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IN THIS ISSUE

Northwestern Consortium T/TAC
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Designed by Jeff Richards

Using Online Resources: Connecting Science Instruction to the Work of Real-World Scientists

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It is exciting to see how many resources are available online to enhance your science curriculum and to help you make science come alive for your students. Some websites offer access to educational videos and other materials on a multitude of topics. Many offer the materials free of charge. We have tried to fill this newsletter with valuable resources for you to use in your classroom. Besides the websites that have been highlighted in the articles in this issue, check out the sites listed below, find resources that are appropriate for your planned science instruction, and continue to inspire your students to become life-long learners of their world through science.

The U.S. Geological Survey (USGS), whose National Center is located at 12201 Sunrise Valley in Reston, VA, provides scientific information intended to help educate the public about natural resources, natural hazards, geospatial data, and issues that affect our quality of life. Discover selected online resources, including lessons, data, maps, and more, to support teaching, learning, education (K-12), and university-level inquiry and research. The USGS website is *http://www.usgs.gov/visitors/directions.html,* although the address *http://education.usgs.gov/* takes you directly to the Science Education section of their site.

Find Out!
What kind of work do scientists of the USGS do? When a natural disaster threatens or occurs, they may be among the first people to respond. While the first priority is to save human life, the next is to understand as much as possible about what happened in order to prevent or minimize the harm from future natural hazards. Find out more about these scientists by reading specific cases where they were called in to investigate disasters such as a rockfall in Yosemite Park and an earthquake in Northridge, California.

The Futures Channel uses video to connect learning to the real world. It not only produces and distributes high quality multimedia content which educators in any setting can use to enliven curriculum, engage students and enhance the learning experience, but it also connects mathematics, science, technology and engineering to the real world of careers and achievement. This site offers teaching guidelines and activities to accompany the videos so teachers can provide students with a context and purpose for what they are learning. The videos on The Futures Channel highlight professionals from the sciences, engineering, and technology sectors, hoping to stimulate interest in these areas and motivate students to continue their education in math and science.

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The site, *http://www.thefutureschannel.com*, also provides links to other sites that add to the breadth and depth of the learning experiences for students.

Find Out!
The Black-Footed Ferret, once thought to be extinct, has made a comeback! Wildlife biologists from the U.S. Fish and Wildlife Service explain what they are doing to save this endangered species. Activities, including charts and tables for student calculations of the biologist's work, can be downloaded from The Futures Channel site. As the video explains the process, from how Black-Footed Ferrets are bred, to how they are eventually prepared to be released back into the wild, students can chart the recovery effort using math and science skills. Find out how and why biologists have been able to help these cute booted creatures make a "come back."

The Why Files is a site that explores the science, math and technology behind the news of the day. It presents topics in a clear, accessible and accurate manner in an effort to help explain the relationship between science and daily life. The Why Files produces a new story each week, posts a biweekly column by science reporter Tom Siegfried, a series of interactive science animations, a popular "Cool Science Images," and a series of Teacher Activity Pages linked to the national science standards. The site was founded in 1996 as part of the National Institute for Science Education, with funding from the National Science Foundation. Since 1998, the site has been supported through the Graduate School of the University of Wisconsin-Madison. You can access this site at *http://whyfiles.org*

Find Out!
Calling all CSI fanatics! How do you think maggots help forensic entomologists narrow the time of death of a corpse or suggest to crime scene investigators that the deceased may have been murdered? Follow the link on this site to Teacher Activities Pages to find lesson plans and activities related to this area of scientific inquiry. Watch a video where a forensic entomologist describes his work with maggots in determining answers that help solve crimes. If you follow the hot links from the Teacher Activities page, you will continue to discover a wealth of information and learning experiences related to forensic science. How can your students not be interested in this?

These are just a few of the online resources that are at your fingertips in the area of science! Use them to help your students understand that what you are teaching them is truly related to work in a variety of real-life situations. Get them excited about the study of science by showing them that knowledge is often the key to solving the many puzzles that exist in our world! Science can be exciting and fun – AND – a learning experience, too!

Inquiry Learning: Instruction for Student Engagement

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Some seabirds find everything they need in ocean waters and spend most of their lives at sea. One type of bird can spend three months over the ocean. What questions does this raise as you think about what all living things need to survive?

This statement and question are setting the stage for an inductive inquiry approach to a student-driven, information-seeking adventure in learning. The teacher has begun the process by providing the focus with a discrepant event or fact to arouse curiosity and engage students' thinking. Inquiry training was originally developed by Richard Suchman (1962) as teacher educators began to teach students the skills of the scientific method used in the natural sciences. Since then, inquiry learning has been widely researched and broadened as an approach with applications across many curriculum areas (Cain, 2002). Inquiry learning provides opportunities for students to become active learners as they interact with the teacher and peers to examine their prior knowledge about the topic or problem presented in a discrepant event that initiated the topic. Students seek new information through question generating and cooperative learning activities. The goal of inquiry instruction is to engage the natural curiosity of students and take them through an organized process to generate questions, establish facts, clarify and define problem statements, build explanations, and develop hypotheses as they research a topic area in depth.

Joyce & Weil (1986) provide an example of some steps that could be used in an inquiry learning process:

Step1. The teacher introduces an unusual object, problem, dilemma, or a discrepant event to begin a unit of study or a lesson. The goal is to arouse curiosity and interest of the students and introduce cognitive dissonance (a contradiction between fact and belief).

Step 2. Students are instructed to begin brainstorming as many questions as they can think of about the discrepant event. Only questions are allowed and all questions are accepted and encouraged. At this stage, the teacher is not trying to get the students to converge on a particular or correct answer or idea, but rather to do broad divergent thinking of as many possibilities as they can , making connections to their background knowledge.

For example: How can they sleep? Do they sleep floating on the water? Do they look for boats to land on or floating junk? How can they drink salt water? Are their bodies salt factories? Why are they out there? How did they get there? Are they too far away to get back? Did they get lost and fly too far away from land? Do they mate out there?

After some initial brainstorming with the whole group, the teacher has students continue to brainstorm in smaller cooperative groups, discussing and writing their questions on sentence strips or post-its, still accepting all ideas. Finally, each group examines their generated questions, grouping and classifying those that seem to go together. Now the teacher may have all groups begin to combine their questions together in categories and identify themes posed in the questions. At this stage the teacher can begin to answer "yes/no" questions to help students clarify and prioritize their questions without shutting down the inquiry process as they identify some main themes or ideas. The process could culminate in a graphic organizer that incorporates emerging themes or big ideas.

Step 3. At this stage, students can be regrouped by interest areas to begin research to answer their questions. Groups brainstorm where and how they will locate the resources needed to find answers to their questions: classroom resources, library, videos, internet, interviews, or experiment. After completing some research, students examine preliminary findings and begin to refine and develop hypotheses. What are the preliminary findings? Can we eliminate any ideas? Can we refine our emerging hypotheses? Students begin to write up their notes in brief paragraphs. Using a graphic organizer is very helpful at this stage as well as KWL charts (What I Know, What I want to know, What I have Learned). This helps students sort facts and inferences and narrow the focus of their research and construct their hypotheses. Now they are switching to a convergent thinking process as they make connections from their research information to the new ideas.

Step 4. Students again organize and analyze their information and use it to formulate an explanation or confirm their hypotheses, discard some incorrect assumptions, construct clear statements that address their findings, draw conclusions from their findings, and identify still unanswered questions. They also prepare to present their information to the class or in individual assignments determined by the teacher or the group.

