# THE STEMEDGE

A quarterly magazine from NCSSS giving teachers and administrators the competitive advantage in professional development.

QUARTER 2 | 2017



# CONTENT

VOLUME 1 | ISSUE 2









# PRESIDENT'S CORNER

## NCSSS Schools Continue to Change the World

As the current president of NCSSS, I have been afforded numerous opportunities to meet and share ideas with experts involved in STEM and STEM education. I am always receptive to new ideas and technologies and I am eager to share what I have learned with others. It is by far the most rewarding aspect of my affiliation with the organization. More importantly, sharing new ideas and best practices is really what this consortium is all about.

Last year, I met Justine and John Diamond from the Enable Community Foundation (now known as LimbForge). They represent an amazing group of individuals from all over the world who use 3D printers to create free 3D printed hands and arms for those in need of an upper limb assistive device. Justine and John met

> "Sharing new ideas and best practices is really what this Consortium is all about."

with a group of students in our school's Makerspace to lead a "group build" of prosthetic hands. Everyone involved was amazed at the impact the students were able to have with the greater community using 3D printers.

During the NCSSS 2016 Student Research Conference, all of the attendees participated in a group build as well. I was thrilled to hear that the Boston media recently ran a story of students at the Mass Academy in Worcester Massachusetts and their work in building and donating the 3D printed prosthetic hands. I encourage all NCSSS schools to do the same.

In April, the NCSSS Board convened in Savannah, Georgia, for our regular Board Meeting. The meeting was hosted by the Savannah College of Art & Design, which proudly showed us their cutting-edge design and manufacturing labs, as well as their state of the art animation lab, where they work with the latest in motion capture technology. Needless to say my fellow board members and I were extremely impressed with what we saw. When I returned to my school, I immediately began figuring out a way to bring motion capture technology to our students. I am happy to share that I recently watched a student demonstration of our school's new motion capture system and was pleasantly surprised at the reasonable cost of this groundbreaking technology. This technology will go a long way in helping students create virtual environments for a variety of applications.

In May, I attended the "Change the World" symposium held by The Mass Academy of Math & Science, one of our NCSSS member schools, at Worcester Polytechnic Institute (WPI) in Worcester, Massachusetts. My thanks to Mike Barney, the Director of Mass Academy, for inviting me to participate in this amazing conference. The symposium began with students of the Mass Academy demonstrating the software applications they had designed in conjunction with the organization "Apps for Good," which has been adopted by several NCSSS schools across the country. The symposium continued with a STEM panel presentation as well as a panel discussion with some of Mass Academy's Alumni. One question posed to the panel was "Where do you think you'd be if you hadn't attended such a special school?" Each panelist agreed that without the rigorous education and support they received, their career paths may have been much different. They expressed gratitude for the people who founded and continue to support their school. I am certain that the alumni of all of our NCSSS member schools feel the same way. NCSSS schools are indeed changing the world!

— RUSSELL DAVIS

**Principal of the Bergen County Academies in Hackensack, New Jersey | President of the NCSSS Board of Directors**


# FROM THE EXECUTIVE DIRECTOR

With the President submitting his proposed education budget, I thought it was worth highlighting some key items pointed out by our partner StemEd Coalition:

- The 2018 Budget proposes $59 billion for the Department of Education, a $9 billion or 13 percent reduction.
- Title I: FY 17 was 15.9 billion, FY18 $16.9 Billion, added $1 billion in new program designed to be portable.
- Title II: Eliminated entirely the $2.4 billion Supporting Effective Instruction State Grants program
- 21CCLC: Eliminated entirely the $1.2 billion 21st Century Community Learning Centers afterschool program.
- Title IV Part A: Student Support and Academic Enrichments (SSAE) Current $400 million, FY18 requested no funding but acknowledged Omnibus appropriations language about competitive program proposed elimination.
- Perkins CTE programs: $1.1 billion for FY17, FY18 proposes $876 billion, a cut of $168 million, includes a new $20 million set aside "that would support a competition to promote the development, enhancement, implementation, or expansion of innovative CTE programs in science, technology, engineering, and mathematics (STEM) fields.

> "Congress is going to drive this budget, not Ed nor the White House."

Complicating matters is that there are still many top political positions to fill at DOE, including the Assistant Secretary for K12 education. A couple of weeks ago I met with the Acting Assistant Secretary for K12, who proceeded to tell me that he is not going to fill the position, and that they have not yet found that person.

What this all means is that Congress is going to drive this budget, not Ed nor the White House.

Now on to more pleasant topics. We have a great program lined up for the Professional Conference. We have a terrific keynoter, an IMSA graduate. Friday afternoon looks different. We listened to you and have some great roundtables set up with interesting topics. That will be followed by groups going to Second City before some incredible excursions on Saturday to IMSA's campus, and then the world famous Fermi Labs.

As always, thank you for your support.

— TODD

Todd Mann | NCSSS Executive Director | todd.mann@ncsss.org

# Giving Students Options

## A professional school counselor's view of helping students find the best fit in higher education

by Lauren Kurtz Lewin

The question "What leads students to higher education?" is the one question that that led me to my role of helping students complete the college application process. Eleven years ago, I assisted my sociology of education professor at the University of Georgia on a research project that changed my life and ultimately led me to wanting to impact other's lives. I have been a professional school counselor at Rockdale Magnet School for Science and Technology for eight years and have assisted all of my seniors in the college application process. Applying to college is more than just applying, it is a process and the process begins years before the student even enters 12th grade.

In helping students in the process, I always focus on one word that I believe is the single most important word when it comes to the application process: *options*. My students having options is the goal I have for each and every student.

- ***Options*** for higher education.
- ***Options*** so the student has control of their decisions.
- ***Options*** to allow the student many doors to choose and many doors to open.

The college application process cannot begin without a list and options cannot be created without treating the list like a process. I often tell students and parents that creating a list is like a science. We use data, geography, logistics and feelings to create the list. I use the words Reach, Range and Safety to create a rough blueprint of a list.

