

Technology in Action

Guide

Secondary Science



Sample Standards Connections

When implementing technology into lessons and units, educators can connect to the content standards of the immediate subject, such as science, quickly. Connecting the tools within this document to the core disciplines of Life Science, Physical Science, Earth and Space, or Engineering can be the first step of Standards Connections. Taking a few steps further, educators need to connect with standards outside of science. Here are a few that might be include with the tools here:

ELA *R.7* Integration of Knowledge and Ideas, *R.10*– Range of Reading and Level of Text Complexity, *L.6*–Vocabulary Acquisition and Use, *W.1-W.3*–Text Types and Purpose, *W.4-W.6*– Production and Distribution of Writing, *W.7-W.9*– Research to Build and Present Knowledge, *W.10*– Range of Writing, *SL.1-SL.3*– Comprehension and Collaboration

SEL—*Goal 1*– Self Awareness and *Goal 2*– Social Awareness/ Interpersonal Skills



Online Experiments/ Simulations



Molecular Workbench (The Concord Consortium) - The complete workbench is a downloadable program that can be modified by the educator and then the students can control the experiments more. However, there is now a selection of “online” HTML 5 experiments and simulations that can be utilized completely online and are Chromebook compatible. This is the link to those resources. (You can also link to the downloadable program and all of the resources available from this webpage on your class website.)

<http://bit.ly/2lrxTcM>

PHYSICAL SCIENCE



Star in a Box—An interactive web app which animates stars with different starting masses as they change during their lives. Some stars live fast-paced, dramatic lives, others change very little for billions of years. The web app visualizes the changes in mass, size, brightness and temperature for all these different stages. It allows a user to examine snapshots of a star's position on the color-magnitude diagram (CMD) - the primary diagram used by astronomers to study evolution within stellar populations and to see how stellar parameters relate to one another.

<http://bit.ly/2lYj3gP>

EARTH AND SPACE



Sparticl is designed for teens. Educators will see that in everything from the content to the site features. Accurate and FUN videos, games, articles, interactive demonstrations, and more for 600+ topics, covering the common concepts and terms used in middle school science. Personalization features such as avatars and custom collections. Searchable menu that makes it easy to find all middle school curriculum subjects, and even the science of sports & fun.

<http://www.sparticl.org/>

PHYSICAL SCIENCE



Go Lab– Electrical Circuits—In the Electrical Circuit Lab students can create their own electrical circuits and do measurements on it. In the circuits, the students can use resistors, light bulbs, switches, capacitors and coils. The circuits can be powered by an AC/DC power supply or batteries. There is an ammeter, voltmeter, wattmeter and an ohmmeter. There is also a version of the Electrical Circuit Lab in which data can be collected. Students can analyze the collected data by creating graphs of the data and use the graphs in the conclusion tool.

<http://bit.ly/23iiw4x> PHYSICAL SCIENCE



Solve the Outbreak—Users in the mission get clues and analyze data to solve the disease outbreak and save lives!

Do students quarantine the village? Interview people who are sick? Run more lab tests? The better a student answers, the higher they score - and the quicker they will climb the ranks to become a decorated Disease Detective. The game plays on a WEB app, iOS app and Android. The web app site includes lesson plans for MS and HS.

LIFE SCIENCE

<https://www.cdc.gov/mobile/applications/sto/web-app.html>



Go Lab– Wind Energy Simulation—Take control of a wind farm to provide electrical energy to a small town. Understand how random changes - in wind speed and power requirement of the town - affect the use of this natural energy resource.

<http://windenergy.ea.gr/> ENGINEERING



Science Videos



Physics Girl is a large collection of physics experiments on video explained by Dianna Cowern and published as PBS Digital Content. Content includes space, everyday physics, and interviews with scientists directed towards preteens/teens. There are also experiments that can be completed in class.

<https://www.youtube.com/c/physicsgirl>



Crash Course, from the PBS Learning Media, has videos ranging from balancing chemical reactions to analyzing famous literature. From Science to Social Studies, Crash Course offers it all in quick-paced, imaginative videos aimed at learners of all ages. **CAUTION:** Content of these videos should be viewed prior to class as there maybe comments or objects in the video that will catch the attention of the class and might cause some reactions. (Nothing inappropriate, just giggles/reactions.)

<http://www.pbslearningmedia.org/collection/crash-course/>



Safe Share TV is a platform to watch YouTube without any additional videos or advertisements appearing on the screen. By copying and pasting the YouTube link into the box on the home page, the website will generate a new LINK to the video. This link will never expire and will go directly to a video display that removes all the unwanted items. Educators can now place this link in a PowerPoint or an assignment in GAFE (Google Apps For Education) that the students can select and they will not be shown "other" items.