Step 5. Finally, students analyze the inquiry process and steps they have used. They discuss and evaluate the challenges and successes they have had with the process and what they have each learned individually about their own learning process.

The inquiry learning process supports students' development as critical and creative thinkers. As teachers struggle to engage all learners in complex subjects across the curriculum, the challenge is often to have them fully involved and taking responsibility for their learning as well as developing strategies to support their navigation through the overwhelming mountain of information available in textbooks and on the internet. Teaching students through an inductive process, is intrinsically engaging and helps students build both the cooperative and independent skills they need for academic success.

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Cain, S.E. (2002). *Sciencing*. 4th Edition. Upper Saddle River, New Jersey: Pearson Education Inc., Merrill Prentice-Hall.

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Suchman, J. (1962). *The elementary school training program in Scientific Inquiry.* Report to U.S. Office of Education, Project Title VII. Urbana: University of Illinois.

Websites on inquiry learning:

http://www.personal.psu.edu/users/k/a/kas132/MESSING%20WITH%20THEIR%20HEADS.ppt.

http://www.sasked.gov.sk.ca/docs/policy/incel/section_4.html

http://www.biology.duke.edu/cibl/

http://www.emints.org/ethemes/resources/S00000902.shtml

http://www.k8accesscenter.org/training_resources/ScienceInquiry_accesscurriculum.asp

http://www.k8accesscenter.org/index.php/category/science/

www.inquiry.uiuc.edu/

www.thirteen.org/edonline/concept2class/inquiry/

Access for Everyone

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THE importance of teaching students with mild disabilities in general education classrooms, using general education materials, has come into focus with the passing of recent legislation, including the No Child Left Behind Act (NCLB) and the Individuals with Disabilities Education Improvement Act (IDEIA). Science instruction, which requires complex cognitive skills such as problem solving, critical thinking, evaluating, analyzing, and interpreting data, can pose significant challenges for students with disabilities (Steele, 2007). What can be done to help students access this curriculum?

One answer is the web-based services of the Access Center, where a wide array of resources filled with research-based information to enhance access to general education curriculum, including science, for all students can be found. The web address is: *http://www.k8accesscenter.org/index.php* and *http://www.k8accesscenter.org/index.php/category/science/* links you directly to science-specific information.

Within the science section, you will find resources in four different formats: information briefs, links to web sites, video clips, and a web seminar presentation.

The first, and most comprehensive, section contains information briefs: short discussions on a variety of research-supported topics. Examples, references and resource lists are frequently included within these discussions.

The briefs include:
Differentiated Instruction for Science which gives an overview of differentiation and explains how it can be applied to enhance science instruction. An explanation of how differentiation may be implemented and a chart of what differentiation looks like in a science classroom is also provided. The chart lists different strategies along with the focus, the definition and some examples for each.

Computer-Assisted Instruction (CAI) and Science provides an overview of remediation and/or instruction presented on computers and its application to science instruction. Descriptions of how to implement this type of instruction as well as lists of resources are included.

Using Mnemonic Instruction to Teach Science is a discussion of three basic types of strategies (Keyword, Pegword, and Letter) designed to help students improve their recall of new information. Each strategy is briefly described, implementation is explained and examples of its application to a variety of science concepts are shared.

Web-Based Resources for Science, Technology, and *Engineering: Tools and Activities for Teaching and Learning* provides an extensive directory of online tools and resources developed by CAST (Center for Applied Special Technology). A summary matrix and a thorough listing of both general and subject specific resources are included. Within these listings, descriptions and grade level designations can be found.

In addition, you will find science briefs entitled *Middle School Science: Access for Students with Autism Spectrum Disorder, Science Inquiry: The Link to Accessing the General Education Curriculum,* and *Alignment of Alternative Assessments to Science Content Standards*.

Second, you will find links to additional web sites which offer information about national science standards as well as sites that provide activities and lesson plans for teaching science. *National Science Education Standards, Education World, and National Geographic* are featured. Going to these sites will lead you to a variety of science activities and resources.

Video Clips are the third format presented. Universal Design for Learning (UDL) principles and supports are discussed using the context of a first grade science lesson. The applications for improving access for all students are part of this presentation.

The final format is a pre-recorded webinar or web seminar called "Science as Inquiry through Physical Science." Watch and listen to the presentation addressing the inquiry method as it is applied to the content of physical science. Presentation slides and handouts are also available.

The web-based services of the Access Center contain a wealth of information for enhancing instruction in science and other content areas. Please check out these resources.

References and Resources:

Access Center: *http://www.k8accesscenter.org/index.php*

CAST (Center for Applied and Special Technology): *http://www.cast.org/*

Education World *http://www.educationworld.com/a_tech/tech/tech158.shtml*

IDEA '97 law and regulations.
Retrieved October 5, 2007 from
http://www.ed.gov/offices/OSERS/Policy/IDEA/regs.html

National Geographic (Expeditions: Geography in Your Classroom):
http://www.nationalgeographic.com/xpeditions/

National Science Education Standards
http://www.nap.edu/readingroom/books/nses/html/

No Child Left Behind. Retrieved October 5, 2007 from
http://www.ed.gov/nclb/landing.jhtml

Steele, M. (2007). Teaching science to students with learning differences. The Science Teacher, p. 24-27. Retrieved September 21, 2007 from *http://www3.nsta.org/main/news/stories/science_teacher.php?news_story_ID=53487*

Strategies to Support Students with ASD in Accessing and Achieving in the General Education Science Curriculum

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(Adapted from Middle School Science: Access for Students with Autism Spectrum Disorders, *http://www.k8accesscenter.org/training_resources/scienceandstudents.asp)*

Science is often viewed as a content area that readily lends itself to inclusion of students with disabilities for instruction in the general education curriculum. Science tasks can often be broken down into smaller components, a method of instruction supportive of students with disabilities (Cawley, Hayden, Cade, & Baker-Kroczynski, 2002; Brownell & Thomas, 1998). Also, an emerging body of research suggests that students with disabilities benefit from hands-on science instruction (Dalton, Morocco, Tinvan, & Mead, 1997). However, general education science teachers may have received little information or training regarding the unique learning needs of students with disabilities (Cawley, et. al, 2002), and in particular, those with Autism Spectrum Disorders (ASD). In order for students with ASD to achieve to their highest potential, it is important that science teachers have information about ASD, as well as knowledge of strategies that will support these students in their learning.

Understanding characteristics of ASD will be of great benefit for science teachers responsible for their learning. Of particular interest to teachers may be that some students with ASD display increased propensity for the acquisition of factual knowledge (Wagner, 2002). Such a predisposition could enhance a student's success in learning science, a subject area rich in factual content. In addition, students with ASD sometimes develop unusual interests or preoccupations around specific topics (Wagner, 2002). Within science, pursuit of special interests could allow students with ASD to develop expertise that could then be shared with the class. Conversely, however, it is important for science teachers to know that students with ASD may have difficulty with abstract reasoning (Wagner, 2002), which is often necessary for inquiry learning and making some information connections within the science curriculum.

