Most people think of technology simply as computers or other electronic devices, when in actuality, technology is everything that is human-made or human-altered. That is so much more than electronics! Technology, according to the ITEEA, is “the innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.” Even the caveman had technology with the wheel and captive fire.

So how does technology fit into the elementary classroom? Technology is everywhere in our schools, from the actual physical classroom itself to every facet of our curriculum. But first and foremost, teachers need to understand what technology is, so we can all use the term correctly as we reference it on a daily basis.

Think through your curriculum - many science concepts teachers share are actually technology. Science deals with the natural environment, but many teach simple machines as science when they are technology. The force used in the machines is the science behind the lesson, but the actual machines are technology. What a natural conversation for you to have with your students during this unit. Teachers can demonstrate, despite the existence of rare natural lodestones, that even basic concepts like magnetism are largely found in man-made objects. History curriculums everywhere focus on ancient civilizations filled with technologies. Every invention created in the past is a technology that has contributed to today’s world. Ancient architectural and transporting structures tie in perfectly when explaining technologies to students. Modern life is no different and examples are everywhere. From computers and calculators to dictionaries and pencils, even mathematics and literature rely on many man-made creations.

Children’s Engineering is a natural fit with technology. All design briefs begin with a challenge statement and the words “design and build” or “design and create”. Well, a human student is building or creating, therefore their end-result is technology. The perfect vehicle for creating and teaching technology is the elementary classroom. So, by simply thinking about your curriculum ahead of time and discovering yourself where the man-made and natural diverge, you can find many intuitive ways to communicate the true definition of technology in your daily teaching. My challenge to you is to change the way you use the word technology; the students will pick up on it even faster and will quickly point out technologies to you.
New Principal’s Journey into Children’s Engineering
Suzanne Bevans, Principal, Henderson Elementary, Montclair, VA

In August 2011, shortly after being appointed Principal of Henderson Elementary in Prince William County, I shared my long-term vision with the staff. We would become a children’s engineering school within five years!

Henderson E.S. seemed ripe for this challenge as an established School of Excellence (nine years) with a diverse student population of 600 (52% white, 17% African American, 14% Hispanic, and 9% Asian, and 8% identified as two or more races). It fit the model that I had in mind. During my journey into administration I read many articles about integration of curriculum, and project based hands-on application of learning that Children’s Engineering could bring into a classroom. As a result, I believed that we had an opportunity to integrate the core curriculum we teach on a daily basis through hands-on, project-based learning, where students would collaborate together in the classroom.

All leaders who attempt to change or modify a culture, even one with a positive track record must have “buy in” from staff. Growth can never be accomplished in a vacuum. I was fortunate that our gifted program teacher expressed interest in my engineering vision, and became our project manager. Together we brain stormed the best way to get Henderson’s staff involved.

Eventually we decided to send an email to everyone inviting them to meet with us if they shared our enthusiasm. The result was that we met with a representative from each grade level, along with the school counselor, reading resource teacher, and ELL teacher. We then directed them to selected web- sites to assure familiarity with the resources needed for engineering implementation, and also to acquire a common language associated with the topic.

Soon a project manager was selected, and she reached out to the Prince William County Supervisor of Career and Technology Education. As a result, we were invited on a field trip to Chesterfield County, VA where we visited two schools that integrate Children’s Engineering: Clover Hill E.S. and Woolridge E.S. We observed teachers integrating engineering into the curriculum, viewed products created from the design briefs, watched highly engaged and excited students, and listened to them talk about what they were learning. It became clear that this integrated hands-on, project-based learning could be a positive new direction for Henderson!

At the next Engineering Team meeting we shared pictures and enthusiasm from our field trip to Chesterfield County. All the members then shared what had been learned from their online discoveries. We concluded that our staff would benefit from the design briefs on the VDOE Web-site, so we downloaded the engineering design briefs K-5. From these the team collaborated and developed a Power Point presentation designed to share our vision for Henderson, and provided each grade level team with a resource binder. Each grade level was then challenged to implement one engineering project before the end of the school year.

After these preliminary steps, I was ready to expose key teachers to relevant information offered at the college level. Consequently in July, four teachers accompanied me to Winchester VA, for a week long course in Children’s Engineering offered by James Madison University. Financial support for this staff development was provided from the Prince William County Supervisor of Career and Technology, and my area Superintendent.

