



## Agenda

Monday, April 16, 2012

Time	Session	Room
8:00 a.m. - 5:00 p.m.	Project-based Learning Conference (Optional add-on)	
11:00 a.m. - 12:00 p.m.	Registration	Imperial Ballroom
12:00 - 12:40 p.m.	Welcome/Lunch	
12:40 - 1:45 p.m.	Robin Marcus, STEM Program Director, NC New Schools Project  Mary Linda Andrews, Director, Community Partnerships GlaxoSmithKline  Keynote Presentations: Emily Pilloton, Founder and Executive Director, Project H Design  June Atkinson, State Superintendent of Public Instruction	
2:00 - 3:25 p.m.	Student STEM Presentations: Attendees will rotate three times during this session	
3:25 - 3:35 p.m.	Break & Transition to Concurrent Sessions	
3:35 - 5:00 p.m.	Concurrent Sessions	See attached
5:15 - 6:45 p.m.	Opening Reception	Imperial Ballroom

Tuesday, April 17, 2012

Time	Session	Room
7:30 - 8:00 a.m.	Registration	Imperial Ballroom
8:00 - 8:45 a.m.	Breakfast/General Session	
9:00 - 10:30 a.m.	Concurrent Sessions	See attached
10:30 - 10:40 a.m.	Break & Transition to Concurrent Sessions	
10:40 a.m. - 12:00 p.m.	Concurrent Sessions	See attached
12:00 - 2:00 p.m.	Lunch & General Session  Wayne Robinson, Talent and Recruiting Manager, Nucor  Keynote Presentation: Tony Wagner, Author and Education Innovation Fellow, Harvard University  Brett Carter, President, Duke Energy North Carolina	Imperial Ballroom
2:10 - 3:40 p.m.	Concurrent Sessions	See attached
3:40 - 3:50 p.m.	Break & Transition to Concurrent Sessions	
3:50 - 5:20 p.m.	Concurrent Sessions	See attached



## Agenda (con't)

Wednesday, April 18, 2012

Time	Session	Room
7:30 – 8:30 a.m.	Breakfast/Opening Session	Empire Ballroom
8:30 a.m.	Board Busses	Empire Lobby
8:45 a.m.	Busses depart to School Visits	Empire Lobby
9:15 a.m. - 12:00 p.m.	School Visits	Schools
12:15 p.m.	Return to hotel/boxed lunch	
12:30 - 1:30 p.m.	Closing Session/Table Talk Discussion  Eric Beacoats, Superintendent, Durham Public Schools  Jan Morrison, President, Teaching Institute for Excellence in STEM (TIES)	Empire Ballroom
1:30 - 2:00 p.m.	Conference Adjournment	Empire Ballroom



## Concurrent Sessions Overview

### Types of Sessions

Workshop (90 minutes)	Workshops are highly interactive, collaborative sessions that engage participants in exploration of STEM education in action. Rooms will be set with round tables.
Symposium (90 minutes)	Symposia are comprised of 2 or 3 presentations that address the same issue from different perspectives. Presentations are given during the first hour, followed by discussion between and among the audience and presenters. The facilitator for this discussion will be identified by the conference committee. Rooms will be set theater style.
Short Course (3 hours)	Short courses provide a deep dive into one or more of the conference strands by engaging participants in hands-on, active learning. Participants have the opportunity to practice highlighted strategies and leave with resources to support implementation. Rooms will be set with round tables.

### Strand Definitions

Curriculum Resources	STEM curriculum emphasizes connections within and between the fields of mathematics and science, heavily and meaningfully integrates technology, and introduces and continually engages students in the engineering design process. The arts and humanities further support the STEM focus and highlight the role of STEM in society and the economy. What resources are available to support implementation of a STEM curriculum?
Instruction	STEM instruction engages students in learning through active solving of real problems. Students regularly engage in deep discourse, marked by discipline-based justifications. Beyond content knowledge, STEM educators value and cultivate creativity and develop the problem solving, communication, and collaboration skills that drive innovation. Most of us were not taught this way. What does this look and feel like in practice?
Assessment	In addition to standard measures of achievement, STEM indicators of success include student confidence and perseverance when faced with a challenge, as well as the ability to gather and analyze relevant information and synthesize knowledge and skills to solve authentic problems in thoughtful and ethical ways. What we assess is what we get. How do we assess for the STEM outcomes we desire?
Policy and Research	States are adopting statewide STEM strategies that are informed by research and either supported or constrained by policy. What does research suggest are the most promising strategies and models for STEM education? What policies have been implemented to support innovation in STEM education?
Extra- and Co-Curricular Opportunities	Extracurricular activities, summer programs, virtual experiences, and internships provide learning opportunities that increase students' awareness of and interest in STEM and its importance in sustaining and improving our lives. How can we establish a comprehensive STEM program that extends beyond courses and classrooms?
Scaling STEM	What does it take to scale an innovation? A clear definition must be ready and available for scaling. Past research must be explored to determine what has worked and what has not worked historically. Finally, barriers must be identified and addressed.



## Monday - Student STEM Presentations

2:00 - 3:25 p.m.

School	Session Title	Room
TBD	TBD	<b>Imperial 1</b>
TBD	TBD	<b>Imperial 2</b>
TBD	TBD	<b>Auditorium</b>
TBD	TBD	<b>Crown</b>
TBD	TBD	<b>Royal</b>
TBD	TBD	<b>Empire A/B</b>
TBD	TBD	<b>Empire C</b>



## Monday - Concurrent Session One

3:35 - 5:00 p.m.

