, physics, chemistry, biology, math

<http://www.olabs.edu.in/>

HHMI BioInteractive

High school+ free virtual labs on a few topics in biology.

<https://www.biointeractive.org/classroom-resources?search=&f%5B0%5D=resource_type%3A17>

Biointeractive

High school+ videos & interactives, environmental science, microbiology, etc. They come with worksheets, etc. Free. Spanish dubs, etc. available.

<https://www.biointeractive.org/>

Labster

Not free: Do have simulations & free trial, highly rated. High school+

<https://www.labster.com/biology-virtual-labs/>

<https://www.labster.com/high-school-science/>

Pearson Interactive Labs

High school+ virtual biology labs, not free

<https://www.pearson.com/us/higher-education/products-services-teaching/learning-engagement-tools/PearsonInteractiveLabs.html>

New England Journal of Medicine – videos in clinical medicine

Videos showing clinical procedures. Probably more of use/interest to older students, but might be useful if a younger student expresses interest in medicine.

<https://www.nejm.org/multimedia/videos-in-clinical-medicine>

**Apps:**

\*Not all educational apps come with age ranges.

The Frog Dissection App, fairly cheap, educational discounts available.

<https://www.frogvirtualdissection.com/>

iPad Frog dissection, also fairly cheap

<https://apps.apple.com/us/app/frog-dissection/id377626675>

Graphing calculator X84

Mimics a TI 84, free

<https://apps.apple.com/us/app/graphing-calculator-x84/id1247828717>

Desmos Graphing Calculator

Free app that mimics a graphing calculator

<https://play.google.com/store/apps/details?id=com.desmos.calculator&hl=en_US&gl=US>

iNaturalist

Allows anyone to identify plants & animals, free

<https://play.google.com/store/apps/details?id=org.inaturalist.android&hl=en_US&gl=US>

App store preview - list

STEM apps for kids

<https://apps.apple.com/us/story/id1454330950>

NASA Visualization Explorer

For middle & high school, free, news about space exploration, earth & space science

<https://svs.gsfc.nasa.gov/nasaviz/>

NOVA Elements

App for exploring the periodic table, upper elementary school+

<https://www.commonsensemedia.org/app-reviews/nova-elements>

We Are Teachers

65+ best STEAM apps for home & classroom

<https://www.weareteachers.com/steam-apps/>

Lab4Physics

Turns your smartphone into a measuring device – accelerometer, speedometer, etc. Suitable for middle school+, free

<https://play.google.com/store/apps/details?id=com.lab4u.lab4physics&hl=en_US&gl=US>

The PocketLab

Free, turns your phone into a measuring device for acceleration, temperature, magnetic field, etc.

<https://play.google.com/store/apps/details?id=com.pocketlab.android&hl=en_US&gl=US>

Physics Lab

Experiments & simulations, interactive

<https://play.google.com/store/apps/details?id=com.civitas.quantumphysics&hl=en_US&gl=US>

Sky Tonight

Free stargazing app

<https://play.google.com/store/apps/details?id=com.vitotechnology.sky.tonight.map.star.walk>

EdTechReview

Best apps for chemistry students

<https://edtechreview.in/e-learning/4988-best-apps-for-learning-chemistry>

Geometry of Molecules

Best apps for chemistry students

<https://geometryofmolecules.com/best-chemistry-apps-for-android-and-iphone/>

Educational App Store

Best apps for chemistry, biology, physics, astronomy, & math students, all ages, free or paid

<https://www.educationalappstore.com/app/category/chemistry-apps>

<https://www.educationalappstore.com/app/category/biology-apps>

<https://www.educationalappstore.com/app/category/physics-apps>

<https://www.educationalappstore.com/app/category/math-apps>

<https://www.educationalappstore.com/app/category/astronomy-apps>

<https://www.educationalappstore.com/app/category/anatomy-apps>

Educational Technology and Mobile Learning

Best chemistry apps for high school students

<https://www.educatorstechnology.com/2017/07/12-excellent-chemistry-apps-for-high.html>

**Collections of images or videos to supplement labs, includes dissection videos:**

Biologybyme

Biology videos, some dissections, etc. High school+

<https://www.youtube.com/user/Biologybyme/videos>

PBS Learning Media – Dissection videos for classroom use

Dissection videos organized by animal

<https://mass.pbslearningmedia.org/collection/dissection-videos-for-classroom-use/>

Anatomy Corner

Free - images made during dissections

<http://anatomycorner.com/main/image-gallery/>

Insides on the Outside

Dissection videos

<https://www.youtube.com/playlist?list=PL_hfIyUEz11wkzmoJpmx9H50tBm6pCIM5>

**General lab resources (curriculum):**

Lab-Aids

This company provides an entire NGSS-aligned science curriculum, middle school or high school, for up to a year’s worth of material for face-to-face classes.

<https://www.lab-aids.com/massachusetts>