A primary defining characteristic of ASD is social skills deficits (Wagner, 2002). This could be problematic in the science classroom as many learning activities are completed with lab partners and/or peer learning groups. Another defining characteristic of autism is communication deficits. Students with ASD may have difficulty with both expressive and receptive language and may have difficulty understanding and/or using language appropriately (Wagner, 2002). In most science classrooms, prerequisite communication skills are drawn upon for speaking, reading, and vocabulary development. Science teachers may find that students with ASD are able to memorize vocabulary in isolation, but have difficulty with comprehension and application of the words learned. Use of visual supports can add meaning to, and increase comprehension of, words learned. A final defining characteristic of ASD is the display of idiosyncratic or ritualistic behaviors (Wagner, 2002). While in science, students may display the repetitive use of objects, compulsions or rituals, hand and finger movements, and/or sometimes self-injurious behaviors. Rigidity in behavior can easily be misinterpreted as

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defiance or non-compliance (Wagner 2002), when in reality, a student with ASD may be abiding by a ritual he/she feels cannot be broken.

In addition to understanding some characteristics that might be displayed by students with ASD, science teachers will benefit from knowing about strategies that can support these learners in their classrooms.

The following table from the ACCESS center, *http://www.k8accesscenter.org/training_resources/scienceandstudents.asp* presents some research-based strategies, their applications to science instruction, and the means by which each strategy helps to provide access to the general education science curriculum. Included in the table are links where teachers can gain more information about each strategy.

Strategies for Students with ASD in the Science Classroom

Strategy	Description of Strategy	Implementation in the Science Classroom	How it Provides Access to Students with ASD
Graphic Organizers	Graphic organizers are visual and graphic displays used to organize information and key conceptual relationships.[1] Graphic organizers can be completed as a teacher-directed activity or independently by students. For more information: *http://www.k8accesscenter.org/training_resources/udl/GraphicOrganizersHTML.asp*	Graphic organizers can convert information containing words in a meaningful way for students. They can be used to display textbook information, illustrate key science concepts, and organize steps in processes such as laboratory experiments. For example, for a textbook chapter on the differences between meiosis and mitosis, a graphic organizer can be used to summarize the information and display the steps in each cell process.	**Cognition** – Graphic organizers can help students with ASD understand difficult content by displaying it in a meaningful way. They can provide easy access to necessary background information. **Communication** – Graphic organizers can allow students to access information from science textbooks, even if they have difficulty reading the text.
Peer Tutoring	In peer tutoring, student partnerships link higher-achieving students with lower-achieving students or those of comparable achievement for structured study sessions. Peer tutoring increases students' motivation to achieve classroom goals.[2] For more information: *http://www.k8accesscenter.org/training_resources/documents/PeerTutoringFinal.doc*	Peer tutors can be used to help students gain information from text, to review or study key science concepts, and to assist with appropriate behavior and implementation during lab experiments. For example, during a laboratory experiment, a trained peer tutor can interact with and help a student with ASD use appropriate social skills. That peer tutor can also assist the student with ASD in performing necessary tasks and gaining information from the experience.	**Cognition** – Peer tutors can help re-teach and explain concepts to students. **Social Functioning –** Specific peer tutoring strategies can be used to have socially competent peers teach and support appropriate skills and behaviors for students with ASD.[3] **Behaviors –** Peer tutoring can provide positive reinforcement and feedback to students with ASD to increase social behaviors and decrease unwanted behaviors.

Strategy	Description of Strategy	Implementation in the Science Classroom	How it Provides Access to Students with ASD
Adapted Text	Text adaptations can be done with either high or low technology. High-technology adaptations include recorded textbooks or text-to-speech software. Students can listen to the recorded or spoken passages as often as necessary.[4] Low-technology adaptations include highlighting, color page diffusers, and materials for tracking can be used to help students locate key information.[5] For more information: *http://www.k8accesscenter.org/training_resources/computeraided_writing.asp*	Recorded science textbooks and text-to-speech devices can be used to provide access to textbook content for students with reading difficulties. Highlighting and other low-technology adaptations can help students locate key vocabulary words and concepts and can also be used to help students follow the steps to complete a procedure. For example, if a student with ASD is working on a classifying activity, the directions for the activity could be recorded so that the student can listen to them as often as necessary.	**Cognition –** Adapting text can help draw attention to necessary information for students with ASD. **Communication –** Adapted text can allow students with limited receptive language abilities to access texts and other written reports or instructions.
Computer Assisted Instruction	Computer assisted instruction (CAI) includes the use of digitized textbooks, online or electronic graphic organizers, and web-based or software applications, including websites. CAI can provide immediate feedback to students and individualize instruction, and allow for extensive rehearsal and repetition.[6] For more information: *http://www.k8accesscenter.org/training_resources/computeraided_math.asp*	Digitized textbooks can be used to communicate science textbook information. Online graphic organizers can organize information and are easy to edit. Software often contains games or other motivational ways to communicate science concepts and information. Also available are virtual experiments and museum visits. For example, a student with ASD might first look at a virtual dissection using interactive software, to gain background information and an idea of what to expect during a lab. The software might also motivate the student to participate in the class activity.	**Cognition –** CAI can provide differentiated methods of accessing science curriculum, allowing students with ASD to learn concepts through a variety of formats. **Communication –** CAI provides support for receptive language by providing information in new visual and/or auditory formats. It provides support for expressive language because students with ASD can use programs and software to communicate about curricular material. **Social Functioning** – CAI may provide a structured and motivating place for students with ASD to work in pairs or groups. **Behaviors –** CAI can be motivating for students and can provide an avenue for students to express and develop interests.

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Strategy	Description of Strategy	Implementation in the Science Classroom	How it Provides Access to Students with ASD
Mnemonic Strategies	Mnemonic strategies are intended to facilitate the recall of academic content and involve some type of reconstruction of unfamiliar words into more familiar ones.[7] Research has demonstrated that students with disabilities taught mnemonically outperformed those taught by alternate methods, such as rehearsal.[8] For more information: *http://www.k8accesscenter.org/training_resources/Mnemonics.asp*	Mnemonic strategies can be used to teach and reinforce vocabulary in the science classroom. Mnemonics can also be used to teach and reinforce major science concepts. For example, when learning vocabulary related to photosynthesis, teachers can provide students with ASD with mnemonics that link key words to terms those students already know and understand.	**Cognition** – Mnemonics can help students with ASD learn science concepts. Mnemonic strategies can also help students with ASD develop background knowledge upon which new concepts can be learned. **Communication –** Mnemonic strategies can help students retrieve unfamiliar labels for science vocabulary words.
Metacognitive Learning Strategies	Metacognitive strategies include goal-setting, self-monitoring, and self-questioning. These strategies help students learn how to become independent learners. They also help to increase students' confidence in their academic abilities (NICHCY 1997). For more information: *http://searcheric.org/digests/ed433669.html*	Metacognitive strategies can help students engage in science curriculum. These strategies can improve students' independence in completing science tasks and labs.[9] For example, students with ASD might have a checklist that details each task in a science assignment that should be completed. Students can independently check off each task as they finish it, and determine their next step.	**Social Functioning** – Metacognitive strategies can help students with ASD become more independent and regulate their own learning in the science classroom. Learning metacognitive strategies can help students with ASD work with peers in small groups as well. Peers can help students learn these strategies. **Behaviors –** Self-regulation can help students with ASD manage many of the behaviors that might otherwise be disruptive in a science classroom. This can help students reach a greater level of participation in small groups and whole-class activities.

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Ryan, R.M., & Deci, E.L. (2000). *Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being.* American Psychologist, 55, 68-78.