Reach is a school that the students' numbers (GPA and/or test scores) are below the averages, or a school that is highly selective and has a low acceptance rate. I believe that an acceptance rate of 30 percent and below is a reach for everyone regardless of data.

A Range is a school that the student meets admission averages and there is a 50/50 shot of the student being accepted.

A Safety is a school that the student's data is higher than acceptance averages and the student has very high chances of being accepted.

> "Applying to college is more than just applying, it is a process and the process begins years before the student even enters 12th grade."

Using the terms Reach, Range and Safety is certainty not exclusive and does not include other factors that are used in a holistic review process such as teacher recommendations, leadership, community service, character, essays, etc., but merely gives me and the student an idea to create balance and options in the list. I have had students say to me before "what If I don't get into a college?" In my eight years, I have never had a student not get into college. If the student completes their applications and follow the guidelines of Reach, Range and Safety, they should not be in a position of rejection to all of the schools on his/her list. The list is individualized and should look different for each student.

Schools that are "Safeties" often provide opportunities for students to join honors programs or receive merit-based scholarships. A safety can also be a school that is a safe financial option. A requirement that I feel passionate about is requiring at least one of the schools on a student's list to be an *in-state public safety*. For many students, moving across the country for college does become a reality, but for many, students realize the financial realities and need to have options that will be financially realistic.

College Fit (Geography, Culture, Financial, Social Life, Academic) is incredibly important to discuss and to use when creating a college list. Discussing *College Fit* is important, but it may be difficult to really understand it without actually stepping on the specific college's campus. When it comes to college size, some students like to predict what is the best fit for them, but it is often hard for them to really know. For example, a student may say they do not want to go to a small school, but a small school in a large city may give them exactly what they need. College size is relative and is a funny concept for students to grasp what they need and want. Some students also underestimate the importance of college fit while creating the list or while actually choosing the school to attend.

## Questions students can ask and consider when picking campuses (From a student voice):

- **Do I want to live in the dorms all four years? Is housing available for all freshmen?**
- **I want to be able to come home for the holidays?**
- **Is it important that other students are just like me? Do I want most students to be different from me? Do I want a diverse campus where I meet students who are both similar and different from me?**
- **Is weather a factor? Would I be happy in the snow? Do I like the heat?**
- **What surrounds the campus? Do I like the campus to be in a big city but be a self-contained campus? Do I want to spend my weekends camping and hiking? Do I want to be able to access a big city easily, but not actually go to school in the city?**
- **Do sports matter? Do I want to go to a school that has a Saturday football atmosphere? Do I want to be involved in club sports?**
- **What level of academic rigor is appropriate? Do I want to participate in undergraduate research? Do I want to be in a competitive but collaborative environment?**
- **Is my major offered? Am I certain this is what I want to study? What classes are offered in my major? What opportunities for co-op or internships are available for my major?**
- **How will I manage my classes while working to pay for school? How much will I need to pay out-of-pocket? Will I be able to get scholarships as a sophomore?**

This list is not an all-inclusive list and could certainly continue. The important thing is that the questions are being asked and students are thinking about their answers. The answers can change and the student may find them irrelevant, but they are at least thinking. Sometimes these questions do not matter and the student picks what they can pay for. Sometimes the student just walks on campus and gets "the feeling." However they arrive to their decisions, regardless if it was the right decision or not, they have at least been thinking critically.

My role is to not decide for the student. My role is to educate the students on what they need to look for and how they need to navigate the application process. Ultimately the student decides and sometimes it is not the right fit because sometimes fit cannot be determined until the student is actually a student on campus.

Sometimes, students do not allow a school to be a good fit because they do get involved and meet new people. Whether a student has the greatest experience, transfers, decides not to stay in school and works instead, my goal is to help the student realize that they have options and they have the confidence to navigate through their life decisions. By helping my students have options before they even leave, I am helping them have options for the rest of their lives. There is no other role I could possibly dream of having in their lives. ■