Strand	Session Title	Room
Instruction	Engineer Integration	Imperial 1
Assessment	Stop Counting Fish: Effectively Aligning Teaching, Learning and Assessment Through the CWRA	Imperial 2
Extra/Co Curricular	FIRST Robotics - An Amazing Journey	Empire A/B
Instruction	STEM in the Humanities: Beyond Technology in English and Social Studies	Empire C
Instruction	Real Problem Based Learning	Auditorium
Assessment	Next Generation Science Standards and Assessment	Piedmont
Instruction	Engaging Students in STEM through Service Learning	Sandhills
Student STEM Presentation	TBD	Crown
Student STEM Presentation	TBD	Royal
Student STEM Presentation	TBD	Bull Durham



## Monday - Concurrent Session One

3:35 - 5:00 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Instruction</b>	<p><b>Engineer Integration</b></p> <p>This workshop will lead participants through developing lessons and projects that use the theme of engineering design process. Participants will engage in a lesson to learn about the engineering design process, brainstorm how the design process connects to other disciplines, and plan a lesson incorporating the process.</p>	<b>Imperial 1</b>	<b>Leslie Eaves, NC New Schools Project</b>
<b>Assessment</b>	<p><b>Stop Counting Fish: Effectively Aligning Teaching, Learning and Assessment Through the CWRA</b></p> <p>John Austin, former Academic Dean at St. Andrew's School (DE), shares an anecdote in which a student is penalized for providing a nuanced response to an assessment item that—on its surface—simply asked her to count fish. Our challenge is to embrace, not denigrate, a reform culture that fosters critical thinking: in our students, our classrooms, and our schools. The CWRA emphasizes that effective teaching, learning, and assessment cannot succeed on their own. Authentic assessment must be aligned with effective teaching and learning for school improvement to succeed. We will discuss ways that schools can improve higher-order skills (like critical thinking, problem solving, and effective communication) by connecting teaching, learning, and assessment through authentic performance-based practices.</p>	<b>Imperial 2</b>	<b>Chris Jackson, College and Work Readiness Assessment (CWRA)</b>
<b>Extra/Co Curricular</b>	<p><b>FIRST Robotics - An Amazing Journey</b></p> <p>Real Challenges - Real Solutions! FIRST provides students with a unique opportunity to work side by side with engineering mentors, classroom teachers and business leaders as they tackle yearly game challenges. Robots are the 'hook' to help engage students in a way that makes their classroom learning relevant to their future education and career choices. Come play with three different levels of robotic systems (elementary, middle and high school) and learn how this after-school activity can fuel a new level of excitement into your school culture. By providing a meaningful project that spans engineering, programming, research, marketing, entrepreneurship, finances, teamwork and more, students gain in self-confidence and discover new avenues for growth and exploration. This session will provide you with the information needed to start a team in your school or community.</p>	<b>Empire A/B</b>	<b>Marie Hopper, NC FIRST Robotics</b>
<b>Instruction</b>	<p><b>STEM in the Humanities: Beyond Technology in English and Social Studies</b></p> <p>STEM education is a huge focus for 21st century students... but where does humanities fit in this puzzle? Yesterday's ideas of presentation tools and word processing lab days as STEM education are making way for more innovative approaches in education. The Common Core curriculum demands better consumers of information and humanities educators have been tasked with making our students more savvy when it comes to discerning reliability and validity in the world around them. English, social studies and other humanities educators will focus on using the engineering design process, team building, critical thinking skills, multimedia design and communication, project based learning, cross curricular lesson design as well as engaging technology tools to create STEM enriched humanities instruction.</p>	<b>Empire C</b>	<b>Becky Evans-Wilson, Guilford County Schools</b>
<b>Instruction</b>	<p><b>Real Problem Based Learning</b></p> <p>Every teacher faces topics that just don't seem to resonate with the students. Using real world problems can be a very powerful tool to motivate students to study and learn topics that would otherwise be difficult to access. In this workshop, participants will get a chance to learn and practice engagement of community partners to source problems and local experts to solve those problems.</p>	<b>Auditorium</b>	<b>Robert Malkin, Duke University</b>



## Monday - Concurrent Session One

3:35 - 5:00 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Assessment</b>	<p><b>Next Generation Science Standards and Assessment</b></p> <p>This session addresses the role of outcomes-based assessment as an approach to measure student learning and support STEM competencies. As the Next Generation Science Standards are developed and adopted, outcomes-based assessment will prove even more critical for monitoring the day-to-day evidence of student mastery of standards.</p>	<b>Piedmont</b>	<b>Marc Siciliano, Teaching Institute for Excellence in STEM (TIES)</b>
<b>Instruction</b>	<p><b>Engaging Students in STEM through Service-Learning</b></p> <p>Service learning is a teaching method that allows students to connect what they are learning in the classroom to addressing real problems in the community. Service learning is especially useful in designing STEM learning experiences because students are able to see the abstract concepts taught in the classroom solving problems in the community. This interactive session will provide strategies and resources for using service-learning in your classroom as well as examples of service-learning happening in middle school classrooms around the country.</p>	<b>Sandhills</b>	<b>Elizabeth Koenig, National Youth Leadership Council</b>
<b>Student STEM Presentation</b>	<b>TBD</b>	<b>Crown</b>	
<b>Student STEM Presentation</b>	<b>TBD</b>	<b>Royal</b>	
<b>Student STEM Presentation</b>	<b>TBD</b>	<b>Bull Durham</b>	



## Tuesday - Concurrent Session Two

9:00 - 10:30 a.m.