<http://safeshare.tv/>

Research / Data Tools



Google Scholar provides a simple way to broadly search for scholarly literature. From one place, users can search across many disciplines and sources: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, online repositories, universities and other web sites. Google Scholar helps users find relevant work across the world of scholarly research.

<https://scholar.google.com/>



TED Ed Periodic Table of Elements videos is a complete collection of Ted Ed videos on all the periodic table of elements. Each of these videos also has lessons attached to them from TEDEd so that educators can have students dive deeper and answer questions on the elements or have further discussion on questions based on the elements.

<http://ed.ted.com/periodic-videos>



Smithsonian Learning Lab has so much to do at this website it is difficult to know where to start. The thrill of discovery awaits students at the Smithsonian Learning Lab. Type the research request after selecting the search icon in the upper left corner. The results will be displayed in pictures below. Results will include photos, videos and documents from many providers. The search can be narrowed by type as well as provider.

<https://learninglab.si.edu/>



Presentation and Publication Resources



Screencast-o-matic allows users to record on-screen display activity and audio from a computer microphone. Students can open their MS Word or Google Doc essay or report and record their reflections or process on how they developed their hypothesis or experiment. The video can then be saved and uploaded to the class website. The same process could be done for any computer generated work, modeling how to research or conduct a search online, or doing a science experiment with an interactive model and explaining why the reactions are occurring.

<https://screencast-o-matic.com/home>



ThingLink creates an interactive digital graphic by adding "dots" that pop up text or connections to websites, videos or more graphics. Users can upload photos, documents or any graphic and then add points anywhere on the item to show items of interest or further exploration. Students connecting to a science model may have linkable items to the research they have based their data or maybe an interactive experiment proving their hypothesis.

<https://www.thinkinglink.com/edu>



Adobe Spark is a resource for creating videos, pages and audio. It is unique because users can start in the online platform, then continue on an iPad, then switch to using a Chromebook, etc. Adobe also hosts or stores all the files for easy access from any location, so students can work from home. (Users may use a portable storage device). To further explain the educational uses, Adobe has created a guide for educators that can be found here: Educators Guide. It also includes many lesson ideas.

<https://spark.adobe.com/>



edublogs allows for educators to create a class account and control the postings of the students. Students are also not required to have email accounts. All accounts now have complete access to all resources including more space, templates, teacher controls, privacy controls...etc. Students can maintain a science blog to connect the community to global or local ecological and environment issues or just share the experiments being explored during a local science fair. This will allow them to have feedback from an authentic audience and experience writing for a greater population.

<http://edublogs.org/>

Website HIGHLIGHTS



The Concord Consortium's Path Finder - Their STEM Resource Finder features some of the best of free, open source educational activities, models and software tools. Educators can search by keyword or filter by subject, grade level and type to find the right resources for learning goals.

****Educators will need to carefully consider where to include these resources in their curriculum to ensure they are aligned properly to their grade level standards.**

<http://concord.org/ngss/>



Virtual Biology Lab has three Biodiversity Ecology Labs for students to explore how changes can effect the habitats. There is an Island, Stream and Plant model to manipulate. No login is required, the graphics are great and work well with a projector.

<http://virtualbiologylab.org/biodiversity-ecology/>



StemRead is from Northern Illinois University (NIU). Carefully selected books rooted in science, technology, engineering, and math (STEM) topics and explore the science behind the fiction. There is a selection of activities to go along with each one, lesson plans and videos to support the books. Since the creators of this platform are in Illinois, they also offer PD opportunities and local contacts. Checkout their contact information and sign up for their email list.

<http://www.stemread.com/>



PhET Simulations from University of Colorado provides fun, free, interactive, research-based science simulations. The simulations are written in Java, Flash or HTML5, and can be run online or downloaded to the computer. Simulations are all grade levels and subjects are physics, biology, chemistry, earth science and math. Educators can use an account to keep track of students and simulations.

<https://phet.colorado.edu/>



Even MORE Resources

To find more resources and the latest up-to-date technology to support technology integration, please visit www.ilclassroomtech.weebly.com.

- ◆ Assessment tools
- ◆ Audio/video tools
- ◆ Content area support
- ◆ Digital portfolios
- ◆ Computer science
- ◆ Learning management systems
- ◆ Mobile apps
- ◆ Research tools
- ◆ Social Emotional Learning
- ◆ Technology terms

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