Virtual Science Demonstrations and Virtual Science Labs

During the Summer 2009 designer workshops, the participants reviewed and made recommendations for Virtual Science Demonstrations (VSD) and Virtual Science Labs (VSL) that would support and enhance Science 21 units. The consensus among the designers was that VSD and VSL should not replace hands-on science. VSD and VSL, in and of itself, will rob students of:

1. learning by doing through use of real materials
2. using all their senses
3. the moment of real investigation
4. immediate excitement, enthusiasm, "wow" and "a-hah" aspects (e.g., seeing a real butterfly emerging from its chrysalis)
5. seeing that not all experiments always work out as expected and then predicting why it may not have worked (VSL generally always produce the expected results)

However, VSD and VSL are best used when they supplement and/or integrate hands-on science, and as resources for review, assessment and research. None of the designers felt that any VSD or VSL could ever be effective as a stand alone science program. As one designer said, "Real, hands-on science education doesn't occur in a virtual vacuum."

Designers also discussed what good, quality VSD and VSL should include. They should incorporate as many of the following components:

- Promotes interactivity (Interactive)
- Promotes engagement (Engaging)
- Promotes observation
- Promotes data collection
- Promotes science inquiry
- Links to related topics, content, or experiments
- Is grade level appropriate
- Contains short, intuitive directions
- Is visually appealing and not "too busy"
- Is clear and easy to understand
- Is simple, easy to use, and self-directed
- Contains consistent vocabulary throughout
- Can be completed in no more than 20 minutes
- Contains closure (has reflection/review/wrap-up at the end)
- Provides instant feedback
- Contains a quick assessment
- Does not have ads
- Does not require registration or fee

We are indebted to the leadership of Science 21 Consultants, Kent Leo (Grades 2-4) and Rick Reuschle (Grades 5-6) as the participants explored, evaluated, and recommended virtual demonstrations and labs and also, of course, to the designers listed below:

Participant Name		Grade	School District	School
DANIELLE	COLETTA	3	YORKTOWN	BROOKSIDE ELEM.
SCOTT	FRIDKIN	3	OSSINING	BROOKSIDE
EILEEN	LYNCH	3	LAKELAND	LINCOLN TITUS
GINNY	MUNOZ	3	CHAPPAQUA	WESTORCHARD
MIJECHELE	PURPURA	3	YORKTOWN	BROOKSIDE
JOY	SNYDER	3	WAPPINGERS	MYERS CORNERS
KATIE	MOELLER	3	HALDANE	HALDANE ELEM.

The recommendations are shown below organized according to Grade Level and Unit.

General Disclaimer: Such websites are occasionally changed or may not be available when teachers and/or students visit them. Also, although the workshop participants examined each of the websites/labs/demonstrations, not all aspects of them were vetted for appropriateness, accuracy, and consistency with our curriculum.

GRADE THREE

Suggested Virtual Science Demonstrations and Virtual Science Labs

Unit 1

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/plants_grow.shtml
This interactive site explores conditions that can affect plant growth. (Interactive Lab)

http://www.explorelearning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=355 Click on "Growing Plants" or "Germination." Both of these games go along with Unit 1. "Germination" goes right along with the lesson on what makes a seed germinate. "Growing Plants" can be used as a culminating activity or as review. With both games the students have 3 sets to experiment with. Students get to choose the seeds, heat, water, etc. They will then see what will grow (or germinate) and what won't. (Lab and Interactive Resource)

http://www.teachersdomain.org/resource/tdc02.sci.life.colt.lp_plantcycle/
Plant Videos – discusses how plants grow, germinate and how to plant a "seed sock" – nice demonstrations of what students can do. (Demonstration/Resource)

http://www.discoveryeducation.com/products/science/elementary.cfm
Scroll down to "Interactive Glossary," and click on it. This can be used for Unit 1 with the germination lesson and lessons on parts of a flower. These are demonstrations, but simplified enough for students to understand. You can link on animation for an animated picture that moves and labels parts. There is also a video with information. (Demonstration/Resource)

http://www.teachersdomain.org/resource/lsps07.sci.life.oate.plantparts/ An interactive site that teaches about plant parts. (Interactive Resource)

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/life_cycles.shtml
This site is an activity related to the structure of the flower. (Interactive Resource)

http://urbanext.illinois.edu/gpe/index.html An interactive site to help students learn about plant growth, plant parts and the plant cycle. (Interactive Resource)

http://www.naturegrid.org.uk/plant/index.html "Plant Explorer" helps students to learn about various aspects of the plant. (Interactive Resource)

http://www.ngflcymru.org.uk/vtc/20050225/Science/Keystage2/thinkings/partsofap/introduct/Starteractivity.htm This is an interactive resource to learn about plant parts and their functions. (Interactive Resource)

http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/index.htm An interactive resource for the study of the plant life cycle. (Interactive Resource)

http://www.crickweb.co.uk/assets/resources/flash.php?&file=lcycles5b An interactive resource for the study of the plant life cycle. (Interactive Resource)