Strand	Session Title	Room
Policy & Research	Future Proofing the Department of Defense Schools and Services	Imperial 2
Instruction	Scaling STEM through Distance Learning: Building Capacity and Improving Outcomes	Empire A/B
Policy & Research	Planting the Seeds of Relationships: Building Connections with a Local Community College	Empire C
Curricular Resources	New STEM tools for High School Biology!	Empire D
Curricular Resources	STEM curriculum, instruction, and assessment for the Common Core State Standards for Mathematics	Empire E
Scaling STEM	Defining STEM Education for Scale	Auditorium
Assessment	Assessing 21st Century Skills	Crown
Instruction	Modeling Instruction: Developing a Model of Energy Across All Science Courses  This is a short-course that lasts from 9:00 a.m. – 12:00 p.m.	Royal
Extra/Co Curricular	Teaching and Learning Through Engagement and Relevance The 4-H Way	Bull Durham



## Tuesday - Concurrent Session Two

9:00 - 10:30 a.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Policy &amp; Research</b>	<p><b>Future Proofing the Department of Defense Schools and Services</b></p> <p>The Department of Defense Education Activity gathered the brightest minds in 21st Century Education, facility design, and professional development to launch a participatory design process during the summer and fall of 2011. This effort features the Center of School Reform Services, The Jacobs Group, 2 Roads Consulting, and The Setser Group engaging stakeholders in discussions around STEM, Blended Learning, Project-based Learning, and real world skill attainment to establish DoDEA schools as the world's leader in 21st Century education. Coupled with a \$5 billion allocation for the redesign of 134 schools, smart designs inform smart spaces so that teachers and learners are engaged, ready for college and careers, and able to optimize facilities as a catalyst for future ready outcomes.</p>	<b>Imperial 2</b>	<b>Bryan Setser, The Setser Group</b>
<b>Instruction</b>	<p><b>Scaling STEM through Distance Learning: Building Capacity and Improving Outcomes</b></p> <p>Think you know a lot about the North Carolina School of Science and Mathematics (NCSSM)? You may know that NCSSM teachers engage students deeply in the content, helping students to discover mathematics and science through inquiry and problem-solving. You may even know that we teach more students through distance education than we do in our residential program. What you may NOT know is that these novel and innovative teaching methods are available to schools and school systems statewide! NCSSM is Scaling STEM: reaching students and teachers through distance education, aligned learning objects, content-area professional development, and technology-enabled teacher-to-teacher collaboration to realize our outreach mission. Leave this session with ideas for partnering with NCSSM, building local capacity for STEM education in your school or school system.</p>	<b>Empire A/B</b>	<b>Melissa Rihm Thibault, North Carolina School of Science and Mathematics</b>
<b>Policy &amp; Research</b>	<p><b>Planting the Seeds of Relationships: Building Connections with a Local Community College</b></p> <p>Hear from a vice-president of a community college and a principal of a STEM high school about the importance of effectively utilizing resources and getting students involved in different STEM activities. Listen as they describe specific strategies currently being implemented at a community college, creating powerful, meaningful relationships that affect policy and practices. In addition, you will hear from a science teacher and a science professor talk about curriculum planning, vertical alignment, collaboration, joint projects, and shared facilities.</p> <p>Presented by Sharon Thompson and Kim Jones of Brunswick Community College; and Vicky Snyder and Claire McLaughlin of Brunswick Early College High School.</p>	<b>Empire C</b>	<b>Symposium Session</b>
<b>Curricular Resources</b>	<p><b>New STEM Tools for High School Biology!</b></p> <p>The Science and Global Issues biology program is the new high school biology program from the Science Education for Public Understanding Program (SEPUP) at University of California, Berkeley. Developed with support from the National Science Foundation, the program develops core content from the biological sciences, using an issues-based, inquiry-driven approach and themes from global sustainability, and personal and environmental issues. Core content from units on ecology, cell biology, genetics, and evolution are supported with case studies emphasizing a problem-solving orientation to current issues in wildlife resource management, STEM cell research, use of genetically modified organisms, and biodiversity. Participants will receive an overview of the program and a hands-on look at activities and materials from the cells and genetics units, to see examples of how core concepts are introduced, developed, and assessed. Support for literacy and technology will also be developed, and participants will have the opportunity to leave with samples of the curriculum materials.</p>	<b>Empire D</b>	<b>Mark Koker, Ph. D, LAB-AIDS Director of Curriculum</b>



## Tuesday - Concurrent Session Two

9:00 - 10:30 a.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
Curricular Resources	<p><b>STEM curriculum, instruction, and assessment for the Common Core State Standards for Mathematics</b></p> <p>Participants will engage in a lesson from Core-Plus Mathematics that exemplifies the goals of a STEM education. STEM instruction and assessment will be modeled while participants use CPMP-Tools, a suite of public domain software that includes algebra, geometry, statistics, and discrete mathematics features. We will consider which of the CCSSM Standards and Mathematical Practices are evident in the lesson. Bring your laptop to investigate here, then try this lesson in your classroom.</p>	Empire E	Beth Ritsema, Western Michigan University
Scaling STEM	<p><b>Defining STEM Education for Scale</b></p> <p>Before any system can scale STEM education, leaders must agree upon a definition of what STEM education means and develop tools for communication, guidance, and assessment. Learn about two large-scale efforts to develop research-based tools for scaling STEM education.</p> <p>Presented by Sam Houston of the NC Science, Mathematics, and Technology Education Center; Karl Rectanus of VIF International Education; Steve Hill of STEM East; and Charles Coble of Third Mile Group</p>	Auditorium	Symposium Session
Assessment	<p><b>Assessing 21<sup>st</sup> Century Skills</b></p> <p>Assessing 21st century skills from collaboration to presentation is an integral part of STEM education. These skills can be leveraged in all disciplines. Participants will engage in identifying 21st century skills needed for the college and career worlds, and will generate ways to assess these from documentation to rubrics.</p>	Crown	Andrew Miller, Miller Educational Consulting LLC
Instruction	<p><b>Modeling Instruction: Developing a Model of Energy Across All Science Courses</b></p> <p>Modeling Instruction is a proven approach of curriculum design and teaching methodology. In this session we highlight an example that stretches across all science courses. The concept of energy storage mechanisms and energy transfer is basic to an understanding of biology, chemistry and physics. Participants will learn instructional techniques to help students construct an understanding of energy storage and energy transfer mechanisms. Participants will experience a series of "energy" stations, develop an operational definition, conduct a paradigm lab to develop the model for energy stored in springs, look at activities to deploy the energy model, and perform a lab practicum to check for understanding. Participants will have opportunities to use Vernier technology for data collection and analysis as well as simple whiteboards to facilitate discussion.</p> <p><b>This is a short-course that lasts from 9:00 a.m. – 12:00 p.m.</b></p>	Royal	Scott Ragan, The Science House
Extra/Co Curricular	<p><b>Teaching and Learning Through Engagement and Relevance The 4-H Way</b></p> <p>4-H challenges youth to "Join the Revolution of Responsibility" by creating change in their community. The goal of the North Carolina 4-H program is to assist youth and adults in becoming competent, coping and contributing members of a global society, developing essential life skills through planned learn-by-doing experiences. This workshop will briefly provide an overview of the framework of the 4-H organization and how to best collaborate with 4-H through STEM programming. 4-H agents will drive the STEM activities that participants will experience.</p>	Bull Durham	Amy Chilcote, North Carolina 4-H



