The Children’s Engineering Journal

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President’s Message
By Charlotte Holter, President VCEC

On February 20 and 21, 2014 the Virginia Children’s Engineering Convention met in downtown Richmond, Virginia with a record-breaking crowd of nearly 600. This 18th annual convention confirmed that professionals involved with the education of elementary students are interested in how to best deliver STEM education through children’s engineering. The workshops were fresh and invigorating. Our speakers, Dr. Gary Benenson, Dr. Megan Healy, and Dr. John Almarode were dynamic and gave us perspective on how children’s engineering strategies are most effective in providing children with authentic experiences that lead to meaningful learning. The vendors provided us with knowledge about the latest resources available for implementing children’s engineering strategies.

Now that our convention is over and the garnered ideas are being put into practice, let’s focus on the future. The mission of the Virginia Children’s Engineering Council is to advance technological capabilities for elementary students, as well as nurturing and promoting the professionalism of those engaged in these pursuits. We want to help you learn to use children’s engineering activities in your classrooms. We are dedicated to developing design and technology instructional materials as well as providing local, regional, and statewide in-service opportunities for educators at grades K-5.

Revisit our website periodically to investigate new ideas from professionals around the state. Look for our new and improved Children's Engineering: A Teacher Resource Guide for Design and Technology in Grades K-5, Second Edition, to surface this year. There are new design briefs there for your benefit. Our new and upcoming website will also provide you with many resources. The journal offers you with firsthand information and success stories from those who have implemented children’s engineering in their areas. Best practice children’s engineering activities are featured in every issue. Consider sharing your story in the journal and be sure to check out the summer classes being offered.

It is our goal to continue to strive as leaders in our field and to remain acutely aware of the educational needs of young children, especially in the delivery of children’s engineering. Our desire is to assist you in raising the technological capacity of children everywhere.
On Tuesday, April 1, 2014 an earthquake registering B.2 on the Richter Scale struck off the coast of northern Chile reminding the world that in spite of April Fool's Day, seismic activity is no joke. The massive B.2 earthquake was felt as far away as Bolivia, approximately 290 miles or 470 kilometers from the epicenter. The culprit, a fault line off the coast of Chile, is well known for startling seismic sensations as a result of continental crust and oceanic crust clashing deep below the ocean water. What has captured the attention of the news media (e.g., CNN and FOX News) in the United States is the relatively small number of deaths reported in this very strong earthquake. To be clear, any loss of life is a significant loss. However, for an B.2 magnitude earthquake in a populated area, a death toll of less than ten is significant and newsworthy.

Experts attribute this positive news to strict building codes in Chile that are implemented to limit the damage from earthquakes. These building codes, like the building codes in the United States, are generated and implemented after the work of scientists, engineers, and mathematicians are applied to the building of structures. That's right, some of the original research of physicists, geologists, meteorologists, mechanical and civil engineers, and applied mathematicians is ultimately translated into the exact building codes that saved so many lives in Chile.

Why are earthquakes and building codes the topics of discussion in this article? The answer is quite simple: the future scientists, engineers, and mathematicians that will one day engage in original research, have their research translated into practical applications, and, potentially make the world a safer and happier place are in our elementary school classrooms today! By providing an engaging and productive STEM learning environment in our elementary classrooms, that is associated with better behavioral, emotional, and learning outcomes, there is a great probability of sparking the interest and curiosity of these future scientists, engineers, and mathematicians. In addition, classrooms will contribute to the scientific literacy of all students, even those that select other ways to change the world. Research has shown time and time again that the early experiences of students in STEM are associated with later achievement, interest, and persistence in STEM areas (Tai, Liu, Maltese, & Fan, 2006; Maltese & Tai, 2010). One body of research suggests that when students are deprived of early experiences in science, they lag behind in science achievement, never to catch up (Almarode, 2011). Using design briefs in our elementary school classrooms provides early experiences for young children in science, engineering, and mathematics, aligns with how the student brain learns and is easily supported with evidence-based strategies associated with better behavioral, emotional, and learning outcomes.

