

Online Data Collection Tools

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Simulations

Simulations can go far beyond the constraints of real-world equipment and settings, allowing students to collect data that would otherwise be unattainable.

Gizmos

www.explorellearning.com*

Interactive, inquiry-based simulations for grades 3 through 12. Gizmos covers a range of topics in science and math. Each simulation is supported with lesson materials, including a teacher guide, vocabulary sheet, student exploration sheet, assessment questions, and learning objectives. Gizmos are free for a 30-day trial period, after which they require registration and purchase. Without a subscription or trial period registration, each simulation is limited to a five-minute preview. Gizmos runs on a computer or portable device using Adobe Shockwave Player*.

Molecular Workbench

<http://mw.concord.org/modeler>*

Visual, interactive simulations that provide computational experiments for teaching and learning science. Simulation topics include physics, chemistry, biology, biotechnology, and nanotechnology. Embedded assessments provide real-time reports for teachers to track student learning progression. These simulations are free and run on the computer using Java.

NASA Online: Science Activities and Simulations

www.knowitall.org/nasa/simulations/science.html*

Science, math, and technology activities and simulations sponsored by NASA. These simulations are not open-ended or inquiry-based, but they can provide useful background knowledge to support an inquiry investigation. They are free and run on the computer using Adobe Flash Player*.

PhET Interactive Simulations

<http://phet.colorado.edu>*

Fun, interactive, research-based simulations of physical phenomena from the PhET project at the University of Colorado. Students in every grade, primary through adult education, can use the simulations to manipulate variables and perform experiments in physics, biology, chemistry, Earth science, and math. Each simulation is supported with teaching resources, sample learning goals, and downloadable teaching ideas. PhET simulations are free and do not require registration. They can be run on a computer or other electronic device, using Java, or downloaded and shared as a file.

Virtual Laboratories

Online virtual laboratories can provide access to scientific equipment that would be prohibitively expensive or otherwise inaccessible.

Froguts

<http://dissect.froguts.com>*

Virtual dissection site that provides realistic specimens for study. Virtual dissection tools are provided as well as step-by-step instructional guides. A demo version of the frog dissection is provided for free, but a yearly subscription is required for the fully functioning version. A subscription includes the frog, starfish, squid, fetal pig, owl pellet, cow's eye, Mendelian pea lab, and fruit fly lab.

Howard Hughes Medical Institute BioInteractive Virtual Labs

www.hhmi.org/biointeractive/vlabs*

Virtual laboratories that provide students with the equipment and instruction needed to perform experiments in biotechnology, DNA sequencing, cardiology, neurophysiology, and immunology. Although they are not open-ended or inquiry based, these virtual labs would provide useful background knowledge to support an inquiry investigation. They are free and run on the computer using Adobe Shockwave and Adobe Flash players.

Howard Hughes Medical Institute: Virtual Immunology Lab

www.hhmi.org/biointeractive/vlabs/immunology*

Virtual laboratory that provides the equipment needed for students to conduct an enzyme-linked immunosorbent assay (ELISA) test to help diagnose diseases caused by malfunctions of the immune system or by infections. It runs on the computer and does not require a plug-in.

University of Delaware: Virtual Compound Microscope

www.udel.edu/biology/ketcham/microscope/scope.html*

Virtual compound microscope that allows students to view an onion root tip, bacterial capsule, cheek smear, and the letter E using varying magnifications and settings. It is free and runs on the computer using Adobe Flash Player.

University of Utah: Genetic Science Learning Center

<http://learn.genetics.utah.edu>*

Virtual laboratory equipment that allows students to perform a number of experiments related to genetics, including DNA extraction, DNA microarray analysis, gel electrophoresis, and DNA duplication using polymerase chain reactions. These virtual labs are free and run on the computer using Adobe Flash Player.

Virtual Labs

www.vlab.co.in*

Virtual labs for high school and university-level students, which address a variety of science and engineering topics. They provide access to costly scientific equipment and resources, as well as related video tutorials and self-assessments.

Water Weed Simulation

www.saddleworth.oldham.sch.uk/science/simulations/waterweed.htm*

Virtual laboratory that provides the equipment and materials needed to collect data on the production of oxygen as a plant photosynthesizes. The virtual elodea plants are exposed to varying light intensities, carbon dioxide levels, and colors of light. The

resulting oxygen production is measured and recorded to determine how each of the factors affects the rate of photosynthesis. This lab is free and runs on the computer using Adobe Shockwave Player.

Large Data Sets

On the Internet, students can access and interact with large educationally relevant data sets and interactive data visualization tools.

Centers for Disease Control and Prevention (CDC) National Vital Statistics www.cdc.gov/nchs/data_access/Vitalstatsonline.htm*

Downloadable public use data files related to birth and mortality statistics in the United States. To query or interact with the data sets, users must follow the links provided for CDC VitalStats and WONDER.