## Tuesday - Concurrent Session Three

10:40 a.m. - 12:00 p.m.

Strand	Session Title	Room
Policy & Research	Experiences from the GRADUATE: A look into a graduation project requirement	Imperial 2
Extra/Co Curricular	Preparing Students to SUCCEED in the 21st Century Workforce	Empire A/B
Policy & Research	STEM as a school wide strategy: Lessons Learned from the New Tech Network	Empire C
Curricular Resources	Implement Mathematical Practices Using Great Tasks	Empire D
Curricular Resources	Using Citizen-Science to implement STEM	Empire E
Scaling STEM	Pathways to the Classroom: Bringing People with STEM Skills into Teaching	Auditorium
Instruction	PBL & STEM	Sandhills
Assessment	The Role of Assessment in the Future-Ready Classroom	Crown
Instruction	Modeling Instruction: Developing a Model of Energy Across All Science Courses <small>This is a short-course that lasts from 9:00 a.m. – 12:00 p.m.</small>	Royal
Extra/Co Curricular	STEMulate K-12 Students with Mentor-Assisted Enrichment Projects & STEMfinity Kits	Crystal Coast Ballroom



## Tuesday - Concurrent Session Three

10:40 a.m. - 12:00 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Policy &amp; Research</b>	<p><b>Experiences from the GRADUATE: A look into a graduation project requirement</b></p> <p>Although the requirement became optional in 2008, 80% of North Carolina public schools are still requiring a culminating project for their students. This symposium will discuss the model and results from different perspectives on the North Carolina Graduation Requirement. Beyond the research and evaluation results from one new school in the National Science Foundation funded GRADUATE, panel members from the Department of Public Instruction, EMC, Xerox and Kelly Services will provide insight into what is working and how the graduation requirement can be improved.</p> <p>Presented by Len Annetta of George Mason University; Karen Peterman or Karen Peterman Consulting; and Elissa Brown of NC Department of Public Instruction</p>	<b>Imperial 2</b>	<b>Symposium Session</b>
<b>Extra/ Co Curricular</b>	<p><b>Preparing Students to SUCCEED in the 21st Century Workforce</b></p> <p>Participants in this workshop will gain a better understanding of how computational thinking and technology can supplement their curriculum to provide students with valuable extra- and co-curricular resources. Participants will learn about Shodor's workshops and apprenticeship program offered through Project SUCCEED (Stimulating Understanding of Computational science through Collaboration, Exploration, Experimentation, and Discovery) as well as internships offered through Shodor's Mentor Center. This workshop will focus on enabling participants to create similar programs in their classrooms as well as after school programs.</p>	<b>Empire A/B</b>	<b>Jenny Jones, Shodor</b>
<b>Policy &amp; Research</b>	<p><b>STEM as a School Wide Strategy: Lessons Learned from the New Tech Network</b></p> <p>How can a STEM program, or a sequence of elective courses, become a school wide approach with a shared set of STEM focused practices across all courses? Discover a national network of innovative STEM schools working in 16 states, including North Carolina, and collaborate with peers to develop key next steps in rethinking or rebranding your school as a STEM school. Learn about the use of interdisciplinary project based learning, innovative assessment practices, and technology rich learning environments to help you frame your school or district's own STEM strategy.</p>	<b>Empire C</b>	<b>Tim Presiado, New Tech Network</b>
<b>Curricular Resources</b>	<p><b>Implement Mathematical Practices Using Great Tasks</b></p> <p>K-12 students need to demonstrate what they truly understand as they solve meaningful problems. Teachers must study and analyze student work in order to diagnose mathematical misunderstandings and to help students learn from their mistakes. Come join this session as we explore Great Tasks that target the Standards for Mathematical Content and the Standards for Mathematical Practice. A copy of the current NCSM Great Tasks will be distributed to each participant.</p>	<b>Empire D</b>	<b>Connie Schrock, National Council of Supervisors of Mathematics</b>
<b>Policy &amp; Research</b>	<p><b>Pathways to the Classroom: Bringing People with STEM Skills into Teaching</b></p> <p>The recent economic downturn, while now abating, has created a large number of dislocated workers from careers rich in experience and expertise in science, technology, engineering and math (STEM). Unlike most previous economic downturns, many of today's under or unemployed workers have the STEM skills – those with high academic and social value. This wealth of skilled talent comes at a time when many public schools are experiencing a shortage of science and math teachers, positions which require the very skills that many of the under or unemployed workers have. This shortage of qualified STEM teachers is particularly acute in many rural and urban schools. The federal Departments of Labor and Education are interested in hearing from session participants about how valuable this idea sounds to them, what barriers exist, what it might take to address these barriers and what ideas they have for moving the idea forward.</p>	<b>Auditorium</b>	<p><b>Gene Caso, US Department of Labor</b></p> <p><b>Dennis Bega, US Department of Education</b></p>