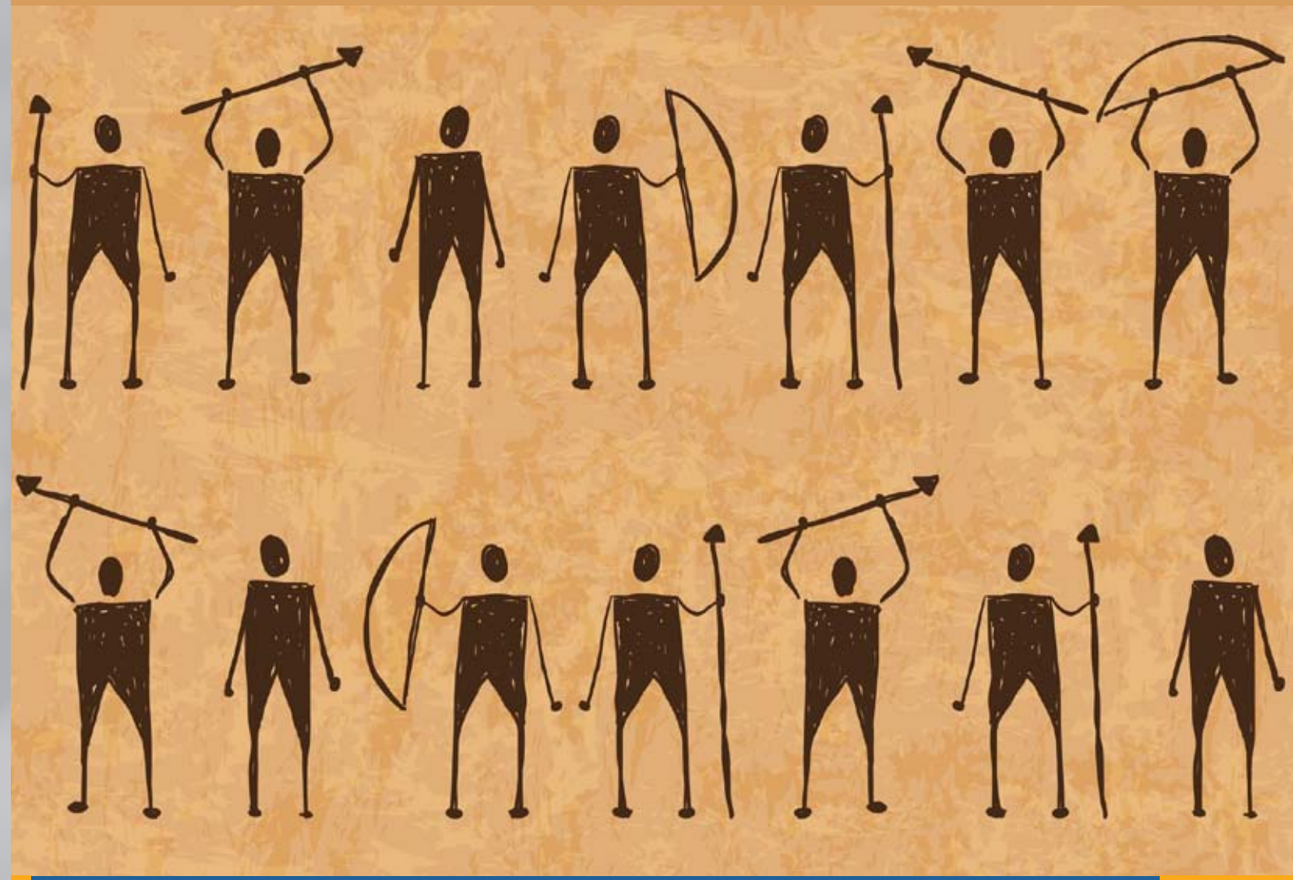
## LAUREN KURTZ LEWIN

**Lauren Kurtz Lewin attended the University of Georgia and received a Bachelor of Science in Psychology and a Bachelor of Arts in Sociology. For graduate school, she attended The Citadel Military College of South Carolina and received a Master's Degree in Counselor Education. In July of 2009, Mrs. Lewin began her role as a Professional School Counselor at Rockdale Magnet School for Science and Technology in Conyers, GA. She is trained and specializes in crisis counseling, personal, social, and emotional counseling and support, academic advising and four-year planning, career advising and planning, and college advising and planning. During her past eight years at RMSST, she was worked extensively to develop a comprehensive college advisement program to assist students in the college application process beginning in 9th grade.**

# Finding My Tribe

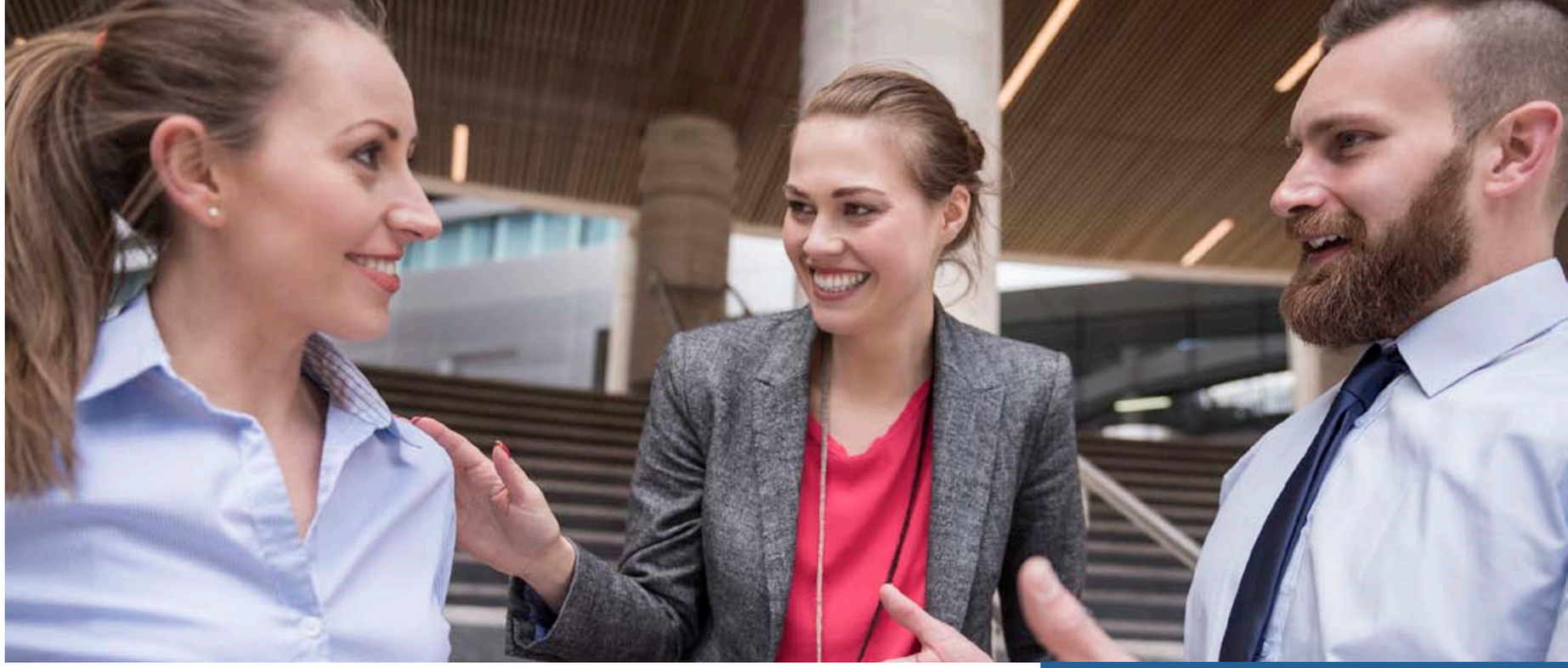
## A first-time Professional Conference attendee offers his thoughts on the value of the Conference

by Tyrone Huebsch



I have spent the last three years teaching at a STEM school. The prestige our school has earned the commitment shown by our district, administration and faculty to live out our STEM focus have kept me energized about enhancing STEM opportunities for my school community.

