Great Resources Suggested by Teachers

Real world science topics

Science Nation - a series of video programs which examine breakthroughs and the possibilities for new discoveries about our planet, our universe and ourselves. Each program features a two-minute and five-minute version. The first episode was released on June 1, 2009. Subsequent episodes will be released every Monday. http://www.nsf.gov/news/special_reports/science_nation/index.jsp

Scientific American Frontiers – in addition to great videos about cutting edge science, this site provides a cyber field trip to the Galapagos Islands. http://www.pbs.org/safarchive/galapagos.html

National Science Foundation – provides daily updates on new science research. http://www.nsf.gov/index.jsp

National Science Teachers Association – provides links to science news items each day. http://www.nsta.org/

PBS Science – access to PBS science programming – NOVA, Nature, etc. – including teacher information on each program. http://www.pbs.org/science/

Science Channel – explores many interesting and unusual science topics. Can also sign up for newsletters from a variety of science programs that highlight current science topics. http://science.discovery.com/

Lesson plans and curriculum resources

Florida Citizens for Science – provides links to lots of great lesson ideas tested by teachers and loved by kids. http://www.flascience.org/sciedlinks.html

Atlas of Science Literacy - a two-volume collection of conceptual strand maps and commentary on those maps that show how students' understanding of the ideas and skills that lead to literacy in science, mathematics, and technology might develop from kindergarten through 12th grade. Developed by AAAS. Can be purchased on-line. http://www.project2061.org/publications/atlas/default.htm

TOPS Learning Systems – good source of science activities illustrating a variety of concepts using simple materials. Subscription/books can be purchased but a number of examples of activities are provided on-line. http://topscience.org/

National Science Digital Library – huge database of science information and learning materials that can be searched by grade level and topic. http://nsdl.org/

National Science Foundation Classroom Resources – links to a variety of good sources of lesson ideas. http://www.nsf.gov/news/classroom/

TeacherTube – YouTube for teachers – blogs, videos, lesson plans from other teachers. http://www.teachertube.com/

Discovery Education – Science videos, activities, open-ended inquiries, virtual labs and other resources provided by the Discovery Channel. Requires a school subscription although samples are available on-line. http://www.discoveryeducation.com/

Genetics Science Learning Center – contains virtual labs, animations, lesson plans and other teacher resources dealing with genetics and inheritance. http://learn.genetics.utah.edu/

Differentiation resources

Renzulli Learning Systems – an on-line program that matches students' interests and learning styles to many different opportunities designed to provide enriched, challenging learning. An individual Talent Development Profile (TDP) is created for each student. Then an individualized Enrichment Differentiation Database (EDD) collection of Internet and downloadable resources are located and made available in a personalized selection of activities related to a unique match for student interests, learning styles, and preferred modes of expression. Requires a subscription. http://www.renzullilearning.com/default.aspx

Nettrekker – educational resource search tool that provides access to digital content organized by grade and reading level. Requires a subscription. http://www.nettrekker.com/

The Lexile Framework – can be used to assess the lexile level of reading material and written sources. http://www.lexile.com/EntrancePageHtml.aspx?1

Life after high school/ Choosing a career

Reality Check – interactive site where students can explore skills needed for different occupations and relate them to income and expenses. http://www.cdr.state.tx.us/realitycheck/start.htm

Teaching about evolution

Biointeractive – website contains downloadable lesson plans, access to free educator resources including videos, animations, virtual labs, etc. Part of the Howard Hughes Medical Institute grant. http://www.hhmi.org/biointeractive/index.html

Evolution and the Nature of Science Institutes – lessons and other useful resources on evolution and the nature of science put together by a group from Indiana University. http://www.indiana.edu/~ensiweb/home.html

Evolution – UC Berkeley's website devoted to explaining evolution to teachers – lessons at a variety of age levels are included within each topic. http://evolution.berkeley.edu/evosite/evohome.html

Florida Citizens for Science – provides links to several good sites that help explain evolution. http://www.flascience.org/sciedlinks.html

PBS/WGBH's guide to evolution for teachers – contains lesson ideas embedded within each topic as well as useful short video clips. http://www.pbs.org/wgbh/evolution/educators/teachstuds/tguide.html

Florida Museum of Natural History's Cyber Horse – provides a good description of horse evolution. http://www.flmnh.ufl.edu/fhc/firstCM.htm

Ashfall Fossil Beds State Park – unusual collection of prehistoric mammals preserved in volcanic ash in Nebraska. http://ashfall.unl.edu/index.html

National Science Teachers Association – besides all the great teaching ideas provided, this site also has the NSTA's position statement on evolution and a good question and answer on some of the controversies teachers face in teaching evolution. http://www.nsta.org/publications/evolution.aspx?lid=tnavhp

Videos and games that help teach science concepts

Spore - simulation game in which players start with single-celled organisms and design life forms that are increasingly complex. The game is quite large so it works best from purchased software rather than trying to play on-line. http://www.spore.com/

Nano Legends - an interactive video game about the science of cells and cancer for middle and high schoolers. It takes place in a 3D cellular world where a nano-sized adventurer experiences sub-cellular phenomena. Students learn science concepts while overcoming video game challenges, and then apply and build on those concepts to win the game. Requires purchase of software although a demo is available on-line. http://www.kendallhunt.com/index.cfm?TKN=C14DAD2F-19B9-B72C-DDD75FC1F2BE4B34&PID=219&PGI=1942

Science Channel – site has several interactive games on a variety of science topics. http://science.discovery.com/

The Nature of Science: Addressing Issues in the Science Classroom
(Source: Brevard County Public Schools)

Science: Science is characterized by the systematic gathering of information through direct and indirect observations in an effort to understand nature. Science demands empirical evidence, and the pursuit of scientific understanding includes observations, replication, rational argument, inference, skepticism, and peer review. Science cannot recreate the past or foretell the future, but scientific modeling and prediction based on evidence may provide useful information as a basis for further research and decision-making (e.g. hurricane projections, preventive medicine).