**How the Brain Learns**

Over the past two decades, there has been an explosion of research into how the student brain receives, processes, and retains information (Medina, 2008; Wolfe, 2010). From a teacher's perspective, this information is very enticing as he or she works to enhance the learning experience of the students in his or her class. Amongst the volumes of technical language associated with brain research, there are some themes that are relevant to the use of design briefs in the classroom and the type of learning experiences that are offered to students. *Our brains learn from simple to complex.* The student brain first starts with simple ideas and then builds in complexity. As young students are first introduced to content in science, engineering, and mathematics, it is vital that information is sequenced and presented from simple to complex. This means that both the introduction of design briefs and the progression of design briefs should begin with simple or foundational ideas and then increase in complexity as the year progresses. The design briefs themselves should move progressively from simple or foundational ideas and gain in complexity as well.

*Continued on page 3*
Our brains learn from concrete to abstract. When new ideas are introduced to young children, they often make meaning of the information by relating it to a personal experience or telling a personal story (i.e., copious hand-raising and the desire to tell a story). This is how their brain is designed to make meaning of abstract ideas. The background and design challenge should offer students a concrete story that allows them to, over time, explore abstract ideas in science, engineering, and mathematics. The background and design brief should be a concrete experience that all of the students can relate to during the process.

We only remember what we think about. This brain rule, or idea, is one of the most important and often overlooked ideas in learning. The student brain only remembers what it thinks about (or what teachers make it think about). That is, students can be following directions, copying notes, doing mathematics problems, but they are thinking about recess. The outcome is that they will not remember the point of the directions, the content of the notes, or how to do the mathematics problems. Instead, they will remember the details of recess. With that being said, design briefs should require students to think about the specific content around which the design brief is created (i.e., sound, pitch, frequency, habitats, etc...). Does the completion of the task grab students’ attention so much that they forget the science and worry more about the color of their structure? If so, students will likely remember how cool their structure looked and not the science behind the design brief.

Design briefs that progress from simple to complex, concrete to abstract, and encourage students to think about the science, engineering, and mathematics content align with how young brains learn.

Where the Rubber Meets the Road – Strategies to Support Children’s Engineering

Just as sitting in your garage does not make you a car, simply using a design brief in your classroom does not make for an engaging and productive learning environment in STEM. In other words, there are group strategies that, when used with a design brief, engage the students’ brains in learning experiences that are positively associated with better behavioral, emotional, and learning outcomes. Although this could be quite a lengthy list, let’s focus on one specific group of strategies: strategies that provide an abundance of opportunities to edit and revise learning (Hattie, 2009, 2012; Almarode & Miller, 2013; Wolfe, 2010; Jensen, 2005).

Editing and Revising Learning. Young learners need opportunities to edit and revise their learning. To expect students to grasp concepts after only experiencing them one time is both unrealistic and inappropriate. Put differently, children do not get complex learning right the first time and initially take in new information in the form of a rough draft (Almarode & Miller, 2013). With regard to a design brief, the learning that occurs before, during, and after a design brief will likely be a rough draft. Therefore, teachers must implement strategies that require students to edit and revise this rough draft learning and upgrade the learning to a “final draft” (Jensen, 2005).

Before, during, and after the design brief, classroom teachers should incorporate strategies that:

1. Require students to write or verbalize observations at each stage of the design brief.
2. Students should be encouraged to use rich descriptions at all stages of the design brief.
3. Each design brief should require students to build explanations and make interpretations of phenomena. Again, this can be written or verbal.
4. Teachers should provide opportunities for students to identify explicit connections to other content or content areas.
5. Students should practice considering different viewpoints and perspectives.
6. Teachers should help students formulate the big idea behind the design brief.
7. Select design briefs that provoke more questions and spark curiosity to address those questions.

Finally, design briefs should aim to uncover the complexity of phenomena and avoid surface-level understanding (Adapted from Ritchhart, Church, & Morrison, 2011). When strategies incorporate
one or some combination of the characteristics listed above, students are engaged in elaborate rehearsal and more likely to retain, recall, and retrieve the essential knowledge, skills, and understanding associated with the content (Wolfe, 2010). Examples of specific strategies include:

1. After the design brief, have students teach content to other classmates (i.e., teach push and pull forces with magnets to classmates).
2. Extract the big idea from the design brief and construct a scientific model (i.e., develop a model of convection).
3. Connect the design brief to a personal event or story (i.e., create a story to go along with the design brief and explain why it aligns with the phenomenon).
4. Illustrate the content for others using non-linguistic representations and visuals (i.e., draw sound waves with different pitches and volume).
5. Have students develop metaphors and analogies for the content (i.e., metaphors for the stages of matter).
6. Create a concept map for the content (i.e., develop a concept map on habitats).