To say that I was thrilled to attend the NCSSS National Conference in Boston is an understatement. I knew that it would be a great experience; I just didn't know how. Upon arrival, it didn't take long to realize that I was among "my people": A like-minded group of individuals looking to share ideas and experiences that could help foster creativity and innovation in our home schools.



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I was able to see and hear about STEM programs from across the country. We took invaluable field trips to Worcester Polytechnic Institute and MIT. In doing so, I was able to validate that what my school is selling is what the next level is buying so that I could make real connections for my students. These trips also helped to spark discussion in formal breakout sessions and at morning coffee about the similarities and differences in our home districts, the inherent challenges of educating for innovation and strategies to keep the train moving forward.

One idea I took home with me relates specifically to the Independent Research course I teach. The idea of a pre-research cohort to develop skills in reading, analyzing and presenting primary literature could prove beneficial for my students prior to their beginning their independent research projects. I look forward to this year's post-planning discussions to see if this idea followed by a research cohort where students collaborate to support one another's work, troubleshoot, share the experience and encourage one another could not become part of our school's development and support system for student researchers.

Since the conference, I find myself being better able to communicate to my students what some of the options are that lie ahead for them and ways to access opportunities. The first-hand exposure to what is going on at other schools, what industries are looking for, how others overcome challenges inherent to STEM education and the enthusiasm for teaching and learning were really uplifting. I left feeling my batteries had been given a boost and that I had made meaningful connections with other professionals.

## TYRONE HUEBSCH

***Research Instructor***

**Rockdale Magnet School for Science & Technology**

**Tyrone Huebsch has taught Research at Rockdale County Magnet School for Science and Technology in Conyers, GA for the past three years. He has been an educator for 25 years at the middle and high school levels in traditional, alternative, public and private schools as both an administrator and classroom teacher. Mr. Huebsch enjoys the collaborative nature of working in a supportive research department that facilitates independent, authentic, student-driven work. In his time at RMSST he has had multiple recognitions from students as an honor teacher. Tyrone holds degrees from the University of WI- Eau Claire and University of WI-La Crosse. He is an avid outdoorsman, recreational musician, tinkerer and an owner of the Green Bay Packers.**


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# AGENDA AT A GLANCE

| | |
|---|---|
| **WEDNESDAY, NOVEMBER 1** | |
| 1:00 pm - 6:00 pm | **Registration Open** |
| 1:00 pm - 3:00 pm | **Excursion** (Illinois Institute of Technology) |
| 6:00 pm - 7:00 pm | **Reception** |
| **THURSDAY, NOVEMBER 2** | |
| 7:00 am - 6:00 pm | **Registration Open** |
| 7:45 am - 8:45 | **Breakfast** |
| 9:00 am - 10:00 am | **Keynote Speaker**<br>**Major Kenyatta H. Ruffin** |
| 10:00 am - 10:50 am | **Concurrent Sessions** |
| 11:00 am - 11:50 am | **Concurrent Sessions** |
| 12:00 pm - 1:00 pm | **Lunch** |
| 1:00 pm - 2:00 pm | **College Fair** |
| 2:00 pm - 2:50 pm | **Concurrent Sessions** |
| 3:00 pm - 3:50 pm | **Concurrent Sessions** |
| 6:00 pm - 8:00 pm | **Reception** |
| **FRIDAY, NOVEMBER 3** | |
| 8:00 am - 9:00 am | **Breakfast & Business Meeting** |
| 9:00 am - 9:50 am | **Concurrent Sessions** |
| 10:00 am - 10:50 am | **Concurrent Sessions** |
| 11:00 am - 11:50 am | **Concurrent Sessions** |
| 12:00 pm - 1:00 pm | **Lunch** |
| 1:30 pm - 2:30 pm | **Concurrent Sessions** |
| 2:30 pm - 4:00 pm | **Concurrent Sessions** |
| 2:30 pm - 4:00 pm | **Panel & Roundtable Discussions** |
| 8:00 pm - 10:00 pm | **Second City Event** (additional purchase at registration) |
| **SATURDAY, NOVEMBER 4** | |
| 8:00 am - 1:30 pm | **Excursion** (IMSA/FermiLab) |

# PROGRAM

## THURSDAY, NOVEMBER 2

**9:00 am - 10:00 am** — **Keynote Speaker**

**10:00 am - 10:50 am**

### STEM Summer Camps as a Recruitment Tool — Administration

Introduce students to STEM and your program at the same time! The Kansas Academy of Mathematics & Science use summer camps to expose students to STEM disciplines at a young age with the hope they will consider attending KAMS in the future. This education session will share with you the framework and strategy in using summer camps. Assessment data from the KAMS summer camps will be shared and discussed. Let your summer camp be the start of a student's lifelong journey in STEM.

**Presenters:** Regina Tolbert, Roger Schieferecke

### The "How's and Why's" of Onsite Student Research: Creating Opportunities for All Students Through Research Class — Administration

Rockdale Magnet School for Science and Technology's Research Department excels at helping students develop, plan, and execute competitive research projects all within the on-campus environment. This approach allows a large number of students from diverse backgrounds to succeed in a variety of research competitions and effectively differentiate themselves during the college application process. This presentation will explore how the supporting administrations and the research teachers work together to make "in house" research successful.

**Presenters:** Scott Bolen, Jennifer Kinsey

### Bring Authenticity to your Coding Program — Computer Science

Explore MobileMakersEdu curricular and professional development programs in the growing field of coding. Created around experiential learning, authentic real-world skills, and connections to the developer community, the program drives student engagement and re-energizes teachers.

**Presenter:** Jessi Chartier

### Process Over Product - Using Google Docs to Encourage Experimentation, Failure and Brilliance — Humanities

Professional writers live by the maxim "first word, worst word." One starts with nonsensical garbage (hopefully with a nugget of potential) and nurtures it to something clean and shiny. But students and sometimes their teachers think more along the lines of "one and done," expecting a refined product on the first draft. This session will present ways to encourage sloppy drafts and reward change rather than set unattainable goals of perfection that will deepen appreciation of the writing process for students and teachers alike.