http://www.catie.org.uk/plants_galore_page.html An interactive resource for the study of the plant life cycle. (Interactive Resource)

http://199.6.131.12/en/scictr/lab/cornstarch/index.htm This site has extension activities for the Mystery Substance Experiment in Lesson 1. (Resource)

http://www.harcourtschool.com/activity/science_up_close/515/deploy/interface.html This site is a wonderful teaching tool for teaching the parts of a flower for lesson 5. It has audio and real photographs explaining the parts of the flower and showing different examples of each part. (Resource)

http://www.harcourtschool.com/activity/science_up_close/512/deploy/interface.html This site is a wonderful teaching tool for teaching photosynthesis. It has audio and animated video clips, showing the entire process. (Resource)
http://www.teachersdomain.org/resource/lsps07.sci.life.reg.plantmovies/ Plant Video on how plants move and grow in response to light. (Resource)

http://www.mbgnet.net/bioplants/main.html This site is a resource for plant growth and plant parts. (Resource)

Unit 2

http://www.bbc.co.uk/schools/scienceclips/ages/6_7/electricity.shtml Simple experiment to find out which objects conduct electricity. (Lab)

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/conductors.shtml Experiment on electrical conductivity. (Lab)

http://www.bbc.co.uk/schools/scienceclips/ages/10_11/changing_circuits.shtml Experiments dealing with circuits. (Lab)

http://www.bbc.co.uk/schools/podsmission/electricity/annie02.shtml This is a virtual circuit builder. (Lab)

http://199.6.131.12/en/scictr/lab/relax/index.htm Electromagnet experiment (Lab)

http://www.andythelwell.com/blobz/guide.html Building Circuits-Interactive (Lab and Interactive Resource)

http://www.teachersdomain.org/resource/phy03.sci.phys.mfe.zele/ Zoom video demonstration on how to show static electricity, using an electroscope. (Demonstration)

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/conductors.shtml Circuits and conductors (Interactive Resource)

http://www.explorelearning.com/index.cfm?method=cResource.dspResourcesForCourse&CourseID=360 Click on "Circuit Builder." This can be used along with Unit 2 either as a culminating lesson or an introductory lesson. This is a simple game where the students must drag materials over to make a circuit. There is a student worksheet to go along with the game and a vocabulary sheet. (Interactive Resource)

http://www.energyquest.ca.gov/ This is an "energy quest" that is a great resource, which contains video clips, factual information and interactive searches. (Interactive Resource)

http://www.engineeringinteract.org/resources/siliconspies/siliconspieslink.htm Interactive game dealing with electricity, and includes interesting facts on electricity and circuits. (Interactive Resource)

http://www.ngfl-cymru.org.uk/vtc/using_electricity/eng/Introduction/default.htm SmartBoard lesson for how electricity is used. (Interactive Resource)

http://www.centralhudson.com/Kids/electric/html/kids1.html Electricity and insulators/conductors. (Resource)

http://invention.smithsonian.org/centerpieces/edison/ Thomas Edison (Resource)

http://www.miamisci.org/af/sln/frankenstein/safety.html Electrical Safety (Resource)

Unit 3

http://www.teachersdomain.org/resource/ess05.sci.ess.watcyc.hydrocycle/ An animated demonstration of the water cycle. Individual stages are animated as well. (Demonstration)

http://www.epa.gov/safewater/kids/gamesandactivies.html Site contains interactive games and information on the water cycle, water treatment and other interesting water facts. (Interactive Resource)

http://apps.southeastwater.com.au/games/education_kidsroom_wcactivity.asp Water Cycle Activity (Interactive Resource)

http://www.eo.ucar.edu/webweather/cloudhome.html Clouds & Weather (Interactive Resource)
http://eo.ucar.edu/webweather/cloud3.html Cloud types with matching and concentration game. (Interactive Resource)

www.teacher.scholastic.com/activities/studyjams/water_cycle/ This contains a good 3 minute video about the water cycle and states of matter. It also contains a teacher guide and lesson plan. (Resource)

http://www.epa.gov/OGWDW/kids/flash/flash_watercycle.html Water Cycle (Resource)

http://www.abpischools.org.uk/page/modules/solids-liquids-gases/?coSiteNavigation_allTopic=1 Video on States of Matter (Resource)

Unit 4

http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks1/science/hamshall/life_cycles/index.htm This site is a resource for the Butterfly Life Cycle. (Resource)

The following list of websites, SMARTBoard lessons, and interactive was developed by Scott Fridkin, a third grade teacher at Claremont School in Ossining.