Centers for Disease Control and Prevention (CDC) VitalStats www.cdc.gov/nchs/VitalStats.htm*

A collection of vital statistics products, including tables, data files, and reports that allow users to access and examine CDC statistics and population data interactively.

Centers for Disease Control and Prevention (CDC) WONDER <http://wonder.cdc.gov>*

Online databases related to public health data. The data from each topic can be refined using search parameters and varying display options. Data sets can be displayed in a chart or exported to a file.

Data.Gov www.data.gov*

Public access to high value, machine readable data sets generated by the executive branch of the U.S. government. Data can be accessed from each governmental agency and filtered through search parameters. The site also includes a useful search tool.

FindTheData www.findthedata.org*

A centralized database for information related to a number of topics, from business and economics to education and government. This site obtains information from public databases, primary sources, and expert sources, and then compiles the information into accessible databases that can be refined using search parameters.

Google Public Data Explorer www.google.com/publicdata/home*

Data sets from dozens of public organizations available for users to select, sort, and turn into charts or graphs. Tools allow users to change the chart colors and selections. By using the time feature, users can watch how the data displayed in a chart changes over time.

U.S. Environmental Protection Agency (EPA) AirData

www.epa.gov/airdata*

Monitored air quality data from the EPA's Air Quality System (AQS) Data Mart. Users can access and download data to a spreadsheet, or produce a data report with charts and graphs. Users can also choose to interact with several data visualization tools, including a tile plot, concentration plot, data map, interactive map, and others.

United States Census Bureau

www.census.gov*

Population data sets collected from the U.S. Census Bureau. Users can download the information as a data set, view it online, or interact with the data using the Interactive Population Map.

United States Environmental Protection Agency (EPA) Data Finder

www.epa.gov/datafinder*

Large governmental data sets related to air, climate, health risks, pollutants and contaminants, waste, and water. For each data source, users can see a basic overview, including the geographic scale and other contextual information, and access the data source itself.

Surveys

Online survey tools allow students to collect data from diverse populations without geographical constraints.

Google Forms

www.google.com/google-d-s/forms*

Over 60 themes and 7 question types for survey creation. Users can see entries in spreadsheet form and add survey responses to a spreadsheet automatically. They can also generate charts and graphs automatically. Users must be of "legal age to form a binding contract" to create surveys.

Polldaddy

<http://polldaddy.com>*

Free version allows up to 10 questions and 100 survey responses per month. Polls can be placed on blogs, Web sites, or social networks. Users can view results live as people respond. Polldaddy* allows multiple choice questions; offers free text, design, and color choices; and includes a link to Polldaddy in every poll. This tool offers basic reports for polls, surveys, and quizzes. Users must be at least 13 years old to create polls.

SurveyMonkey

www.surveymonkey.com*

Easy online survey creation tool. Users can view results immediately online. The SurveyMonkey* site indicates that all languages are supported, and offers many different types of questions, templates, and a collection of visual themes. Surveys can have both required and optional survey responses. Users can collect data via Web link, e-mail, Facebook*, or embedded on a site or blog. A free version allows up to 10 questions and 100 responses. Users can print results or take screenshots of graphs, but they cannot export data in the free version.

Audience Response Systems

An audience response system (ARS) allows people to vote on a topic or answer a question, and the responses are recorded and presented immediately. Each person uses a device (specially designed equipment or a cell phone) to make selections. The Web sites listed in this section require text-enabled cell phones.

iVoted

www.ivoted.com*

Free version allows an unlimited number of polls, and up to 25 votes per poll. Free polls last 24 hours. Respondents answer via e-mail, Twitter*, text messaging (with a cell phone), or Web page. Users obtain results and statistics in real time. Polls are currently limited to respondents from the United States and Canada. Check the iVoted FAQs for possible updates on the countries supported.

Poll Everywhere

www.polleverywhere.com*

Free version allows an unlimited number of polls, and up to 30 votes per poll. Users can create multiple-choice (voting) and free-response (txt2screen) polls. Results and voting widgets can be placed on Web sites or Microsoft PowerPoint* slides that update automatically. Full results can be downloaded in Microsoft Excel*. Participants can use Twitter, text messaging, web-enabled phones, or the Internet to respond. This tool supports multiple languages in worldwide regions. Polls cannot identify answers by participant in the free version. Polls are deleted after 30 days if they are not modified or do not receive any responses. Individual cell phone carriers may charge standard text message charges. Users must be at least 13 years old.

PollDaddy

<http://polldaddy.com>*

Free version allows up to 100 survey responses per month. Polls can be placed on blogs, Web sites, or social networks. Users can view results live as people respond. PollDaddy offers multiple choice format and free text, design, and color choices.