**Final Thoughts**

The early experiences of young children in science, engineering, and mathematics make a difference in the learning trajectories of students in STEM. When these early experiences are designed with the brain in mind (e.g., simple to complex, concrete to abstract, engages student to think about the content), teachers provide an engaging and productive learning environment that is associated with better behavioral, emotional, and learning outcomes. This is best achieved when teachers strategically select strategies that support the use of design briefs in the classroom. Through this framework, teachers are truly engineering better brains in STEM.

**References**


Operation Patriotic STEM Grant
Fort Belvoir Elementary School, Fairfax County Public School

Fort Belvoir Elementary School (FBES) is a Fairfax County Public School (FCPS) located on a military post. The school serves nearly 1,200 students, approximately 96 percent of whom are military dependents. For the last four years FBES has been a STEM (Science, Technology, Engineering and Math) focus school due to two grant awards from the Department of Defense Activities (DoDEA). The first grant ($1.5 million) was received in 2010 and the second grant was received in September 2013 ($1.6 million). These two grants have served as the seed money for the STEM program known as Operation Patriotic STEM (OPS).

These funds allow the school to implement an after-school program and summer extended STEM learning for students at FBES. Funding also supports a STEM classroom, STEM resource room and a STEM resource teacher – Mrs. Kara Fahy. Additionally, the grant funds:

- provide STEM professional development opportunities for staff
- enable the school to participate in STEM related field trips
- support assemblies for students, family activity days, environmental programming and transportation for Marymount University student teachers to provide tutoring services to students.

The STEM extended learning program is known as Kids Lab at FBES and provides after-school programming to 600 students in two 10-week sessions each year for four years. Parents and students choose from a wide variety of STEM activities such as: NXT robotics, SCRATCH (MIT) computer programming, Infinite Potential (Jason Project), Weather Reporter (Project Clarion), and parachutes (Engineering is Elementary). Class sizes are limited to 18 students and a teacher and an instructional assistant or co-teacher work together to implement lessons and support student learning. Teachers receive professional development and are provided planning time to collaborate with colleagues to develop lessons that not only integrate the grade level science and math curriculum, but are also fun and engaging. Additionally, grant money permits transportation to and from the program, which allows for the largest attendance possible.

The school’s Kids Lab Summer STEM Academy has grown since its first year. Initially, the summer program was exclusive to FBES students. FCPS provided additional funding in order to allow students from five neighboring elementary schools to participate. Teachers from FBES and from the neighboring elementary schools collaborate on lesson plans. In addition to the elementary school teachers, FBES collaborates with the Engineering and Technology educators from local middle schools to enhance the programming.
During the instructional day, all students at FBES are provided STEM lessons in the STEM Lab and STEM Resource classrooms. Mrs. Kara Fahy, FBES STEM Resource teacher, sees all classes from preschool to sixth grade in the STEM Lab every other week. Students participate in STEM related inquiry/project based activities that enhance their math and/or science curriculum. Additionally, teachers have access to a well-equipped STEM Resource classroom that is available to them on the alternate week.

Fort Belvoir has a partnership with Marymount University (MU). Currently, MU pre-service teachers are taking a methodologies class at Fort Belvoir every Wednesday. These students spend time with their professor and then go into the classrooms to assist where needed. The partnership between Marymount University and Fort Belvoir Elementary School has been awarded the 2014 Association for Teacher Educators Virginia School/University Partnership Project Award.

FBES was also honored by receiving the Virginia Technology & Engineering Education Association (VTEEA) Program of the Year Award in 2013. This was the first time this Award was given to an elementary school. In addition, Fort Belvoir’s Operation Patriotic STEM will be recognized by The International Technology & Engineering Educators Association (ITEEA) in March 2014. These awards provided $1,000 in cash to FBES and another $1,000 in gift certificates to Legos and Pitsco!