Scruggs, T.E. & Mastropieri, M.A. (1992). *Classroom applications of mnemonic instruction: Acquisition, maintenance, and generalization.* Exceptional Children, 58(3), 219-229.

Simpson, R.L., Myles, B.S., Sasso, G.M., & Kamps, D.M. (1997). *Social skills for students with autism.* Arlington, VA: The Council for Exceptional Children. U.S. Department of Education. (2005). Proven method: The facts about science achievement. Retrieved April 14, 2005, from *http://www.ed.gov/nclb/methods/science/science.html.*

The Access Center. (2007). *Middle School Science: Access for Students with Autism Spectrum Disorder*. Washington, DC: U.S. Office of Special Education Programs. Retrieved September 26, 2007, from The Access Center Web site: *http://www.k8accesscenter.org/training_resources/* documents/ScienceandstudentswithASD_002.do

Wagner, S. (2002). I*nclusive programming for middle school students with autism/asperger's syndrome.* Arlington, TX: Future Horizons

(Table footnotes)

1. Kim, Vaughn, Wanzde, & Wei, 2004
2. Ryan & Deci, 2000
3. Simpson et al., 1997
4. Mastropieri & Scruggs, 1995
5. Beck, 2002
6. Rieth & Semmel, 1991
7. Mastropieri & Scruggs, 1995
8. Scruggs & Mastropieri, 1992
9. Alley & Deshler, 1979

Beakers and Ballpoints: Writing to Learn in Science

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I remember seventh grade for many reasons: gym uniforms, school lunches and seven period days. I remember seventh grade science with a wince and a sigh. It was the year of the outline. I can still see my teacher: slim, short brown hair, enthusiastic and determined to teach us a strategy. It was universal. It was research-validated. It was outlining.

Her pedagogy was sound. The strategy was introduced and we co-constructed an outline for chapter 1, section 2. She gave us time to practice in class with copious and unwanted feedback and then required that we create an outline for each reading she assigned. Groaning and whining ensued, but she won and in the end we were converts. Outlining became an automatic process. Outlines are one of many formats for taking notes. It is the process of taking of notes that engages the student in organizing and summarizing. Student engagement in the literacy skills of note taking and summarization promotes learning.

Summarizing and note taking has been identified (Marzano, Pickering and Pollock, 2001) as one of nine instructional strategies that affect student achievement. This meta-analysis places note taking second to identifying similarities and differences. These powerful approaches are natural partners. Graphic devices, such as Venn Diagrams and matrices, not only organize information, but also encourage comparison and contrast (see Marzano et al. 2001). Students can be taught to complete teacher-created templates to access the skill and, via practice, begin to create their own formats for independent learning. Note taking integrates the writing process across contents. Adding a graphic component may draw in the visual and/or non-linear learner.

To illustrate the integration of science with language arts and research-validated strategies, a science activity will be summarized and followed by several possibilities for note taking.

The Dirty Water Challenge (Walker, Kremaer and Schluter, 2007) describes an activity filtering dirty water through a series of filters. After a teacher demonstration in which students are blind to the type and order of filters, they work in small groups to evaluate

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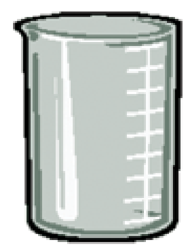
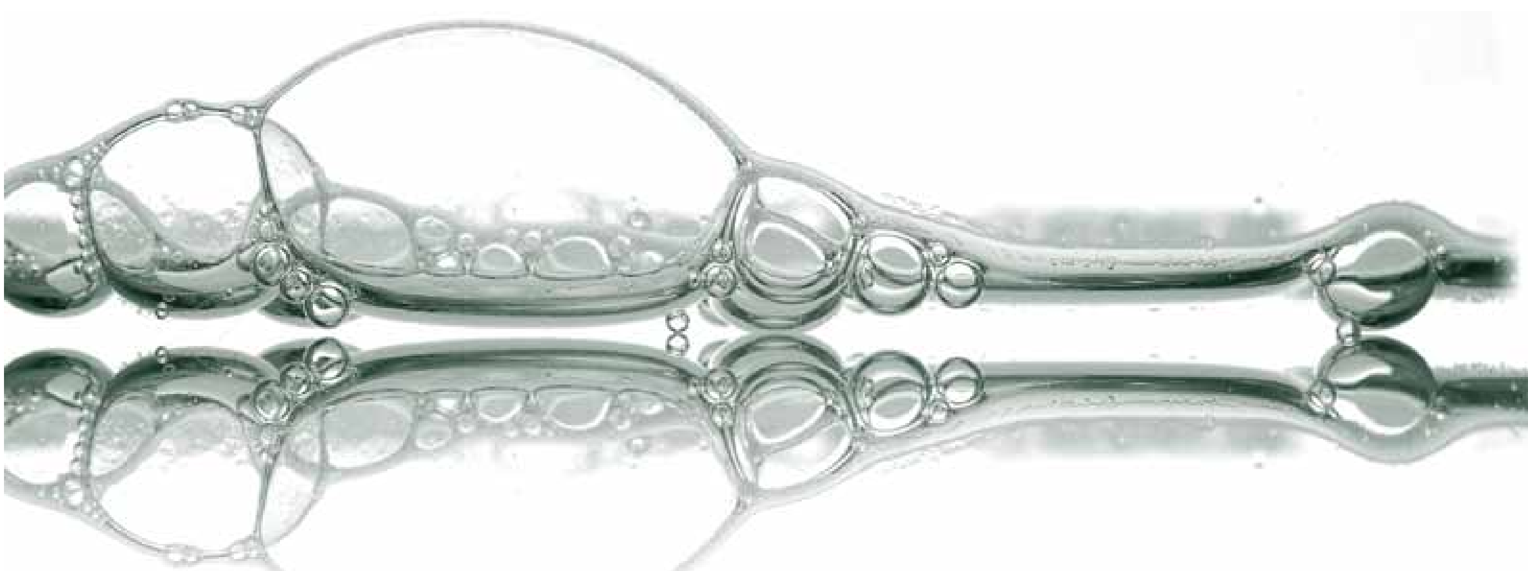
each filtering agent separately. Then, students try a variety of sequences of filtering agents to determine which works best.

There are many possible ways for students to use literacy skills to respond to a science activity. For example, you may ask students to report before, during, after the demonstration (Figure 1). To keep it simple, use a plain sheet of unlined paper. Crease to create sections. Demonstrate how to set up the recording page and have students fill in the text. To differentiate for struggling writers, or to save some time, create the page and run copies.