Third Grade Science SMARTBoard Lessons/ Interactives:

Plants:

General

http://www.topmarks.co.uk/Interactive.aspx?cat=78

http://urbanext.illinois.edu/gpe/index.html

Photosynthesis: http://www.kscience.co.uk/animations/photosynthesis.htm

http://www.harcourtschool.com/activity/science_up_close/311/deploy/interface.html

Structure of a leaf: http://www.curriculumbits.com/prodimages/details/biology/bio0017.html

http://www.curriculumbits.com/prodimages/details/biology/bio0021.html

Biology of Plants from seeds to flowers:

http://www.mbgnet.net/bioplants/main.html

Plant Life Cycle:

http://www.ngfl-cymru.org.uk/vtc/plant_life_cycles/eng/Introduct/default.htm

Parts of a Flower:

http://www.harcourtschool.com/activity/science_up_close/213/deploy/interface.html

http://www.inlets.net/ICT/science/plants/index.php#

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/life_cycles.shtml

Roots:

http://education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Senteo/USA/Elementary/K-3/Science/Roots+and+Leaves+Question+set.htm

http://www.scholastic.com/play/root.htm

Pollination:

http://www.ngfl-cymru.org.uk/vtc/plant_repro/eng/Introduction/default.htm

http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=635

What affects plant growth:

http://www.ngfl-cymru.org.uk/vtc/factors_plant_growth/eng/Introduction/default.htm

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/plants_grow.shtml

http://www.bbc.co.uk/schools/scienceclips/ages/5_6/growing_plants.shtml

http://www.ngfl-cymru.org.uk/vtc/plants_light_water_to_grow/eng/Introduction/default.htm

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/Canada/Elementary/K-3/Science/Plant+Needs.htm

http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=615

http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=637

Plant or animal?

http://www.foodafactoflife.org.uk/Activity.aspx?siteId=13&sectionId=54&contentId=173

Labeling a green plant:

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/Canada/Elementary/K-3/Science/Labeling+a+Green+Plant.htm

Trees:
http://urbanext.illinois.edu/trees1/flash/index.html

http://urbanext.illinois.edu/trees2/index2.html

Plant Quiz:
http://www.woodlands-junior.kent.sch.uk/revision/Science/plantparts.html#quiz

Electricity:

Electrical Safety: http://www.switchedonkids.org.uk/

http://www.derbyshire-fire-service.co.uk/userimages/kitchen.swf

Circuits:
http://www.learningcircuits.co.uk/

http://www.mystery-productions.info/hyper/Hypermedia_2003/Thelwell/Site/

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/changing_circuits.shtml
http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=638

http://www.bbc.co.uk/schools/scienceclips/ages/6_7/electricity.shtml

Conductors and non-conductors:

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/conductors.shtml

Batteries:

http://education.smarttech.com/ste/en-GB/Ed+Resource/Lesson+Activities/Notebook+Activities/Browse+Notebook/Secondary/KS3/Science/Batteries.htm

Different forms of energy:
http://www.bmweducation.co.uk/energised/

http://www.sciencenetlinks.com/interactives/powerup.html

Water Cycle:

http://www.southeastwater.co.uk/education/watercycle.asp

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/United+States/Elementary/4-6/Science/The+Water+Cycle.htm

http://www.bbc.co.uk/schools/riversandcoasts/water_cycle/rivers/pg_02_flash.shtml

Cleaning Dirty Water (movie)

http://www.primaryscience.ie/site/activities_activity_movies.php

Solids and Liquids:

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/solids_liquids.shtml

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/United+States/Elementary/K-3/Science/Water+Liquid+or+Solid+SMARTcreated.htm

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/Canada/Elementary/4-6/Science/Solids+Liquids+and+Gasses.htm

http://www.bbc.co.uk/schools/scienceclips/ages/8_9/solid_liquids.shtml

States of matter:

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/gases.shtml

http://www.bbc.co.uk/schools/ks2bitesize/science/activities/changing_state.shtml

http://www.abpischools.org.uk/page/modules/solids-liquids-gases/

http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=661

Evaporation:
http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/United+States/Elementary/K-3/Science/Water++Evaporation+SMARTcreated.htm

http://www.fossweb.com/modules3-6/Water/activities/evaporation.html

Weather:

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/Canada/Elementary/K-3/Science/Weather.htm

http://www.education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Notebook+Activities/Browse+Notebook/Canada/Elementary/K-3/Science/Whats+the+Weather.htm

http://urbanext.illinois.edu/kalani/

Temperature:
http://education.smarttech.com/ste/en-US/Ed+Resource/Lesson+activities/Senteo/USA/Elementary/K-3/Science/What+Is+the+Temperature+Question+set.htm

Butterflies:

What is an insect:

http://www.ngfl-cymru.org.uk/vtc/minbeasts/eng/Introduction/default.htm

http://urbanext.illinois.edu/insects/

Life Cycle:

http://www.ngfl-cymru.org.uk/vtc/2008-09/cynnal/discovery/eng/life_cycle_3.html

Metamorphosis:

http://www.harcourtschool.com/activity/science_up_close/315/deploy/interface.html

Camouflage:

http://oncampus.richmond.edu/academics/education/projects/webunits/adaptations/camou1.html

http://www.butterfly-guide.co.uk/survival/cam_early.htm

General All Subjects:

http://technology.usd259.org/resources/whiteboards/smart-lessons/elementary_lessons.html#Sci

http://www.internet4classrooms.com/skills_3rd_original.htm

http://www.longwood.k12.ny.us/longsmart_elem.html

http://www.smartboardlounge.com/