**Presenter:** Richard K. Weems

### Teaching Mathematics through Distance Education — Math

In this session, we will discuss techniques and best practices in teaching mathematics in non-traditional, virtual classroom environments. We will address designing and teaching online courses, courses offered through real-time videoconference, and those delivered in a hybrid, or blended, classroom environment. Examples from courses taught at the North Carolina School of Science and Mathematics (NCSSM), including Precalculus, Applied Finite Mathematics, and Single and Multivariable Calculus, will be presented and provide context for participants to discuss.

**Presenter:** Tamar Avineri

### Developing a Course Focused on Biological Problems in Contemporary Society: Opportunities for Interdisciplinary Connections, Differentiation, and Integration of Technology — Science and Engineering

Educators will have the opportunity to learn about development of a topics oriented upper level biology course. Experiences in course establishment, recruiting students, incorporating reputable resources, as well as developing original activities and projects will be discussed. Objectives of the course, their applications to problems faced in scientific research and society at large, as well as ways in which the class can be tailored to student interests and talents will be incorporated. Opportunities for modification over time to introduce responsible use of new technologies will be demonstrated. Examples of differentiation for gifted learners and example student products will be shared.

**Presenter:** Rebecca Phillips





### Student Support in STEM Schools — Wellness

This session is designed to generate dialogue regarding methods to support students in STEM schools. In a diverse society, multiple measures are required to offer support for the needs of individual of learners. The rigor and demands of STEM schools accompany high levels of stress and adaptation for high school students. This roundtable will address questions concerning support offering for students with diverse needs. Specific support discussion areas include varying levels of academic strengths in advanced courses, preparation for high stakes exams, academic achievement, leadership, meeting developmental needs, differentiation, cultural responsiveness, organization, and stress management.

**Presenter:** Dr. Lynette Clark

**11:00 am - 11:50 am**

### Calling All Future Scientists and Engineers! — Administration

Recruiting is the life blood of our school. It's our first opportunity to share the unique programs and opportunities that make our campus thrive. Here at John Jay Science & Engineering Academy, recruiting is a yearlong effort. From elementary outreach, to middle school science fair judging, we are always finding ways to promote our school and attract potential candidates. During our presentation, you will learn about our comprehensive recruiting program and how we consistently attract a diverse population of students who have a passion for Science and the perseverance to achieve high academic success.

**Presenter:** Gretchen Bley, Crystal Mitchell

### Cross Curricular Project Based Learning - Physics and Computers Science — Computer Science

Cross Curricular Project Based Learning – Angry Robots! Using PBL and computer science to enhance the understanding of physics and computer science concepts. In this session we will review our projects, provide them in word format and lead the attendees to sketch out their own cross curricular project.

**Presenters:** John Chapin, Jacob Voetberg

### Before Bob Dylan: Poets and Agitators in Popular American Music — Humanities

As teachers of history and literature, we ask students to read and to think critically about the past, the present, and their own lives. Bob Dylan's receiving the Nobel Prize in Literature has led me to realize that I should help my students listen critically as well. All students listen to music, certainly more than they read, so I weave threads of music history into my class to help them understand the roles music has played in shaping American society and to provide a context for current music. Please join me in discussing popular American music as history and literature.

**Presenter:** John Woodmansee

### Standards Based Grading in the STEM Classroom — Math

Now in it's fourth year of implementation at NCSSM, our Standards Based Grading approach for assessment in Pre-Calculus and Calculus continues to evolve. Come hear what SBG is all about, how it has worked in our courses, and how you can get started in your own classroom. This talk is appropriate for all administrators and teachers, not only for those of STEM fields. Sample standards and assessments will be provided for math, science, and language courses.

**Presenter:** Taylor Gibson

### Building STEM Confidence and Capacity in Girls — Science and Engineering

Retention of girls in high school STEM classes leading to STEM careers is challenging. iBio Educate Center has designed the Stellar Girls middle-school program to build self-efficacy and STEM skills for girls. Wheeling High School uses this program as a mentorship model for high school girls and their middle school counterparts to provide a hands-on science/engineering experience in a girls-only environment. The program has built leadership capacity, boosted skill confidence and increased academic persistence in both the high school and middle school participants. The mentorship model provides social reinforcement to consider science and engineering a viable option for the future.

**Presenter:** Kathy Konyar

### The Grand Challenges of K-12 Engineering Education in the 21st Century — Science and Engineering

In 2015 college engineering deans from around the US made a commitment to educate the next generation of engineers to meet the Grand Challenges of Engineering for the 21st century. This preparation does not have to start with college—it can start at the K-12 level. Come and engage in discussion on how to develop K-12 traditional and virtual engineering programs.

**Presenter:** Ershela L. Sims, PhD

### A Model for Improving Wellness and School Climate: Results from BCA's Pioneering Wellness Initiative

**Wellness**

This presentation gives an overview of the outcomes/lessons from an innovative wellness pilot program run at Bergen County Academies that improved the well-being of all participants. Students reported many benefits, including increased self-esteem, greater ability to cope with set-backs, express empathy, manage difficult feelings, make friends, engage in healthy behaviors, and manage stress. The program trained juniors in the fall trimester as peer wellness coaches. Coaches then taught a formal

**Presenter:** Deborah Teplow

**1:00 pm - 2:00 pm** College Fair

**2:00 pm - 2:50 pm**

### Reach Outside the Classroom and Impact Your State

**Administration**

Since its inception, the Mississippi School for Mathematics and Science has focused on outreach activities for the two-fold purpose of impacting education across the state while simultaneously promoting MSMS to prospective students. This presentation will focus on some of MSMS' most successful outreach activities that could be easily implemented at other NCSSS schools. Attendees will also be encouraged to share effective outreach activities their schools have implemented.