Continued on Page 3
Continued from Page 2

The Winchester course provided us with the knowledge and skill set needed to implement Children's Engineering with fidelity. However, as the course unfolded I also realized that my entire staff needed to have this type of strong knowledge base so that we could move forward together with a shared understanding. The answer was to invite experts, Joan Harper-Neely and Gay Reilly, who had participated with us in Winchester, to Henderson.

In November, we had the privilege (as a K-5 staff) to receive an intensive two-day staff development from Mrs. Harper-Neely and Mrs. Reilly. The agenda was loaded with hands on opportunities for the staff to design and build projects, design a rubric, plan a design brief based on the curriculum to be taught within the next four to six weeks, and web site links for more ideas. The results of the subsequent teacher survey revealed that they were enthused, motivated, and had learned a lot.

After reflecting on the journey into Children’s Engineering, I believe that the initial Engineering Team was a critical element. They provided keen direction and implementation for the staff in small manageable chunks, which allowed the time necessary for teachers to experience integrated project-based learning in a safe and risk-free manner. As a result, Henderson’s staff has adopted my early vision to become a Children's Engineering school, and they have been provided with the skills and resources necessary to embark on this new adventure. Most important for the long term success however, our staff has witnessed the excitement and engagement of students, and grade level classroom collaboration.

The next steps will be to bring in grade level teams over the summer to design project-based learning activities that integrate the curriculum every four weeks, and my goal is to provide a stipend for this time commitment. Furthermore, we are also actively exploring a two-four week engineering camp at Henderson over the summer months.

While much still needs to be accomplished, our building blocks have now been put in place. I would encourage principals who are considering the Children’s Engineering journey for their school to share their vision with staff and supervisors, then develop a collaborative plan of action where the skills, resources, and incentives are provided to ensure success.

Dr. Harvey Dean poses with some of the Pitsco team and his award from the Virginia Children’s Engineering Council.
The first graders at Henderson Elementary School love doing S.T.E.M. projects!!!! We started the year off planning to do just one S.T.E.M. project each quarter. However, as the year progressed we observed the powerful impact these projects were having on our students learning. Students started bringing in S.T.E.M. projects that they had created on their own at home. As a result we added more projects into our curriculum for the second half of the year.

Our first S.T.E.M. project this school year was a spider book. All students created a book with a pop up and a moving part. The students were so excited not only about their exploration of spiders, but also about the process of creating their books!

Our second project went along with our writing exploration of fairy tales. Students were asked to build their own fairy tale houses. They had to have a pop-up, a moving door and include the characters from the story on their houses. The students had to draw a design plan for each side of their house before they started creating their houses. They had a list of materials and worked in teams in order to help each other as they problem solved. The plans were amazing! We were thrilled with the creativity. The students loved building their houses and the process took several days. Once the projects were complete the students invited our administrators to come in to see their final products. They were excited to tell our administrators about the process of constructing their houses.

During the second semester of school, our students worked on several other S.T.E.M. projects. They created an invitation for our Show Off Your Learning Night. First graders completed a plant project and a 100th Day of School project. We have several other S.T.E.M. projects planned for the remainder of the school year. As a team first grade teachers at Henderson are thrilled with our students’ enthusiasm. In addition to loving learning, they are really embracing the S.T.E.M. concepts taught in class. We have many students who will be participating in Camp Invention, the S.T.E.M. Summer program that we will be offering at Henderson this summer. The parents are excited to have their students participating in a program where their students will be having fun and learning at the same time!
Design Brief to Try

A Night at the Museum
By Charlotte Holter, Gifted Resource Specialist, Rockingham County, VA

Background: (This design brief could be customized to fit any History and Social Science SOL)
In the movie, A Night at the Museum, exhibits come alive and all sorts of things happen. Think about why we have museums? Museums give us great information about our past and help us understand the present. It also helps us to see how technology changes. Think about an exhibit you are interested in.
Well-written information is needed to educate people who come to visit.

Design Challenge:
After watching Ben Stiller describe all of the exhibits at the Smithsonian Institution in the video choose an exhibit that you like from one of these museums:

• Air and Space Museum
• American History Museum
• Natural History Museum

You will design and build your own exhibit that will contain the following criteria:
__ Must fit on a box bottom (like the ones 24 sodas come in)
__ Must have a part of the display that is at least 12” tall
__ Must have a display case that contain an artifact from that time period
__ Must have at least two moving parts
__ Must have a sign that shares information (choose number of facts) about the exhibit
__ Must show what would have been considered “new” technology during that time period

Materials:
Box top, construction paper, pipe cleaners, glue, tape, brads, cardboard, cardstock, straws, recyclables