## Tuesday - Concurrent Session Three

10:40 a.m. - 12:00 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
Instruction	<p><b>PBL &amp; STEM</b></p> <p>What is Project Based Learning (PBL) and how does it relate to STEM? How do you design STEM projects that are standards-driven and interdisciplinary? What do various levels of STEM projects look like? How do you manage STEM projects in my classroom? All of these questions and many more will be answered during BIE's interactive workshop on PBL &amp; STEM. During the workshop, participants will learn how the eight Essential Elements of PBL relate to STEM. They will better understand how to do integrated curriculum design. Participants will see exemplars of projects implemented by first-year PBL teachers and experienced PBL veterans. They will also learn basic project management tips and technology to help with typical classroom challenges.</p>	Sandhills	Alfred Solis, Buck Institute for Education
Assessment	<p><b>The Role of Assessment in the Future-Ready Classroom</b></p> <p>Assessment is more than quizzes and tests. Understanding the relationship between assessment and instruction is key to designing meaningful STEM lessons that are matched to student needs. The goal of this session is to gain a more holistic understanding of assessment as an integral part of everyday teaching practice. Participants will learn how to employ a variety of assessment tools, including authentic, formative, and informal, to guide and motivate student learning. Teachers will practice creating and using rubrics for problem solving and leave the session with tips and tools they can use in their own classroom.</p>	Crown	Rachel Porter, The Centers for Quality Teaching and Learning
Instruction	<p><b>Modeling Instruction: Developing a Model of Energy Across All Science Courses</b></p> <p>Modeling Instruction is a proven approach of curriculum design and teaching methodology. In this session we highlight an example that stretches across all science courses. The concept of energy storage mechanisms and energy transfer is basic to an understanding of biology, chemistry and physics. Participants will learn instructional techniques to help students construct an understanding of energy storage and energy transfer mechanisms. Participants will experience a series of "energy" stations, develop an operational definition, conduct a paradigm lab to develop the model for energy stored in springs, look at activities to deploy the energy model, and perform a lab practicum to check for understanding. Participants will have opportunities to use Vernier technology for data collection and analysis as well as simple whiteboards to facilitate discussion.</p> <p><b>This is a short-course that lasts from 9:00 a.m. – 12:00 p.m.</b></p>	Royal	Scott Ragan, The Science House
Extra/Co Curricular	<p><b>STEMulate K-12 Students with Mentor-Assisted Enrichment Projects &amp; STEMfinity Kits</b></p> <p>STEMulate is a partnership of K-12 students, parents, teachers, higher education, businesses, and other key community stakeholders invested in Science, Technology, Engineering and Mathematics (STEM) teaching and learning. STEMulate will connect college mentors to high-need students where they can share their passion and knowledge through hands-on projects, inspiring the students to pursue STEM careers. Through STEMulate mentorship, future scientists and engineers meet with students weekly to teach new skills and create a product or performance to share with their community. Mentors will teach topics like solar car engineering, chemistry, and robotics to spark students' creativity and have been shown through rigorous evaluations to boost proficiency and on-time graduation rates.</p>	Crystal Coast Ballroom	William A. Gray, Mentoring Solutions



## Tuesday - Concurrent Session Four

2:10 - 3:40 p.m.

Strand	Session Title	Room
Curricular Resources	Using Citizen-Science to Implement STEM	Imperial 2
Instruction	Developing Future-Ready Learners Through Inquiry and PBL <small>This is a short-course that lasts from 2:10 – 5:20 p.m.</small>	Empire A/B
Policy & Research	Program Evaluation of STEM Based Initiatives	Empire C
Curricular Resources	Problem Centered Approach to CCSS	Empire D
Instruction	Strategies for Purposeful Problem-Solving	Empire E
Scaling STEM	Leadership Content Knowledge for Transforming Mathematics Education	Auditorium
Assessment	Authentic Assessment in Performance-based STEM Education Activities	Crown
Assessment	Applying NAEP to Achieve Goals in Teaching and Learning STEM	Royal
Extra/Co Curricular	Ten80 Student Racing Challenge: NASCAR STEM Initiative <small>This is a short-course that lasts from 2:10 – 5:20 p.m.</small>	Crystal Coast Ballroom