**Presenter:** Rick Smith

### Pathways of Experience: The Evolution of the Senior Capstone Program at GSMST

**Administration**

This presentation will discuss the new three-pronged pathway approach that GSMST has developed to offer internship opportunities in the age of differentiated instruction. The evolution of our Senior Capstone Experience program will be discussed to show the growth of the program. A description and discussion of the resultant Pathways of the "Thinker," the "Doer," and the "Maker" as the solution to the problem of lack of student choice within blanket one-size-fits-all internship programs will be provided to express the value offered by this program and how others may be able to develop a similar program to fit their needs.

**Presenter:** Kerri Napoleon, Ph.D.

### Tracking STEM Degree Completion Among Graduates: Using Data from the National Student Clearinghouse

**Administration**

Over the past four years, the North Carolina School of Science and Mathematics (NCSSM) has been using data from the National Student Clearinghouse, a college enrollment and degree verification service, to track graduates into and through their postsecondary education pursuits. In addition to tracking postsecondary persistence, NCSSM has also used data from the Clearinghouse to track which graduates complete STEM postsecondary degrees and what degrees they complete. Session presenters will discuss what postsecondary data is available from the Clearinghouse, how they are using the data to track STEM degree completion among graduates, and what they have found through their analyses.

**Presenter:** Todd Roberts

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**Presenter:** Kerri Napoleon, Ph.D.

### The Scientific Narrative: Using Creative Writing to Craft Compelling Research Papers

**Humanities**

All STEM students write research papers, but, despite the multitude of genres available to student writers, almost all of their research papers are written in nonfictional prose. Different students do their best writing in different genres; if we want to see our students' best written work, we should allow them to experiment with the genres in which they write—even when writing research papers. Participants will read and discuss student research papers written in a variety of genres, learning about the theory, research, structure, and benefits of alternative-genre research papers.

**Presenter:** Mike Miller

### The Mathematics Classroom: Group Work vs. Working in Groups

**Math**

How many times have we heard from colleagues and students, "groups in math class don't work"! Over the years, my response has developed into a question: "do you mean working in groups or simply sitting in groups and working?" I have been successfully using group work for nearly 30 years to take advantage of peer sharing and guided instruction. In addition to encouraging conference participants to share thoughts and questions, I will share tips for a successful classroom and sample group activities. I will also share research supporting the effectiveness of group work in the classroom.

**Presenter:** Donita Robinson





### Mentors for a Minute -how students can successfully engage scientists for advice

**Science and Engineering**

For several years, I have had my research students email their research proposals to 2 scientists whose work was cited in the student proposal and ask the scientist for advice (hopefully specifically on something that was not clear). The interaction between scientists has proven so valuable in supporting students with resources, technical advice, and substantial validation and encouragement. All students have obtained at least one reply! I can share the training I provide my students for this assignment and some of the outcomes!

**Presenter:** Andrea Cobb, Ph.D.

### Promoting and Modeling Work-Life Balance

**Wellness**

Technology has made this easier for employees working at consortium schools. While staying connected has some advantages, and is sometimes necessary, it can also be argued that this constant connection is not healthy for the employee and does not set a good example for the students that we work with. How do consortium schools recognize the importance of employee work/life balance and encourage employees to achieve balance integrate work and life? This roundtable conversation will provide an opportunity for participants to unplug and discuss how we find, promote, and model work life balance.

**Presenters:** Terry Lynch

**3:00 pm - 3:50 pm**

### Community STEAM Outreach: The Bergen County Experience

**Administration**

This presentation will share lessons learned from over twenty years of providing STEAM outreach programs to elementary students, middle school students, and adults from Bergen County, New Jersey and nearby communities. In addition, the presentation will explore new developments and open a discussion where participants can share ideas and reflections about STEAM outreach. The goals of this presentation are to provide a framework to map out the potentials of STEAM outreach programs, to inspire and help to guide new STEAM outreach efforts, and to develop and encourage networking among people interested in sharing ideas and promoting these programs.

**Presenters:** Ken Mayers, Mark Tronicke

### Aquaponics – We built it! Now what?

**Administration**

Project based learning has the unintended consequence of leaving completed projects behind. Large scale capital projects, such as the construction of a closed aquaponic system, pose an even greater issue. How can a school integrate a large-scale project into existing curricula,and still meet the educational and testing needs of the student body? This session will focus on the logistical and staff issues necessary to extend the usefulness and agency of a large-scale capital project.

**Presenters:** William Wolfe, Josh Headley, Dr. Dwight Smith, Mr. Jeffrey Reeser

### Sprint to STEM Success: Combine the Agile Design Process for Project Success

**Computer Science**

Assisting our students in becoming innovative thinkers and creators is paramount. In STEM at North County High School, we believe that experience is the best teacher! In our unique Community Challenge course, students, nonprofits and for profit companies work alongside one another. By transforming the traditional classroom to a solution creation center we bring authentic learning to life! Our nonprofit partners consult with our students with a business-based issue. Using the Agile Design Process a student team, with a business member as a mentor devise and propose the best possible solution for the "client."

**Presenter:** William Forrester

### Analytical Writing for STEM Students

**Humanities**

Writing is the medium for lasting and deep professional discourse; however, students tend to associate writing solely with English class, and not transfer the skill effectively to their other disciplines. High school history, when taught to inculcate the analytical thinking and writing skills necessary for professional success, incorporates writing instruction and usage that equips students to write well in any discipline. With this combination, students get rigorous writing instruction, plus the experience of writing non-fiction in expository and persuasive styles. Consequently, students receive a relentless message that solid writing is a necessary skill not tied to any particular discipline.

**Presenters:** Jill Burdick-Zupancic, Monte F. Bourjaily, IV

### Using Geogebra to teach Multivariable Calculus

**Math**

Geogebra is a free dynamic math software that can be used to create interactive animations of mathematical ideas. By demonstrating a series of activities I've designed to teach my Multivariable Calculus students about curves and paths in R^3, I will highlight several features of Geogebra that make it a particularly valuable tool for teaching PreCalculus, Calculus, and Multivariable Calculus.