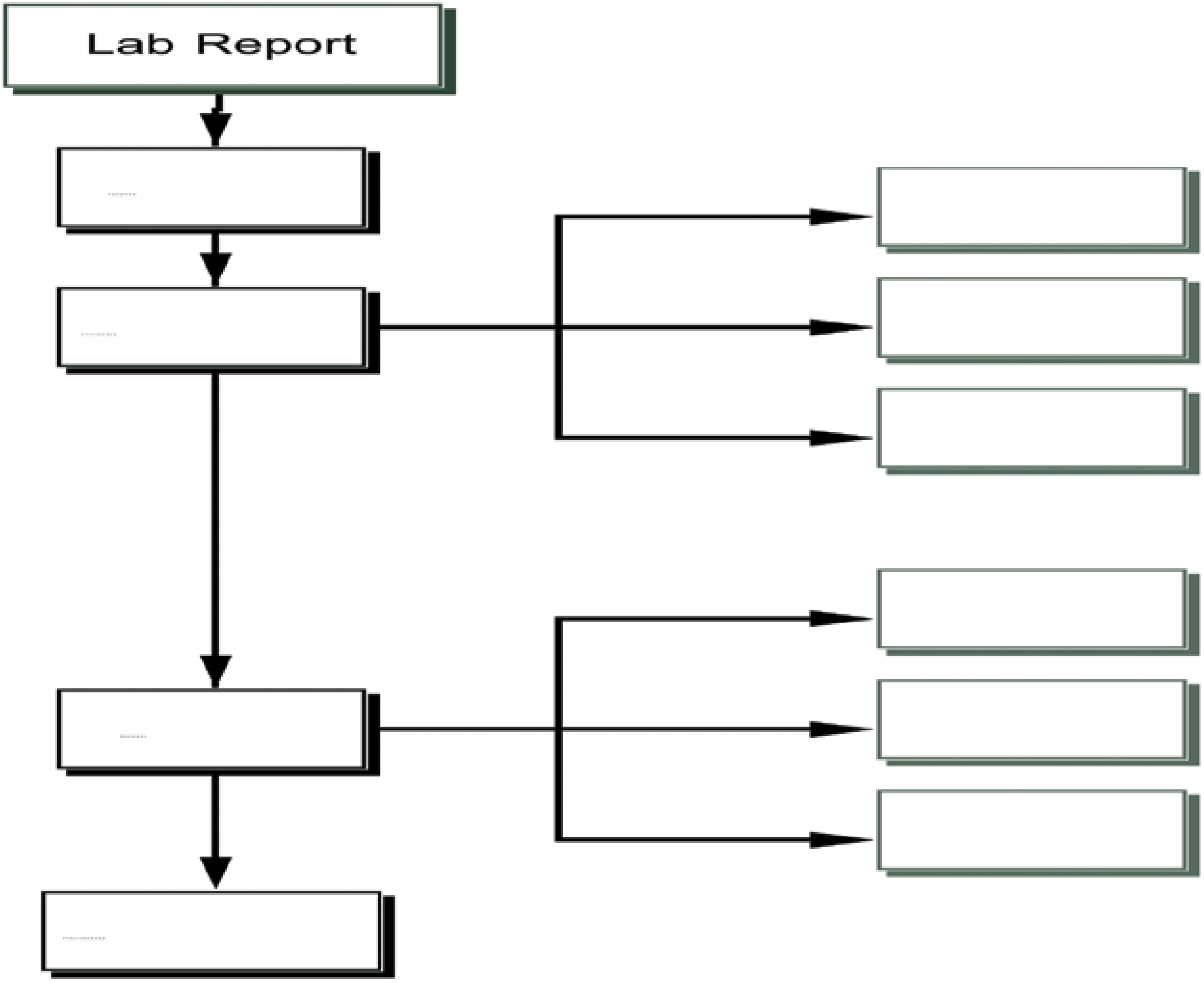
Figure 1: Before, During and, After: Cleaning up our Water

Describe and sketch the "dirty" water.  Before filtering	What did you see? What did the teacher do? 1st: 2nd: 3rd: 4th:	Describe and sketch the water after filtering.  After filtering



The more traditional manner of reporting on a science activity is the "lab report." Students may be familiar with the outline format for lab reports. Figure 2 illustrates a graphic alternative.

Figure 2: Graphic for a traditional lab report *(Created with Inspiration software)*



You may wish to have students brainstorm their hypotheses and help them re-word these statements into a purpose statement. Initially, provide copies of a graphic or cued outline for students to use. Later, students may sketch a graphic based on the teacher's example.

Finally, the science activity challenges students to observe or carry out a series of activities to determine which filtering agent was the individual best and which sequence of filtering agents produced a better (in this case clearer) product. Consider providing a matrix that cues students to track the steps and compare and contrast the results. See figure 3 on the next page.

(Continued from previous page)

Figure 3: Comparing the effects of filtering agents

Write a good description of how the water looked before filtering. Think about color, texture or debris.			
Filtering Agent	**My prediction Number 1 =best Think and rate Number 1-3**	**After filtering, the water looked…**	**Number 1 =best Think and rate Number 1-3**
Gravel			
Sand			
Filter paper *(or coffee filter)*			

To differentiate, you may want to provide more or fewer cues, provide a word bank, require complete sentences or allow single words, or allow students to collaborate on recording the information.

We tend to think of science as activities. And indeed, a hands-on approach is desirable. But recording is critical to the scientific process and the integration of language arts is unavoidable. Providing students with strategies to enhance record keeping makes sense.

References:

Marzano, R. J., Pickering, D. J., and Pollock, J. (2001) *Instructional strategies that work: Research-based strategies for increasing student achievement.* Alexandria, VA: Merrill Education/ACSD.

Science report template (Version 6.0) [Computer software] Beaverton, OR: Inspiration Software Inc.

Walker, M., Kremer, A, and Schluter, K. (2007) The dirty water challenge. *Science and Children. (44)* 9. 26-29.

Preschool Science: Little Learners, Big Rewards

By Kris Ganley, M.Ed.
VDOE T/TAC at George Mason University

Science is not just for school age students. Preschool children are inquisitive about their environment and continually seek to explore the world around them. Science activities can and should happen throughout the day, not just at the science table. The Virginia Foundation Blocks have topics dedicated specifically to science including scientific investigation, force, motion, & energy, matter, life processes, earth patterns, and resources. The preschool classroom is a perfect environment for children to answer the "Why" and "How" questions as well as expand knowledge of the scientific process and explore the world around them.

Although Virginia's Foundation Blocks provide suggestions and activities for teaching these standards, there are many resources available to use with preschool students. One of these resources is Lisa Murphy, The Ooey Gooey Lady ®. She has presented workshops on science activities for young children throughout the country and was a keynote speaker for the Virginia Early Childhood Conference, Shining Stars 2006. Ms. Murphy presented several sessions at Shining Stars, where she demonstrated a variety of simple science activities to engage young children in learning. Five of these popular activities are described below and can be found in one of her books, "Even More Fizzle, Bubble, Pop, & Wow," published by The Learning Through Adventure Company, San Diego, California. These activities and much more can be found on her web site *www.ooeygooey.com*. Check out The Ooey Gooey Lady ®'s web site for additional books and videos on how to make your classroom an ooey gooey, fun place to learn!