FBES has committed staff that works tirelessly on these STEM programs. At FBES, Nancy Rowland serves at the STEM Program Coordinator and Kara Fahy is the STEM resource teacher. Rachael Domer, a middle school engineering and technology teacher, has collaborated from the very beginning on the after-school and summer programming. In addition, FBES owes the success of the program to the dedicated teaching staff and administrators who make STEM education at the elementary level a priority. The Fort Belvoir Elementary School staff and school community feel very fortunate to have Operation Patriotic STEM in order to engage students in STEM learning at an early age.
Design Briefs to Try

Adaptations
“Fly Traps! Plants That Bite Back”
Dottie Litz (Retired), Spratley Gifted Center– Hampton, Virginia

**Background:** The class has been studying physical adaptation, habitats, food chains and reading the book, “Fly Traps! Plants that Bite Back” by Martin Jenkins. We have learned that plants have many physical adaptations that help them survive in different habitats. They have different types of adaptations such as roots, leaves, color and ways of getting nutrients. They even move.

**Challenge:** Your team must design, collaborate and build a never before seen flytrap that will help eliminate the bugs in our habitat. The trap must have at least three adaptations that will help it survive. The trap must include a poster that diagrams its habitat, possible prey and any predators that might eat it. Students will be given two 45-minute periods to complete. Time management is important.

Fly Trap Criteria
- The fly trap needs a name
- Constructed of recycled or discarded materials and limited craft items
- At least one movable part
- Flytrap must have at least three physical adaptations
- Includes a poster that diagrams the flytraps habitat, possible food chain and predators.

Materials:
- Recycled or discarded items
- One sheet of card stock paper
- Pipe cleaners
- Yarn
- White glue/hot glue
- Tape - limit of 15 cm
- Two brads
- Markers, crayons or color pencils

Tools:
- Hole punch
- Scissors
- Hot glue gun
- Pencils, markers, colored pencils
- Ruler

Targeted Standard of Learning:
Science: 3.1c measure, 3.4b adaptations, 3.6b terrestrial ecosystems, 3.6c populations and communities 3.5 food chain
Math: 3.10 measure 3.11 tell time
English: 3.1 communication skills in a group activity 3.2 brief oral reports 3.9 write for a variety of purposes
Technology: Standard 1.d, 2.k, 2.l, 5.b, 6.b, 8.c, 9.c, d
**Geometric Creatures**


**Background:** We have been learning about geometric shapes, such as squares, triangles, rectangles, circles, cubes, rectangular solids, spheres, pyramids, cones, and cylinders.

**Design Challenge:** Design and build an imaginary geometric creature using both plane and solid geometric shapes. Your geometric creature must stand by itself and have at least two moving parts.

**Criteria:** Your creature must
- have at least five plane shapes
- have at least three solid shapes
- have two moving parts that incorporate simple machines
- stand by itself for five minutes
- be colorful and neatly constructed.

**Materials:** Select from the list below. **Tools:** Select from the list below.
- balloons
- construction paper
- craft sticks
- empty containers
- flattened cardboard containers
- glue
- paper fasteners
- Pipe cleaners
- scrap paper
- spools
- straws
- string or yarn (limit 12 inches)
- tag board
- tape (limit 12 inches)
- pushpin paper drill
- pencil
- ruler
- scissors

**Targeted Standard of Learning:** Mathematics 3.14
**Targeted Standard for Technological Literacy:** 9
**Supporting SOL:** English 3.1, 3.2; Mathematics 3.9; Science 3.1, 3.2
**Supporting STL:** 8, 10, 11
Using Children’s Engineering to Create REAL Learning Experiences
Joan Harper-Neely, W. M. Cooper Elementary Magnet School for Technology, Hampton, Virginia
jharperneely@hampton.k12.va.us

It was an honor to receive the Virginia Technology and Engineering Education Association award as Elementary Technology Teacher of the Year for doing something that I enjoy so much. As the engineering and technology teacher for an urban elementary school, I write curriculum, find resources, plan and deliver instruction for all students in kindergarten through fifth grade. The state standards and standards of technological literacy (STL) are taught using integrated units. Incorporated into the units are an exploration of the various fields of engineering and the technologies each field creates to solve problems and meet the needs of people.

We begin the school year learning about aerospace engineers. Our school is just a few miles from both Langley AFB and NASA Langley. In every class there is a student who knows an adult who works at one of these places. There is a REAL connection. Rockets are designed, built and tested to meet specific challenges depending on the grade level. Primary grades design rockets to fly the greatest distance. Fourth graders design rockets to land within a marked area. Fifth graders must fly their rocket through a moving target. The goals of the aerospace unit are to:
1. expose students to careers in aerospace and aeronautical industries located in the Hampton Roads community
2. provide a context to use the engineering design problem solving process
3. gather authentic data using scientific investigation methods as students test their rocket designs and make improvements by changing one variable of their rocket
4. use related vocabulary in context
5. build an understanding of transportation technologies.