**Presenter:** Sarah Harrelson

### Adventures with Electronic Student Lab Notebooks

**Science and Engineering**

How can we increase the learning value from science student notebooks? Science students engage in the authentic practice of keeping research notebooks to organize their workflow, handle materials safely, follow protocols, document progress, showcase their hard earned data analysis, problem solve, obtain feedback on thinking, (and for grades) . What advantages do electronic notebooks offer? Drawbacks? This session documents our first year of electronic notebook use with senior researchers and electives students and why our students protested when we suggested returning to traditional paper notebooks. See student samples, ask questions and share your experiences with electronic or traditional science notebooks!

**Presenter:** Andrea Cobb, Ph.D.

### Thriving: Connecting Academic and Social Skills to Promote Leadership Development Among Gifted Students

**Wellness**

Leadership development in gifted students is important to their educational experiences, decision making, and overall social development. In most institutions with a gifted student population, the idea of leadership development is an abstract thought. Often times leadership is correlated with giftedness and academic success. This correlation may lead to a lack of understanding of leadership and a lack of opportunities for leadership development. The implications are poor decision making by student leaders a lack of commitment from our student leaders and possible removal from the position. The purpose of this session is to discuss leadership development opportunities that can assist students in their positive leadership behavior and journey.

**Presenter:** Cathy Thomas

## FRIDAY, NOVEMBER 3

**9:00 am - 9:50 am**

### PD for all: Building the capacity of your teaching staff

**Administration**

Building the capacity of all teachers is important to school improvement. Learn how to create a professional development plan to impact the learning of and incorporate the voices of your entire staff, while also helping your PLC structure to thrive. We will specifically focus on how our PD structure helped teachers to grow professionally but also furthered our STEM and college and career readiness initiatives in our diverse, comprehensive high school. Also, we will discuss how to empower teacher leaders to be partners in the leading of this professional development.

**Presenters:** Rebecca Kinnee, Chris Rugg

### Coding Arkansas' Future with Apps for Good

**Computer Science**

This session details how ASMSA has leveraged Apps for Good to strengthen our Computer Science outreach program, connecting us with teachers and students we otherwise might have missed. Apps for Good is a global community of over 1,500 educators empowering a generation to change their world through technology.

**Presenters:** Daniel Moix, Denise Gregory

### Piling Good Things: Using Science Fiction and Fantasy to Enhance Empathy

**Humanities**

Empathic understanding is critical for developing positive social relationships in youth, so how can school officials facilitate this growth in a manner that is appealing to students? One way would be by using relatable works of science fiction and fantasy that they regularly consume. Join us to discuss such works as Doctor Who, Star Trek, Buffy the Vampire Slayer, The Twilight Zone, Quantum Leap, and others and how they can help enhance empathy in your students. Whether you prefer to beam up or roam cemeteries late at night, you are sure to have a good time learning applicable skills!

**Presenter:** Heath Stevens

### Science Meets Humanities: Researching & Communicating Today's Science

**Humanities**

This session will demonstrate how English/humanities classes can collaborate with science and library partners to produce meaningful student science essays and audiovisual products. We will discuss how to scaffold student research in cutting-edge science and incorporate student chemistry lab experiences into compelling science narratives. From purposeful research to focused persuasive writing to symposium product, this session will discuss how you can offer your students a meaningful opportunity to investigate and communicate innovative STEM ideas with professionals and peers.

**Presenters:** Jennifer Seavey, Anne Applin

### Games in Mathematics

**Math**

I will talk about ways in which I have used traditional games (bingo, tic-tac-toe, Jeopardy, etc) to help students review material and practice difficult mathematical concepts. I will also talk about certain games that can be used to teach mathematical principles including ideas from Abstract Algebra and combinatorics.

**Presenter:** Nicole Kroeger





### The Inner Light: The Great AmericanTotal Solar Eclipse of 2017

**Science and Engineering**

The great American total solar eclipse of August 21, 2017 presented both the secondary academic community as well as the general public with the greatest and most widespread appeal to STEM interfacing and empowerment with overall and overarching national educational standards and aspirations. The following presentation will detail one such expedition, outreaching to a small community in western Nebraska and outline the steps in directing new frontiers for today's secondary school boys and girls based upon astronomical objectives. The opportunity to kindle commitment to long term investment in experimental science will highlight the presentation.

**Presenter:** Lawrence Berz

### Do Your Students Matter?

**Wellness**

The central component of mattering is the students' perceptions that they are important, significant, and of concern to another individual, an organization, or the world. These perceptions play a role in the persistence and retention of students and more importantly, their overall well-being. Research has shown that students who believe they matter to their institution are more motivated to learn. What are you doing to make sure your students know they matter?

**Presenters:** Roger Schieferecke, Regina Tolbert

**10:00 am - 10:50 am**

### State Supported Residential STEM: Similarities & Differences

**Administration**

This session is the result of a Mini-term research project that looks as the similarities and differences among state supported residential programs. During the hands-on portion of the session, we hope to gather additional data and insights on each of our residential campuses and to advance the proposed development of a student leadership role where representatives from across all residential campuses participate in monthly virtual training sessions hosted by each campus and a yearly student summit where representatives explore common challenges or issues facing state supported residential communities and develop sustainable approaches to meeting them.

**Presenters:** Letita R. Mason, Akelo Agingu

### It's Gettin' HOTT in Here: Promoting Higher Order Thinking with Technology

**Computer Science**

There's no doubt that technology engages our students, but are they cognitively engaged? In this session, participants will learn about technology based classroom activities that allow students to connect with content in meaningful ways while remaining motivated and engaged. Participants will actively work through a framework that aides in designing lessons that culminate in HOTT (Higher Order Thinking w/ Technology) activities. We will also discuss ways in which teachers can utilize technology to facilitate classroom discussion around student work to further promote higher order thinking and deepen understanding of concepts.