## Tuesday - Concurrent Session Four

2:10 - 3:40 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Curricular Resources</b>	<p><b>Using Citizen-Science to implement STEM</b></p> <p>Citizen-Science is a term used for the systematic collection and analysis of data; development of technology; testing of natural phenomena; and the dissemination of these activities by citizens acting as researchers. The use of Citizen-Science networks often allows scientists to accomplish research objectives more feasibly than would otherwise be possible. In addition, these projects aim to promote public engagement with the research, as well as with science in general. The session will explore several opportunities and resources teachers can use to implement citizen-science programs in their school.</p>	<b>Imperial 2</b>	<b>Patrick Curley, Onslow County Schools</b>
<b>Instruction</b>	<p><b>Developing Future-Ready Learners Through Inquiry and PBL</b></p> <p>Authentic STEM instruction prepares students for careers that require innovation and creative problem-solving. Inquiry and project-based learning (PBL) are fundamental elements of a future-focused STEM classroom. This session immerses teachers in a model inquiry-based project. Teachers are then guided to deconstruct the model to its essential elements and begin designing their own inquiry-based projects. Participants will analyze the essentials of effective PBL, and connect them to their own content. Teachers will select relevant problems and scenarios, craft essential questions and create high quality assessment tools. All participants will leave the session with a working plan for implementing an inquiry-based PBL module with their students.</p> <p><b>This is a short-course that lasts from 2:10 – 5:20 p.m.</b></p>	<b>Empire A/B</b>	<b>Steve Puls, The Centers for Quality Teaching and Learning</b>
<b>Policy &amp; Research</b>	<p><b>Program Evaluation of STEM Based Initiatives</b></p> <p>The symposium will focus on two current studies of evaluations of STEM based high school initiatives. The first, entitled “Re-designed High Schools for Transformed Learning” focuses on a formative and summative evaluation of ten redesigned STEM high schools in North Carolina. The goal of the study is to learn how creating innovative learning environments for STEM education can help motivate students to become active learners with the capacity to think critically and solve real-world problems. The second, "Measuring the Effectiveness of Inclusive STEM Schools" summarizes an exploratory project, testing the effects of attending three ISHS partner schools in North Carolina to measure students’ STEM interests and experiences at the time of entry into ninth grade and their in- and out-of-school STEM experiences during high school.</p> <p>Presented by Jeni Corn of the Friday Institute; Larry Bernstein of RTI International; Barbara Means of SRI International; and Ann House of SRI International</p>	<b>Empire C</b>	<b>Symposium Session</b>
<b>Curricular Resources</b>	<p><b>Problem Centered Approach to CCSS</b></p> <p>This session will give participants a taste of the Interactive Mathematics Program (IMP). IMP is an exciting problem based way for high school students to learn mathematics. IMP's four-year program of problem-based mathematics replaces the traditional Algebra I-Geometry-Algebra II/Trigonometry-Precalculus sequence. This curriculum meets college entrance requirements and prepares students to use problem-solving skills at school and on the job. Participants will work on activities from two problem based units and look at their correlation to the Standards for Mathematical Practice and the CCSS.</p>	<b>Empire D</b>	<b>Margaret Small, Buncombe County Schools</b>



## Tuesday - Concurrent Session Four

2:10 - 3:40 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Instruction</b>	<p><b>Strategies for Purposeful Problem-Solving</b></p> <p>Purposeful problem-solving is critical to success in the 21st century. But what does purposeful problem-solving entail? What distinguishes an expert problem-solver from a novice? How can teachers help cultivate problem-solving expertise in their students? What is the role of technology and new media in the problem-solving process? Workshop attendants will have the opportunity to use these techniques, share best practices, and discuss how they might adapt these techniques to their particular classroom context. While the techniques were originally designed for quantitative problem-solving, they are also applicable for conceptual problem-solving. As such, teachers from all grade levels are encouraged to attend.</p>	<b>Empire E</b>	<b>Jeff Milbourne, North Carolina School of Science and Mathematics</b>
<b>Scaling STEM</b>	<p><b>Leadership Content Knowledge for Transforming Mathematics Education</b></p> <p>STEM does not simply mean adding more math and science courses. STEM education requires a fundamentally different approach to teaching and learning. Yet few have the necessary leadership content knowledge to raise achievement, close gaps, and support implementation of the Common Core Standards for Mathematical Practice. Learn how to develop team capacity for long-term, systemic improvement of your mathematics program.</p>	<b>Auditorium</b>	<b>Virginia Stimpson, University of Washington</b>
<b>Assessment</b>	<p><b>Authentic Assessment in Performance-based STEM Education Activities</b></p> <p>This presentation identifies aspects of intentionally derived Integrative STEM learning reinforcement activities that provide a basis for the demonstration of student advanced process skill. Authentic means of assessment will be outlined for the purposes of the analysis of STEM student learner artifacts. Further, methods of identifying higher levels of student cognition within performance-based STEM activity will be discussed. The cognition categorization of learner artifacts permits the analysis of higher order processing in student activities. These learner artifacts require knowledge, understanding, and skill application in a real world context scenario or simulation, while targeting specific competencies within STEM education goals.</p>	<b>Crown</b>	<b>Jeremy V. Ernst, Virginia Poly-technical Institute</b>
<b>Assessment</b>	<p><b>Applying NAEP to Achieve Goals in Teaching and Learning STEM</b></p> <p>Teaching students to be successful problem solvers requires that we learn how to assess problem-solving effectively in STEM disciplines. One source of information about assessment of problem solving is the National Assessment of Educational Progress (NAEP). Because NAEP data includes various ways of presenting problems to students, various rubrics, many examples of student work, and collections of student performance data, it provides a laboratory for probing concepts that students find difficult to learn. By examining NAEP problems and data, participants will learn how to address STEM topics that present learning difficulties for students.</p>	<b>Royal</b>	<b>Tracy Goodson-Espy, Appalachian State University</b>
<b>Extra/Co Curricular</b>	<p><b>Ten80 Student Racing Challenge: NASCAR STEM Initiative</b></p> <p>As an official partner of NASCAR, the Student Racing Challenge is a science, technology, engineering, and mathematics (STEM) league that uses motorsports as its core thematic and teaching platform. From the classroom to the race track, middle and high school students compete using a 1:10 scale remote control car. Throughout the curriculum, students problem solve and change variables to optimize performance similar to professional race teams. Why motorsports? Because it is the only sport won or lost in real time with the application of STEM. Drivers only have a chance to win because the team as a whole makes good decisions. Experience the Student Racing Challenge: the "practice league" through which future engineers, scientists, marketing, and creative professionals prepare for their futures.</p> <p><b>This is a short-course that lasts from 2:10 – 5:20 p.m.</b></p>	<b>Crystal Coast Ballroom</b>	<b>Jeff Thompson, Ten80 Education</b>



## Tuesday - Concurrent Session Five

3:50 - 5:20 p.m.