Bubbling Eruption

In a pitcher, mix ½ cup of dishwashing liquid soap, 1 cup of water, ¾ cup vinegar, & a squirt of liquid watercolor. In a clear bottle, put ½ cup baking soda. Using a funnel, slowly pour the vinegar liquid into the baking soda bottle. Watch what happens! Carbon dioxide gas, created by mixing baking soda and vinegar, pushes the colored mixture up, simulating an eruption. The dishwashing liquid extends the reaction time and thickens the lava. (Murphy, 2006, p. 27)

Film Canister Pop

Fill a clear film canister about 2/3 full with water. Drop in an alka seltzer tablet and quickly put the top of the canister back on. It will take about 18 seconds for the top to explode off and shoot into the air! The canister top is forced off in a small explosion by the carbon dioxide gas which is formed by the alka seltzer tablet. Caution should be used when conducting this activity. Be sure to aim the film canisters away from children, and it is best to do this activity outside. (Murphy, 2006, p. 42)

Jumping Spices

Sprinkle salt and pepper into a pie tin, on top of the table, or into a small shallow tray. Blow up a balloon and rub it through your hair. Hold the balloon over the salt and pepper. Static electricity is produced by running the balloon through your hair. The balloon becomes charged and the spices are attracted to it. (Murphy, 2006, p. 52)

Ooblick

Mix equal parts of cornstarch and water to create this fun gooey suspension! Slowly add the water and mix well. At first, the mixture will be stiff and hard. Continue working with it and watch it turn from a solid to a liquid. Cornstarch and water will mix together but will not dissolve. This is a suspension. By definition, a suspension is a substance which has the properties of a solid and a liquid at the same time (Murphy, 2006, p. 69)

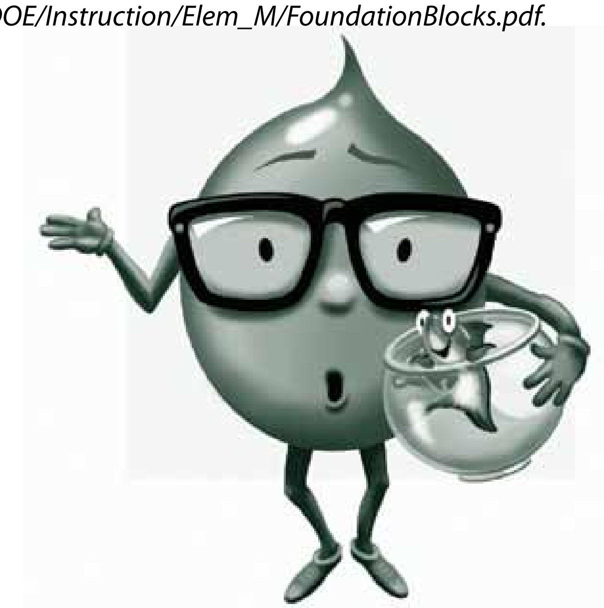
Rainbow Layers

In a clear plastic cup pour a layer of each of the following liquids: colored green water, blue dish soap, cooking oil, and some pink shampoo. Watch as the layers separate out into the same pattern no matter which order you poured them into the cup. All of the ingredients are of varying density. The heaviest (more dense) liquids will fall to the bottom and the lightest (less dense) will always float on the top (Murphy, 2006, p. 74).

References:

Murphy, L. (2006). *Even more fizzle, bubble, pop and wow*. San Diego, CA: The Learning Through Adventure Company. (Original work published 1992)
Ooey Gooey.com (2007). *Ooey Gooey Essentials Workshop Handouts: Fizzle, Bubble, Pop, & Wow!* Rochester, NY. Retrieved September 18, 2007 from *http://www.ooeygooey.com.*

Virginia Department of Education (2007). *Virginia's foundation blocks for early learning: comprehensive standards for four year olds.* Richmond. Retrieved September 18, 2007 from *http://www.doe.virginia.gov/VDOE/Instruction/Elem_M/FoundationBlocks.pdf.*



New ASOL Instructional Resources Offer Help for Teaching Science and Other Content to Students with Significant Cognitive Disabilities

Karen Berlin, M.Ed.
VDOE T/TAC at George Mason University

IN 2007-2008, states are required to administer science assessments at least once in elementary, once in middle, and once in high school. The expectation is that students participating in the VAAP submit a collection in science at the same grade level the SOL science test is given within a division. Teachers and professionals offering instruction in the Science ASOL will be pleased to know that a wealth of new resources have been created and are readily available through TTAC Online to enhance their science and other content area teaching efforts. Visiting *www.ttaconline.org* and clicking on VA Assessments, then VAAP opens a gateway to instructional resources! This article will offer a brief summary of what instructional resources are available at just the touch of a fingertip! Some examples of what can be found within each resource category are listed below:

Curriculum Based Assessment:
This section of resources assists teachers in identifying what core skills students already have, and what skills need to be taught. Among the tools to be found are the following:

- Student Profile: This simple one page document is used to collect and summarize critical information about a student's areas of instructional strengths and needs. It can be used when determining appropriate entry points, as well as considering appropriate adaptations and modification for science and other content area instruction.

- Communication Tools: A variety of communication assessment tools are posted to assist professionals in determining the meaning behind specific behaviors students use to communicate and to help teachers define how students will demonstrate what they know about science and other ASOL content.

- ASOL Matrix: Clustered by grade level and reporting category, this tool allows teachers to see how content area skills are clustered, and where a student is performing in each reporting category. Referring to the matrix will remind teachers that there are only FOUR reporting categories from which to choose for science instruction and will allow them to see what particular ASOL are clustered together for instructional purposes.

- Skills Assessment/Planning Guide: These tools have been designed to allow teachers to determine not only which functional skills are priorities for instruction for students, but also how to embed science and other ASOL content into functional skill instruction. This tool, coupled with the "Priorities for Instruction Worksheet" allows teachers to put ASOL and functional skills together to create quality instructional plans.

Understanding the ASOL
This second subsection of the VAAP Instructional Resources offers resources to assist teachers in their understanding of the ASOL they will be teaching. Among the resources posted here, one will find:

- Curriculum Frameworks: These documents assist teachers in understanding essential components required by the ASOL. Linked directly to the supporting SOL, teacher notes, essential understanding, knowledge and skills are all listed.

- Scope and Sequence Documents: Organized by grade level, these documents offer a visual representation of how skills are clustered, and how they progress in complexity by grade level and reporting category.

Teaching Process
Within this final subsection of the Instructional Resources, visitors to TTAC Online will find a variety of resources to assist them in the teaching process to offer active, meaningful and relevant instruction. Among what can be found are these helpful tools:

- Blended Curriculum Planning Form: Drawing upon assessment information within the first subsection, this form helps teachers think about how to infuse science and other content ASOL into functional routines within the student's day.

- Literacy and Numeracy Ecological Inventories and Checklist: These planning tools assist teachers in examining their focus on literacy and numeracy within their classrooms, and suggest a myriad of ways to include literacy and numeracy instruction throughout the day. These tools could be readily adapted to focus on science instruction as well.

- Thematic Unit Planning Form: This tool, particularly useful for science instruction, gives a brief overview of the essential components in creating thematic units and lists other website links where units can be found.

- ASOL to SOL Crosswalks: These documents, available not only for Science, but for all four content areas, provide the direct link between the ASOL and SOL and will lead teachers to additional training materials, websites, curriculum resources and lesson plans that are aligned with SOL numbers.

- Sample Activities: Carried over from past years' manuals, a collection of sample activities designed to give teachers quick ideas about how to begin instruction are available for each of the four science reporting categories. There are also reporting categories for other content areas.

SEARCH for ASOL feature

Finally, and perhaps best of all, those visiting the website will find a "Search ASOL" function in which they can enter any ASOL and be immediately linked to suggested lesson plans for the instruction of that ASOL. This direct link to the Enhanced Scope and Sequence Plus documents, (lesson plans developed by VDOE instructional support teams with students with special education needs in mind), puts a wealth of teaching ideas immediately into the hands of the ASOL instructor. Visit *www.ttaconline.org* to access this tremendous compilation of resources or to order CDs of resources on-line.

Special Education Policies and Procedures: What's New?

Nancy Anderson, M.Ed.
VDOE T/TAC at George Mason University

Virginia's Proposed Regulations: Do You Want to Understand What Everyone is Talking About?

The Regulations Governing Special Education Programs for Children with Disabilities in Virginia must be revised to comply with the changes outlined in IDEA and its federal implementing regulations.