Tools:
Scissors, Pencils, Markers, Crayons, Colored Pencils, Glue guns, Safety glasses, Hole punch

Questions to use in Rubric for Evaluation:

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How tall is my exhibit?</td>
</tr>
<tr>
<td>What artifact do I have in my showcase?</td>
</tr>
<tr>
<td>How many moving parts do I have in my exhibit?</td>
</tr>
<tr>
<td>What does my sign tell about my exhibit?</td>
</tr>
<tr>
<td>What did I say was new technology during the time period of my exhibit?</td>
</tr>
</tbody>
</table>

History and Social Science Studies SOLs
USI.1b The student will demonstrate skills for historical and geographical analysis and responsible citizenship, including the ability to make connections between the past and the present.

Resources:
Ben Stiller’s video can be obtained from [http://www.si.edu/Visit/VideoTour](http://www.si.edu/Visit/VideoTour)
Background: In Virginia Studies class, students have learned about 8 famous 20th-21st Century Virginians and their contributions.

Design Challenge: Design and build a 3-D model of a famous 20th Century Virginian that demonstrates his or her contributions to Virginia history. Plan with your small group and create one 3-D model, poster, and a character sketch (or resume, if your Virginian was a job-seeker today) per group--be creative and divide the work up among your team members. You may research your Virginian using encyclopedias, books, magazines, reference sources, including the internet.

Criteria:
Your project (model, poster, and character sketch/resume) must:

- be a famous 20th-21st century Virginian studied in class
- be 3-D
- have one moving part
- be smaller than a shoe box (the character model)
- be creative (some examples: political cartoon, small props to accompany your character, write a play/skit)
- include a separate page illustrating a character sketch or job resume for your Virginian
- include your name(s) (first and last) and a title--all team members will participate and give presentation

Materials:
Plastic wrap, aluminum foil, construction paper, copy paper, graph paper, string, yarn, popsicle sticks, pipe cleaners, rubber bands, paper clips, glue, index cards, paper towel rolls, tissue boxes, Styrofoam balls

Tools:
Ruler, colored markers, pencils, crayons, scissors, stapler, hole punch

Vocabulary:
rural, urban, agricultural society, industrialized society, desegregation, Massive Resistance, Pay-as-you-go

Targeted Standards:
VS. 9 The student will demonstrate knowledge of twentieth- and twenty-first-century Virginia by
Technology 101

Sometimes there just isn't enough time in the day to cover all that you have planned. One way to maximize time when using design challenges is to break up the design process steps over a few days. The planning can be morning work or even a homework assignment. Language arts teachers at Cooper Elementary in Hampton, VA used the example below.

Next week third graders will have engineering day in the Tech Lab. The design challenge will be paper engineering. Teams will create a pop-up book with moving parts. The homework this week will help you prepare for the challenge. List the 3 main events for your assigned story. Illustrate each event. Make sure you include the following for each event:
- Characters
- Setting
- Action (what is happening)

Don't let your team down. Make sure you complete your homework by Wednesday, February 1.

Visit [http://guest.portaportal.com/coopertechlab](http://guest.portaportal.com/coopertechlab) to learn about pop-up books.

Use complete sentences to tell about each event.

Name__________________________

Assigned Story:

------------------------------------------------------------------------------------------------------------------

Character 1: ________________________________________________  Setting 1: ____________________________________________

Action 1: __________________________________________________

Character 2: ________________________________________________  Setting 2: ____________________________________________

Action 2: __________________________________________________

Character 3: ________________________________________________  Setting 3: ____________________________________________

Action 3: __________________________________________________

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Core Connections: Integrating STEM with Social Studies and Language Arts
Jessica Schrage, 5th Grade Teacher, Social Studies Instructional Leader, Cooper Elementary, Hampton, VA

At Cooper Elementary, K-5 teachers provide students with design challenges in every core subject throughout the school year. Most recently, fifth grade students were asked to build a character model of a notable Virginian as part of their Virginia Studies unit. Since the students were already familiar with all eight notable Virginians, they were able to divide up the tasks among their working groups. Collaboration and planning are crucial in order for students to be successful in their design process. Our students are so practiced in the process, that they understand the importance of teamwork and are able to jump right in and plan.

Usually I assign students to small groups, but this time I chose eight student team captains and had each one choose the name of a notable Virginian from a stack of pre-printed index cards. Then they chose students to fill each “STEM Collaboration Team.” Giving my students choices promotes a positive and invigorating learning environment, as they were already anxious to start working and temporarily forgot that it was only a day before the start of their Spring Break!