Strand	Session Title	Room
Curricular Resources	<b>A New Fourth Year STEM Course: Advanced Mathematics Using Technology and Engineering Models</b>	Imperial 2
Instruction	<b>Developing Future-Ready Learners Through Inquiry and PBL</b> <small>This is a short-course that lasts from 2:10 – 5:20 p.m.</small>	Empire A/B
Policy & Research	<b>An Inside View of the Mathematics Curriculum Analysis Tools</b>	Empire C
Curricular Resources	<b>The STEM Approach</b>	Empire D
Curricular Resources	<b>Toward Developing Mathematical Thinkers: Problem Based Learning</b>	Empire E
Scaling STEM	<b>Scaling by Design</b>	Auditorium
Policy & Research	<b>STEAM Adapts at 213 Degrees</b>	Crown
TBD	<b>Preparation for Tomorrow: Southern Regional Education Board</b>	Royal
Extra/Co Curricular	<b>Ten80 Student Racing Challenge: NASCAR STEM Initiative</b> <small>This is a short-course that lasts from 2:10 – 5:20 p.m.</small>	Crystal Coast Ballroom



## Tuesday - Concurrent Session Five

3:50 - 5:20 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Curricular Resources</b>	<p><b>A New Fourth Year STEM course: Advanced Mathematics using Technology and Engineering Models</b></p> <p>Participants will learn about a new curriculum that we plan to be a new fourth year mathematics alternative. We will provide support for participants as they work through contextual problems from a new STEM course called AMTEM. The course is based on Industrial Engineering and Operations Research mathematical models. The mathematics is primarily based in algebra and probability and suitable for students who have finished Algebra 2 and need a fourth year of high school mathematics. The course has been piloted in approximately 200 classrooms with great success and the problems will emphasize the STEM basis that can be brought into high school classrooms.</p>	<b>Imperial 2</b>	<b>Karen Allen Keene, North Carolina State University</b>
<b>Instruction</b>	<p><b>Developing Future-Ready Learners Through Inquiry and PBL</b></p> <p>Authentic STEM instruction prepares students for careers that require innovation and creative problem-solving. Inquiry and project-based learning (PBL) are fundamental elements of a future-focused STEM classroom. This session immerses teachers in a model inquiry-based project. Teachers are then guided to deconstruct the model to its essential elements and begin designing their own inquiry-based projects. Participants will analyze the essentials of effective PBL, and connect them to their own content. Teachers will select relevant problems and scenarios, craft essential questions and create high quality assessment tools. They will utilize internet resources for PBL planning and student research, and select web 2.0 tools for student products. All participants will leave the session with a working plan for implementing an inquiry-based PBL module with their students.</p> <p><b>This is a short-course that lasts from 2:10 – 5:20 p.m.</b></p>	<b>Empire A/B</b>	<b>Steve Puls, The Centers for Quality Teaching and Learning</b>
<b>Policy &amp; Research</b>	<p><b>An Inside View of the Mathematics Curriculum Analysis Tools</b></p> <p>The purpose of the Common Core State Standards for Mathematics (CCSSM) Curriculum Materials Analysis Project is to provide a set of tools that will assist K-12 textbook adoption committees, school administrators, and K-12 teachers in selecting mathematics curriculum materials that support implementation of the newly developed CCSSM. The tools are designed to provide educators with objective measures and information to guide their selection of mathematics curriculum materials based on evidence of the materials' alignment with the CCSSM and support for implementation of the CCSSM in classrooms. Bring your textbook and curriculum materials to use Tool 1: Standards for Content Analysis; Tool 2: Standards for Mathematical Practices Analysis; and Tool 3: Analysis of Overarching Issues - Equity, Assessment, and Technology. Tool 1 is specific to a grade band, Tools 2 and 3 are intended to be used with all grade bands. All three tools provide different lenses on which to base a comprehensive analysis of curriculum materials and ultimately an informed decision.</p>	<b>Empire C</b>	<b>Suzanne Mitchell, National Council of Supervisors of Mathematics</b>
<b>Curricular Resources</b>	<p><b>The STEM Approach</b></p> <p>Learn how to infuse STEM options that add rigor to content, relevant instruction, authentic assessment, real-world mathematics, science, and language arts applications through hands on activities, problems, and projects.</p>	<b>Empire D</b>	<b>Gail Parsons, Project Lead the Way</b>



## Tuesday - Concurrent Session Five

3:50 - 5:20 p.m.

Session Descriptions			
Strand	Session Title/Description	Room	Lead Facilitator
<b>Curricular Resources</b>	<p><b>Toward developing mathematical thinkers: Problem Based Learning</b></p> <p>What can we do to push students deeper into mathematical thinking and problem solving? As in effective STEM instruction, Problem Based Learning front-loads the problem scenario creating a classroom of student inquiry and a motivation for content instruction. This session will provide an overview of Problem Based Learning - a model of mathematics instruction that deeply involves students in mathematical content while maintaining fidelity to the tenets STEM. Participants will discuss task design and facilitation of a problem-based mathematics classroom as well as topics such as the role of technology, the role of STEM, scaffolding, workshops, and curriculum mapping within a problem-based environment.</p>	<b>Empire E</b>	<b>Geoff Krall, New Tech Network</b>
<b>Scaling STEM</b>	<p><b>Scaling by Design</b></p> <p><b>Description to follow</b></p>	<b>Auditorium</b>	<b>Henry King,</b>
<b>Policy &amp; Research</b>	<p><b>STEAM Adapts at 213 Degrees</b></p> <p>Virtual learning experts Dr. Bryan Setser of The Setser Group and Richard Boyd, Chief Architect of Lockheed Martin's Virtual World Labs, discuss their latest project to bring STEAM opportunities to teachers and students via adaptive algorithms, ultra-efficient gaming, smart learner profiles, and continuous feedback. Combining a variety of cutting edge technologies with a crowd sourcing platform, conference participants will be engaged in demonstrations, discussions, and reviews that allow a global user base of STEAM teachers, students, researchers, and the business community to learn at any pace.</p>	<b>Crown</b>	<b>Richard Boyd, Lockheed Martin</b>
<b>TBD</b>	<p><b>Preparation for Tomorrow</b></p> <p><b>Description to Follow</b></p>	<b>Royal</b>	<b>Southern Regional Education Board</b>
<b>Extra/Co Curricular</b>	<p><b>Ten80 Student Racing Challenge: NASCAR STEM Initiative</b></p> <p>As an official partner of NASCAR, the Student Racing Challenge is a science, technology, engineering, and mathematics (STEM) league that uses motorsports as its core thematic and teaching platform. From the classroom to the race track, middle and high school students compete using a 1:10 scale remote control car. Throughout the curriculum, students problem solve and change variables to optimize performance similar to professional race teams. Why motorsports? Because it is the only sport won or lost in real time with the application of STEM. Drivers only have a chance to win because the team as a whole makes good decisions. Experience the Student Racing Challenge: the "practice league" through which future engineers, scientists, marketing, and creative professionals prepare for their futures.</p> <p><b>This is a short-course that lasts from 2:10 – 5:20 p.m.</b></p>	<b>Crystal Coast Ballroom</b>	<b>Jeff Thompson, Ten80 Education</b>