Many organizations, advocacy groups, and listservs are offering meetings and resources on their analysis of Virginia's proposed regulations. Since IDEA 2004 has been approved for a while, why are Virginia's proposed regulations just coming to our attention? From the timeline posted below, you can see that it is a long process. Also, posted below are the proposed regulations. After reading them, if you have questions, check out the resources and contacts listed on the VA Department of Education website.

How Long Does it Take for the Proposed Regulations in Virginia to be Approved? (A Timeline)
http://www.doe.virginia.gov/VDOE/dueproc/RevisionTimeline.pdf

The Proposed Revisions to the Virginia Regulations (Please note: This is a large document.)
http://www.pen.k12.va.us/VDOE/VA_Board/Meetings/2007/sep-itemA.pdf

For More Information About Virginia's Regulations for Special Education:
http://www.doe.virginia.gov/VDOE/dueproc/regulationsCWD.html

Special Education Performance Reports: Where Do I Find This Information? What are Performance Indicators?

The federal law, Individuals with Disabilities Education Improvement Act (IDEA) of 2004, mandates that states report on the performance of students with disabilities. Data on performance indicators are used to determine if states and individual school divisions have met targets in each state's special education performance plan.

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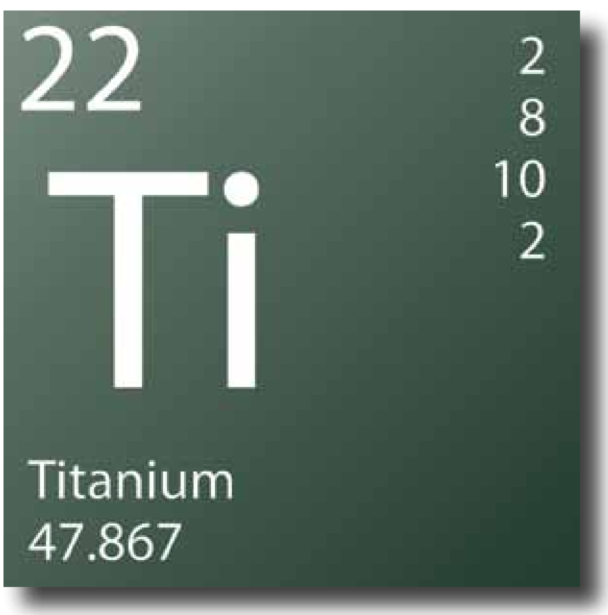
For 2007, states are required to report data on graduation, dropouts, participation and performance on statewide assessments, suspension/expulsion, and Part C to Part B transition. Data on suspension/expulsion by race, parent involvement, disproportionality in special education and related services, disproportionality in specific disability categories, timeline for Part B eligibility, Part C to Part B transition, and secondary IEP goals and transition services will be reported in 2008. Lastly, in 2009, preschool outcomes and post-secondary outcomes data will be reported.

To learn more about these reports and performance indicators and to view Virginia's state level and school division level reports visit the following website:
http://www.pen.k12.va.us/VDOE/sess/spp/
And now, do you understand what your colleagues, administrators, parents, and friends are talking about? Hopefully, this information will help you. Stay tuned!



Using Interactive Whiteboards in Science Instruction

Soojin Jang, M.Ed., VDOE T/TAC @ GMU
Estela Landeros-Dugourd, M.A., VDOE T/TAC @ GMU

The use of interactive whiteboards is increasing in schools. This tool, now commonly found in many educational settings, allows teachers to easily utilize the principles of Universal Design for Learning (UDL), by providing a variety of possibilities for the presentation of information by teachers, by enabling students to express themselves in multiple ways, and by maintaining motivation and participation levels throughout lessons. Use of interactive whiteboards can improve the learning environment for all students including those with disabilities. There are multiple resources available that allow teachers to include the use of interactive whiteboards in their science lessons and activities.

Here is a list of links related to science that may help you to create your next lesson. Some contain ready-made interactive lessons that you can adapt to your students' needs while others contain supporting materials. We hope that you find them interesting and useful.

Interactive Whiteboard Resources for Science

Science lessons and interactive activities - A collection of science lessons and activities on a wide variety of topics.
http://www.can-do.com/science/lessons_interactive.html

BioInteractive from Howard Hughes Medical Institute - Video, animation, and interactive and virtual labs for high school level science teachers and students.
http://www.hhmi.org/biointeractive/index.htm

BBC-Science clips - A highly interactive, curriculum-based science site for children aged 5-11 and their teachers
http://www.bbc.co.uk/schools/scienceclips/index_flash.shtml

Cell Alive - A virtual microscope site utilizing film and computer-enhanced images of living cells and organisms including plant/animal cells, mitosis and meiosis.
http://www.cellsalive.com/

Science Animations - Science Animations Movies & Interactive Tutorial Links
http://science.nhmccd.edu/biol/animation.htm

TryScience – Experience the excitement of contemporary science and technology through on and offline interactivity with science and technology centers
http://www.tryscience.org

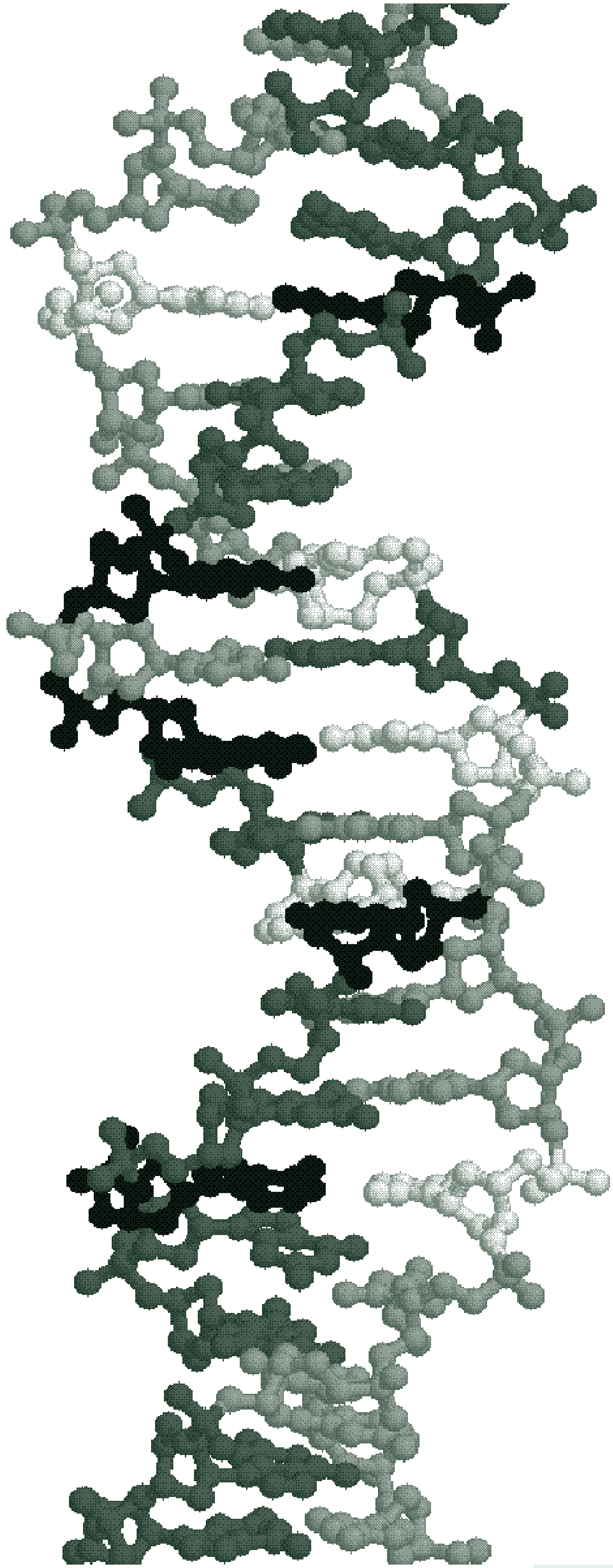
Planet 10 - Explore the planets, comets and asteroids on an interactive virtual fly-through and try to create the perfect world.
http://solarsystem.org.uk/planet10/