The back page of the student design brief is typically reserved for their planning. They know that they may not begin building without a solid plan in place. Often I send the planning piece home for homework and it becomes their ticket to purchase building supplies the next day. For this challenge students had time to finish planning the day before in class, and after reviewing their criteria, they went to work. Each group was given one laptop for the researcher(s). Students were instructed to divide up the responsibilities, and each group was successful in meeting all seven criteria, as they worked productively, exchanging ideas for each part of the challenge. The English 5.1 standard (see bottom of design challenge) was easily met during this project and students were excited to have enough flexibility with their freedom of expression. Some chose to complete character sketches, while others wrote job resumes as if their Virginian was a modern-day job seeker. For this challenge, as with any design brief, I used the design criteria to create a rubric for student assessment. Each student received a copy with the design challenge.

This design brief was a fun way for our students to accept a new challenge that helped them review and demonstrate their knowledge of eight notable Virginians learned in social studies. It was simple, but still allowed for higher-level thinking and creativity as they designed and built their own 3D character models. Their creativity was not stifled, but instead, enhanced as they designed their model with the materials provided. It helped reinforce the facts, accomplishments, and contributions of the eight characters that we have studied during our Virginia Studies class time.

Students were engaged throughout the hands-on project because everyone had a stake in their plan. I printed a flyer for each, listing the name of the “STEM Collaboration” team, along with the notable Virginian, and the design criteria, so that we could display their models and work samples on the bulletin board. It provides a nice review for all of our students that pass by it, as well an eye-catcher of the attractive and creative products that resulted from their top-notch teamwork. One reason that our students will be better prepared for the STEM, educational, and employment challenges of tomorrow is because of the time that we invest in completing engineering design challenges across the curriculum here at Cooper.
Awards

Technology Teacher of the Year, Susan Nagel

Jesse White, Curriculum and Instructional Leadership Award

Technology Program of the Year, Woolridge Elementary School
L-R: Dr. Lynn Basham, Windi Hobbie, Bill Holden, Elizabeth Kirk, and Principal June Edwards
George Willcox Honored by the Children’s Council of ITEEA
George Willcox, Coordinator, Planning, Administration and Accountability, Office of Career and Technical Education, has been recognized with the prestigious Mary Margaret Scobey Award, presented during the International Technology and Engineering Educator’s Association Conference held in Columbus, Ohio, March 7-9, 2013. The award recognizes a person who has demonstrated dedication to elementary school technology education on a sustained basis and has demonstrated a Passion philosophically and through activities conducted on behalf of elementary children and teachers. The award is given by the Children’s Council of ITEEA.

Virginian’s Honored in Columbus, Ohio
The International Technology and Engineering Educator’s Association held its 75th conference in Columbus, Ohio, March 7-9, 2013. Virginia was well represented by 51 people and awards were received by many in attendance.

Among those honored were the Program of Excellence winners: Woolridge Elementary School, Chesterfield County, represented by Elizabeth Kirk and Windi Hobie; Washington Irving Middle School, Fairfax County, Carl Uccellini and Matt Bechtel; McLean High School, Fairfax County, Cara Mosely. Honored as Teacher of Excellence winners were Susan Nagel, Chesterfield County; Maria Roberts, Fairfax County; and David Lorenz, Chesapeake City Schools.

In addition, Dr. Johnny Moye from Chesapeake received the Silvius---Wolansky "Outstanding Publication" Award. He and Mohamad Barbarji from West Point were awarded the Distinguished Technology and Engineering Educator award. Dr. Petros Katsioloudis from Old Dominion University was awarded for outstanding research, and Dr. Philip Reed, also from ODU was awarded Technology Teacher Educator of the Year award.
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**Keynote Speakers to be announced by September.**

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**Registration Fee:** $145.00

**Registration Postmark Deadline**
January 11, 2014
(non-refundable after January 31, 2014)

**For More Information Contact**
Marcia Hickey, Convention Coordinator
mdhibey@comcast.net

Dr. Lynn Basham, VDOE Representative
(804) 786-4210, lynn.basham@doe.virginia.gov

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Technology Education Service, Virginia Department of Education

(Check [http://www.childrensengineering.org](http://www.childrensengineering.org) for updates.)

Updated: 06/28/13
2013 Convention Highlights
On the Cover
Students from Henderson Elementary in Montclair, VA complete a design challenge for the story *Those Darn Squirrels* by Adam Rubin. Their designs included simple machines to make the squirrels fly.

Plan to join us next year for our annual Children’s Engineering Convention.