How does REAL learning look in an elementary class?

<table>
<thead>
<tr>
<th>Real world connection</th>
<th>Exposure to non-traditional careers</th>
<th>Application of skills and knowledge from core subjects</th>
<th>Learning in context</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA sends a rover to Mars to collect data</td>
<td>Assume roles as scientist, engineers, and technicians</td>
<td>Complete Design Challenge</td>
<td>Research facts about Mars and learn how to control variables</td>
</tr>
</tbody>
</table>
Our First Year of Growing STEM
Nancy Loyd and Jane Whitely, The Steward School, Richmond, VA

When a group of Steward teachers returned from attending the Children's Engineering Convention in February of 2011, there was a buzz of excitement about using hands on teaching for integrating various areas of the curriculum with Children's Engineering. This enthusiasm gave others a desire to learn more about STEM (Science, Technology, Engineering, and Math) in the classroom. In August of 2012 The Steward School sent four teachers from the Lower School to the “Design, Children's Engineering and Technology Content and Strategies for the Elementary Classroom” class in Winchester, Virginia. The group traveling to attend the class included the third grade teachers, a second grade teacher, and a fifth grade teacher. This article outlines some of the STEM activities that the third grade teachers incorporated into our third grade curriculum during the 2012-13 school year.

Before attending the Convention we had misconceptions as to what forms “technology” could take. Our mental picture of technology had been computers, iPads, and even Smart boards. In our class we quickly discovered that levers, pencils, paper fasteners, and scissors all make work easier, thereby meeting the definition of technology. These simple tools and many others play an important role in the process of Children's Engineering. For us the seeds of an innovative teaching approach had been planted, and we were anxious to observe what might develop. Returning to school soon after the class resulted in an enthusiasm to begin integrating the STEM design model into our existing third grade curriculum as soon as possible.

To introduce both students and parents to the concept of Children's Engineering, our first STEM activity was completed during the first few weeks of school in preparation of Back to School Night. This activity included both a writing component and a self-portrait action figure. Using an interview questionnaire to learn about the assigned partner, each student composed a paragraph to introduce this third grader to the class and to the parents. Finally each child’s stand alone action figure was made with appropriate school attire and identifying facial features. We challenged the students to construct a way for their action figures to stand alone using only index cards and tape. It was amazing to observe the many ways our third graders approached this design problem. A second language arts design brief, “Presidential Walk of Fame”, was a biography book report on a current or past president. This challenge required students to create a paper figure of their president and place three important events from the president’s life along a timeline on a poster. A lever was used to move each presidential figure along the path of his life.

In the area of science we were inspired by the first chapter of our science text to create the “What We Know about Living Things” design brief. The students created a rotating wheel featuring a living organism of their choice. Each student needed to apply research skills in locating the correct information to demonstrate how the four basic needs of the chosen living thing were met. As the wheel turned, cut-outs revealed the requirements of the plant or animal. The project gave us the opportunity to introduce the compass in measuring the diameter of a circle and obtaining required dimensions for their circles and half circles. A second science design brief entitled “Let's Bloom”, focused on the parts of a plant. We wanted the students to create a 3-D cut-away model of a plant revealing the structures that were part of the reproductive process. This design activity required a hinged lever with a moving pollinator attached. The students were excited to use glitter to represent pollen on their models. Allowing the students to experience the 3-D prototype of a plant’s reproductive system helped them to better understand how the parts work together.

To enhance the social studies curriculum, we wanted a visual representation of our curriculum’s fifteen cultural aspects that are applied to each of our specific countries of study. Some of these aspects of study are agriculture, industry, currency, type of government, recreation, and others. Choosing France as our nation of focus, a different cultural topic was given to each pair of students.

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The partners created pop-up cards with a moving part to help illustrate their subject. The dioramas were then presented to the grade level as a study aid. “Vive la France!” required students to utilize research to complete this challenge with correct information. A second social studies activity was to allow the students to use classroom atlases to research important landmarks of the three regions of Asia. The information was then used to create a brochure illustrating and describing the features and a proposed travel plan. Students completed a trifold with a written itinerary, bullets of interest, and a pop-up sign for each section of the three regions.