## Wednesday – School Visits

8:45 a.m. – 12:00 p.m.

Visit Descriptions		
<p>Each participant will choose which visit they would like to attend. During the visit, participants will observe two innovative secondary schools in Durham, NC. Busses will depart from the Imperial Ballroom lobby at 8:45 a.m.</p>		
Visit	School Descriptions	Facilitators
Visit A	<p><b>Neal Middle School</b></p> <p>Neal Middle School serves approximately 650 students in grades 6-8. In the 2011-12 school year Neal staff committed to developing their school culture and strategies around STEM. While early in the development as a STEM focused school, Neal teachers and students have begun to use the engineering design process in core classrooms paired with the use of a common instructional framework supported by instructional coaching. Project Lead the Way provides a jumping off place for STEM through the elective program and course modules have been selected by grade level to support state curriculum standards.</p>	<p><b>Dana Diesel Wallace,</b> Vice President for School Development NC New Schools Project</p> <p><b>De McKenzie,</b> STEM Program Director NC New Schools Project</p>
	<p><b>Southern School of Engineering</b></p> <p>Southern School Of Engineering delivers a rigorous and relevant college preparatory program for all students. Every student is placed on the College/University Course of Study and takes Honors and AP courses. They focus on project/problem-based learning with a collaboration of school work and real-world experiences. Students will have the opportunity to earn up to 12 hours of college credit before graduating from high school. The school opened in 2007-2008 with 100 students in the 9th grade. Enrollment continues to increase in each grade level. Southern School of Engineering is designed to substantially increase the number of underrepresented students who will pursue advanced studies and careers in Science, Technology, Engineering, and Mathematics.</p>	
Visit B	<p><b>City of Medicine Academy</b></p> <p>The City of Medicine Academy (CMA) was founded in 1996 as a Health Occupations Academy on the campus of the Southern High School, a large, comprehensive high school in Durham, NC. The current principal, Elizabeth Shearer, joined the Academy as the program became a stand-alone school on a temporary campus in 2008. In the fall of 2011, the City of Medicine Academy, which serves students from grades 9 to 12, moved to its permanent building on the campus the Durham Regional Hospital. CMA has maintained a strong Career and Technical Education (CTE) Health Occupations program, which now includes clinical rotations through Durham Regional Hospital. The school serves close to 400 students and partners with Durham Technical Community College to provide students access to college credit.</p>	<p><b>Matt Sears, STEM</b> Program Director NC New Schools Project</p> <p><b>Rebecca Stanley,</b> STEM Program Director NC New Schools Project</p>
	<p><b>NC School of Science and Mathematics</b></p> <p>The North Carolina School of Science and Mathematics (NCSSM) was founded on the vision of former North Carolina Governor James B. Hunt Jr., former Governor, Senator and Duke University President Terry Sanford, and academician and author John Ehle. As a result, the School opened in 1980 as the first school of its kind—a public, residential high school where students study a specialized curriculum emphasizing science and mathematics. This approach was built on the premise that regions which invest in the creation of human and intellectual capital will receive global economic returns, the key to success in a worldwide economy. NCSSM has since become the model for 18 like-schools around the globe and has helped found the National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology (NCSSSMST).</p>	



## Wednesday – School Visits (cont' d)

8:45 a.m. – 12:00 p.m.

Visit Descriptions		
<p>Each participant will choose which visit they would like to attend. During the visit, participants will observe two innovative secondary schools in Durham, NC. Busses will depart from the Imperial Ballroom lobby at 8:45 a.m.</p>		
Visit	School Descriptions	Facilitator
Visit C	<p><b>Hillside New Tech High School</b></p> <p>Hillside New Tech High School is a small, STEM high school located in Durham, North Carolina and was established before the 2007-2008 school year. Hillside New Tech is designed to offer a break from the traditional high school experience. New Tech offers a one-to-one computer-to-student ratio, Project-Based Learning, and a small school environment designed to build strong working relationships with teachers and fellow students. Hillside is dedicated to having its students understand how educational content relates to real-world experiences, making sure that students have access to technologies they will experience in college and work, and teaching them the 21st century skills.</p>	<p><b>Sofi Frankowski,</b> Senior Program Director NC New Schools Project</p> <p><b>Robin Marcus,</b> STEM Program Director NC New Schools Project</p>
	<p><b>J.D. Clement Early College High School</b></p> <p>Opening in 2004, the Josephine Dobbs Clement Early College High School was the first early college in the state of North Carolina to serve students who are often underrepresented in college, including those who are from low income families, minorities and those whose parents didn't attend college. Located on the campus of North Carolina Central University, its program of study allows students to meet all high school graduation requirements and earn up to two years of college credit over the course of four years. From the small beginnings of 84 students, the school currently has an enrollment of nearly 400 students. As an autonomous public high school, it has its own principal, administrators, teachers, support staff and budget.</p>	