Virtual Body - Interactive 3-D presentation of human anatomy and physiology.
http://www.medtropolis.com/VBody.asp

Google Earth - This website combines the power of Google Search with satellite imagery, maps, terrain and 3D buildings to put the world's geographic information at your fingertips. *http://earth.google.com/*

United Streaming - This site offers digital video on-demand and online teaching resources in all content areas. (Requires registration and fee)
http://www.unitedstreaming.com/

Eduscapes - This site provides many activities and sample lessons for using interactive whiteboards in the classroom in science and other content areas.
http://eduscapes.com/sessions/smartboard/



Conferences & Trainings:

October

12th-13th 29th International Conference on Learning Disabilities Coastal Treasures: Effective Collaboration and Research-Based Teaching | Sheraton Myrtle Beach Convention Center Hotel - Myrtle Beach, SC
This conference focuses on collaboration and research-based practices for teaching individuals with learning disabilities to be successful learners in all environments. Topical sessions and workshops that are responsive to important issues and inclusive of effective, research-based practices in the field of learning disabilities are offered.
Sponsored by: Council for Learning Disabilities
For information: Dr. Mary C. Provost, CLD Conference Director 843.971.2980 mcprovost@bellsouth.net
www.cldinternational.org

November

5th-6th TechKnowledgy 2007 Special Topics in Assistive Technology
Holiday Inn-Koger Center South, Richmond, VA
Nov. 5: Dan Keplinger will present the keynote address, and a variety of commercial assistive technology exhibits and workshop sessions will be provided by company representatives who will demonstrate and discuss the application of their products.
Nov. 6: Sessions on topics relevant to meeting the needs of students with disabilities who are served in a variety of settings will be offered. For information: Carol Wiegle, T/TAC at JMU, 540.568.8812 or wiegleca@jmu.edu

8th-9th From TUNING OUT to DROPPING OUT Intervention and Prevention in Grades 6-10
Omni Charlottesville Hotel, Charlottesville, VA
Research-based, systematic approaches to address the complex problems of student disengagement and student dropouts will be reviewed. This two day event is designed to help school teams examine issues and build solutions pertinent to their situations. Different models will be presented and assistance will be provided to help school teams analyze the relevance of each model to their own school improvement efforts. Cost: $395
Sponsored by: UVA, Center for K-12 Education, School of Continuing and Professional Students
434.982.5252 or toll-free 1-800-FIND UVA (346.3882)
Deadline October 24, 2007 Mail or FAX registration

November *(Continued)*

12th-13th Ziggurat Model and CAPS, Designing Global and Comprehensive Behavior Interventions for Individuals with Autism Spectrum Disorders
Doubletree Hotel in Charlottesville, Virginia
This two day workshop will provide a description of a method for developing a comprehensive program for individuals with autism spectrum disorders that can easily be implemented across general education settings. Fee: $100.00 Monday: 9:00-4:00, Tuesday 8:30-4:00
Sponsored by: VDOE TTACs and Commonwealth Autism Services For information: Becky Boswell, bboswell@autismva.org. Contact Commonwealth Autism Service to register 1.800.649.8481 www.autismva.org

30th Discovering the Possiblities with Visual Strategies
Crowne Plaza Richmond,West Richmond, VA
Cost: $197.00 7:30 -4:30
For information: Linda Hodgdon 248.879.2598
tour@quirkroberts.com - www.quirkroberts.com/tour/

December

3rd-4th Strategies for Supporting Individuals with Autism Spectrum Disorders |University Hall, University of Mary Washington Stafford Campus, Fredericksburg
$30.00 per professional, $15.00 per family member or paraprofessional This event is a two-day workshop designed to introduce participants to effective strategies for supporting people who experience social, communication, and sensory issues related to ASD across the life span. Participants in this workshop should have a basic understanding of autism spectrum disorders and the characteristics of persons with autism.
9:00 – 4:00 both days Sponsored by: VDOE T/TACs
For information: Susan Bowman 540.568.8843
bowmansp@jmu.edu

5th-8th TASH 2007 Conference – Equity, Opportunity and Inclusion | Seattle, Washington
This conference focuses on strategies for achieving equity, opportunity, and inclusion for people with disabilities
Regular: before 11/12 - $239 after 11/12 - $259 - See website or brochure for complete rate schedule.
(888) 221-9425 THC@housingregistration.com
For more information, visit www.tash.org

December *(Continued)*

12th-13th Strategies for Supporting Individuals with Autism Spectrum Disorders | Albemarle County Office Building, 5th Street Office, Charlottesville

$30.00 per professional, $15.00 per family member or paraprofessional. This event is a two-day workshop designed to introduce participants to effective strategies for supporting people who experience social, communication, and sensory issues related to ASD across the life span. Participants in this workshop should have a basic understanding of autism spectrum disorders and the characteristics of persons with autism.

9:00 – 4:00 both days Sponsored by: VDOE T/TACs

For information: Susan Bowman 540.568.8843

bowmansp@jmu.edu

February

14th-16th Relationships: The Heart of the Matter Virginia Association for Early Childhood Education Annual Conference | Hyatt Regency, Reston, VA

Visit www.vaece.org for information

April

18th Scott Bellini, Ph.D. | Building Social Relationships

Commonwealth Autism Service and Virginia Department Of Education T/TACs (GMU and VCU)

Fredericksburg Hospitality House, Fredericksburg, VA

Building Social Relationships: A Systematic Approach to Teaching Social Interaction Skills to Children and Adolescents on the Autism Spectrum.

This workshop will provide an overview of the social skill instructional model developed by Dr. Bellini. The workshop integrates research on social-emotional functioning with effective strategies for teaching social skills to children and adolescents with autism spectrum disorders (ASD). The five-step model provides a systematic and comprehensive framework to guide parents and practitioners in the development and implementation of social skills programming. Registration fee $50.00

Contact Info: Commonwealth Autism Service

1.800.649.8481 | 1.804.355.0300

information@autismva.org | www.autismva.org

May

4th-8th Engaging Learners in Literacy: International Reading Association 53rd Annual Conference

Georgia World Congress Center, Atlanta, GA

For more information: www.reading.org or 800.336.7323

June

23rd-27th 9th Annual Content Teaching Academies

On the campus of JMU, Harrisonburg, VA

Sponsored by JMU College of Education, VA Dept. of Education, and Region 5 T/TAC

George Mason University
The Helen A. Kellar Institute for Human disAbilities
4400 University Drive
MS 1F2
Fairfax, VA 22030
703.993.4496
http://ttac.gmu.edu

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Improving the lives and productivity of persons with disabilities

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