Purpose: Understanding the natural world is the goal of science. Scientific understanding can change as a result of new insights or better tools for gathering and interpreting evidence. While scientific truth does not actually change, the ability of scientists to collect, analyze, and understand evidence in an effort to reveal it can change as scientists use more advanced technology and become more knowledgeable and adept. The ongoing search for improved, refined knowledge is inherent to the pursuit of scientific truth, and new ideas, evidence, or interpretation are cause to bolster rather than diminish confidence in the processes of science. (For example, the Sun has never revolved around the Earth, and diseases were never the result of an "imbalance among the humors". Improved tools and scientific processes contributed to changes in our knowledge and understanding.)

Laws & Theories: Scientists use laws and theories to communicate scientific knowledge. *Laws* are generalizations that describe how particular natural phenomena behave under specific conditions. *Theories* explain laws. Scientific *laws* and scientific *theories* both must meet the following criteria: a) internal consistency, b) compatibility with current evidence, c) reliability after repeated testing against applicable phenomena and evidence, and d) broad and demonstrable effectiveness in further research. A *theory* (explanation) can never become a *law* (description of a relationship), and not every *law* has an accompanying explanatory *theory.* (For example, the *law* of gravity describes what we can expect to happen when we drop an apple. A comprehensive explanation of how and why gravity acts the way it does defines a *theory* of gravity.)

Scientists: Scientific evidence is subject to the interpretation of people, sometimes resulting in differing perspectives on the same data. Replication, rational argument, skepticism, and peer review are important to the scientific process, and credible scientists closely adhere to the tenets of scientific ethics. Valid scientific knowledge is determined by empirical evidence, not by vote or popularity. The reviews of qualified scientific peers may be useful in evaluating the credibility of diverse sources.

Science Instruction: The focus of instruction in science classrooms should center on the processes of science, as well as the scientific understandings produced by those processes. Because science, by definition, seeks empirical evidence, non-scientific processes and explanations do not have a role in science. Skepticism, freedom of ideas, rational argument, and diverse interpretations of data are an important part of science and should be encouraged in science classrooms. While the ideas and viewpoints of all should be genuinely respected, the sole emphasis of the science classroom should be on the processes of science and the scientific understandings produced by those processes. Instructors should not be pressured to exclude scientific information, nor to include nonscientific information, as part of science curriculum and instruction.

Resources: Educators should take care in selecting and evaluating information sources. Some sources which may on the surface appear scientific do not actually adhere to the tenets of science, but rather focus on furthering a particular viewpoint. The organizations listed below are among those providing scientific, peer-reviewed information based on empirical evidence.

AAAS (American Association for the Advancement of Science): www.aaas.org
ACS (American Chemical Society): www.acs.org
AIP (American Institute of Physics): www.aip.org
AMS (American Meteorological Society): www.ametsoc.org
CDC (Centers for Disease Control and Prevention): http://www.cdc.gov
EPA (U.S. Environmental Protection Agency): www.epa.gov
I0M (Institute of Medicine): www.iom.edu
NAE (National Academy of Engineering): http://www.nae.edu
NAS (National Academy of Sciences): www.nationalacademies.org
NASA (National Aeronautics and Space Administration): www.nasa.gov
NIH (National Institutes of Health): http://health.nih.gov/
NOAA (National Oceanic and Atmospheric Administration): www.noaa.gov
NRC (National Research Council): http://sites.nationalacademies.org/nrc/index.htm
NSF (National Science Foundation): www.nsf.gov
USGS (United States Geological Survey): www.usgs.gov

Additional Information Related to Issues in Science

Climate: The United States government has established a program to facilitate the understanding and application of knowledge about Earth's global environment through research and communication. Its aim is to use "science-based knowledge to manage the risks and opportunities of change in the climate and related environmental systems." www.climatescience.gov

Evolution: The science curriculum in Brevard Public Schools complies with Supreme Court rulings and is aligned with state and national science education standards. It is also consistent with the recommendations of major science organizations.

· The National Academy of Sciences emphasizes the importance of evolution as an underlying concept related to almost every aspect of biological science. www.nationalacademies.org/evolution
· Biological evolution is a fundamental scientific concept. Evolution still occurs today, as evidenced by new strains of resistant bacteria, pesticide-resistant insects, and metal-tolerant plants.
·Science and religion are different ways of understanding the world, and can be compatible. Most religions of the world do not have a conflict with the idea of evolution. Many people hold strong religious beliefs and simultaneously accept the scientific theory of evolution. (For example, the Vatican has long accepted the evidence of evolution. www.catholicnewsagency.com)

·Evolution is an accepted *scientific theory*, not a hypothesis. Evolution has been repeatedly tested and confirmed, and has been used reliably in predictions and scientific research. There is no controversy in the scientific community about evolution. The evidence is considered compelling and overwhelming.