To culminate our study of children’s engineering practices, the third grade hosted a “Toy Challenge Expo”. Our Toy Challenge was inspired by an article that was required reading for our summer Children’s Engineering class. The third grade students worked with partners to design and create a toy or game in one of three categories: instructional, family, or outdoor. This challenge was a true “leap of faith” for the teachers, because we had no idea where it would lead. We also planned to use the students’ final products to showcase the third grade STEM program for parents and other members of our school community. The students first practiced with an assigned partner and were allowed only nine common materials to use in creating a toy or game. As the challenge continued students were given the opportunity to refine their original ideas or brainstorm new games or toys. Other specific challenges to be completed included determining the game category, writing the rules/directions, identifying the purpose of the game, listing the materials and tools used, deciding if the game mainly involved luck or skill, drawing a picture of the game or toy, determining age appropriateness, and making a presentation poster. We encouraged the use of recycled materials and were excited to see some students bring additional materials from home to enhance their final product. Each week time was set aside for planning, sketching, designing, or modifying the toys or games. When the projects had been completed, all Lower School students, parents, and Steward administrators were invited to visit. Our students were visibly animated as they greeted visitors and proudly shared their final products. They were able to describe the design process they had followed, problems they had encountered, and even speculated on what they might have done differently.

As we observed our students participate in the STEM activities this year, we saw the content areas of our curriculum become more meaningful to them. The design process allowed students to interconnect several areas of study in an authentic and active learning environment. Creativity and problem solving were key components to this way of learning. The children needed to communicate effectively with each other and be willing to negotiate and compromise to reach a solution. Each challenge also provided a framework for students to become more self-directed and work to meet the criteria of the design brief. Risks were taken to find a successful way to complete a project, but failure was considered an opportunity to adapt and attempt again. Students were able to appreciate the uniqueness of their fellow classmates and their approaches to given challenges.

The major challenge during our first year of growing STEM was the time needed to prepare for these activities. We wrote and planned Children’s Engineering challenges that would enhance our required curriculum and meet the needs of our students. Writing the design briefs was time consuming. We usually produced a model of the project in advance to make sure the instructions were clearly written with specific parameters, but we wanted to allow the students as much creativity as possible. It took time to obtain the needed materials and tools that the STEM activities required. We also carefully considered the grouping of our third graders before meeting for the weekly Children’s Engineering sessions. We wanted students to have the opportunity to work with all the members of the third grade before the end of the year.

In reviewing our first year’s efforts we were excited about our many successes. Although we have been out of school for only a short time, we have already begun planning new Children’s Engineering activities for our next school year!
Dr. Marlene Scott was honored by having the Curriculum and Instructional Leadership Award named in her honor. The winner of The Marlene C. Scott Curriculum and Instructional Leadership Award is Rockingham County Public Schools.
Children's Engineering
K-5 Strategies for Implementing

This hands-on interactive course is designed for teachers in grades K-5. Participants will learn to use design, engineering and technology instructional resources to enhance children’s attainment of the Virginia Standards of Learning in science, mathematics, social studies/history and language arts. The course will engage participants in critical thinking and problem solving experiences that contribute to a child’s ability to retain content in the Standards of Learning. Participants will discover how easy it is to integrate Children’s Engineering into the existing curriculum as a strategy for increasing children’s academic success. (Teachers will take home a notebook filled with design briefs and ideas for enhancing their daily instruction. These resources will not be an add-on to your curriculum. The resources will enhance your instructional program.)

Save the date!!

July 28-August 1, 2014, Hampton, Virginia
August 4-8, 2014, Chesterfield County, Virginia
One follow up Saturday session - date to be determined.

For more information, contact:
• Patti Fazzi at patriciafazzi@aol.com
• Linda Harpine at lharpine@rockingham.k12.va.us

James Madison University Course Information

Title: Children’s Engineering (501)
* JMU - 3 graduate credits, 90 recertification points
* JMU Tuition - $846
* JMU Non-refundable Application Fee - $20
* Materials Fee $65

VCEC Professional Development Information
* Non-college credit, 45 recertification points, $375 (Early Bird by June 20, 2014. After June 20, 2014, $395)

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If you would like to submit to the upcoming Fall 2014 edition, please send articles (up to 500 words and 2 jpeg pictures) and design briefs with CEC journal as the subject to cholter@rockingham.k12.va.us by August 30.