**Presenter:** Becky Shiring

### Creative Thinking as Critical Thinking

**Humanities**

With a focus on the interrogation of situations in order to create and resolve problems, along with the use of structural tools from fields like logic and cartography, a creative writing course can also be a course in critical thinking. STEM students benefit in multiple ways: the ability to construct and dismantle scenarios translates into math, engineering and science research courses, and the ability to explore and develop identity builds confidence and compassion - necessary tools for innovation.

**Presenter:** Dr. Nicole Sarrocco

### Puzzlepalooza: An interactive look at engaging students in learning through puzzles

**Math**

Are you looking for ways to engage gifted learners? Puzzle hunts provide an opportunity for students to work on problems where solutions or even directions are not immediately evident. The "Puzzle Lords" of Montgomery Blair HS will share their successes and challenges from the eight years of Blair Puzzlepalooza. This will be a hands-on session in which participants will have the opportunity to dive into sample puzzles and work collaboratively on a truly out-of-the-box intellectually stimulating activity.

**Presenters:** James Schafer, David Stein, Peter Ostrander & Peter Hammond

### Flipping Pieces - How to Build Successful Tech-Flipped Activities and Lessons

**Math**

The research is in … Students enjoy using technology to engage in learning activities both inside and outside the classroom. Using technology successfully to flip classroom instruction does not have to be an all or nothing proposition. Current research suggests that using video micro lectures to offload instruction through homework or out-of-class activities can provide more time in class for student-centered activities, investigations, and the construction of knowledge – "Off-loading instruction" to promote "construction." Video micro lectures are also a good way to accelerate, differentiate, and to provide open-ended investigations of challenging concepts for our students.

**Presenter:** Laura C. McConaughey

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| | **STEM Innovation & Entrepreneurship Go Hand in Hand (Part 1)**<br>Innovation and entrepreneurship are joined in this interactive and collaborative workshop which focuses on how to turn students' innovative ideas into entrepreneurial actions. Participants will be given a real problem in the market to solve and work together to create a marketable STEM based solution. Get ready for a fast paced exercise in brainstorming, problem solving, collaboration and out of the box thinking. Your solution will be pitched to our sharks and may the best STEM product win!<br>**Presenters:** Laura Boyd Smidt, Kathryn Cossa | Science and Engineering |
| | **The Neuroscience of Mindfulness: How to Encourage Wellness on Your Campus**<br>In this session, participants will learn: The definition of Mindfulness, neurophysiological underpinnings of Mindfulness and learning, practical classroom applications of Mindfulness via experiential learning, and how to create mindful spaces on campus.<br>**Presenters:** Meagan Butler, M.Ed., Marissa Rivera, M.A., LPC | Wellness |
| 11:00 am - 11:50 am | **Project-based, Collaborative STEM Education for High School Students: MIT Beaver Works Summer Institute**<br>The MIT Beaver Works Summer Institute (BWSI) is a rigorous, world-class STEM program for talented rising high-school seniors. In its first year, the program featured an intensive, hands-on, project-based challenge through which teams of students learned how to navigate an autonomous mini-racecar through a complex environment. This program culminated in a final race day when the students put their new skills and knowledge to the test against the clock. In this session, we will provide the details of this new program, its teaching objectives, and its results. We also briefly discuss future directions and opportunities.<br>**Presenters:** John Vivilecchia, Jane Abbott Connor | Computer Science |
| | **Transitioning the Transition: Best Practices and Support for Trans Students in a Residential Setting**<br>This session provides an opportunity to discuss theory, best practices, and current practices of institutions surrounding issues that concern transgender students. Approach of residential schools will be foremost, as this setting appears to present the most issues, but all perspectives are welcome. The goal is to walk away with a better understanding of transgender students in a residential setting, how we can better support these students, and current practices being implemented.<br>**Presenter:** Kim Howell | Wellness |
| 1:30 pm - 2:30 pm | **Holistic Admission Application Review in Pharmacy Education**<br>St. Louis College of Pharmacy is implementing a holistic admission application review process for the 2017-18 recruitment cycle, which will allow us to evaluate experiences and attributes beyond the traditional academic metrics. We hope to attract, admit and retain students who have the resilience, persistence and desire to succeed in our rigorous academic program and as healthcare practitioners. This session will demonstrate how the holistic review process was developed; how the process ties into the College's mission, vision and values; how candidates will be evaluated; and what this process means for students currently in secondary and post-secondary STEM programs.<br>**Presenter:** Elizabeth Keserauskis | Administration |
| | **Virtual Reality for Educators**<br>This presentation will introduce attendees to Virtual Reality (VR) and its uses within an educational environment. An overview of current hardware and software options will be provided so that educators have a basic understanding of the range (and costs) of VR options at this time. A profile will also be provided of a real-world project created by high school students in partnership with an external partner organization. Finally, the benefits and challenges of working with VR will be covered. A discussion of possible future directions will wrap up the presentation.<br>**Presenter:** Scott Lang | Computer Science |
| | **A Librarian, Historian and Computer Scientist Walk into a Classroom: Digital Humanities Happens**<br>In a collaborative teaching effort between faculty and staff, a digital humanities experience was created for U.S. History students at the Arkansas School for Mathematics, Sciences and the Arts. Students created mobile apps featuring artwork from cultural heritage institutions paired with interpretive essays that connected these objects to citizenship rights and responsibilities in the United States. This project required students to use and develop a broad range of skills, including historical knowledge and understanding, locate, evaluate and incorporate information, and technical skills. This session will include the project's instructional scaffolding, lessons learned, student examples and the future of this project.<br>**Presenters:** Liz Miller, Daniel Moix, Dr. Neil Oatsvall | Humanities |





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| | **Digital Story Assessment in World Languages**<br>Digital Storytelling would seem a perfect tool for world language assessment in a STEM-emphasis school. Many world language teachers are unsure how to begin such a process and digital specialists may not be aware of the constraints of language assessment markers. When media specialists along with world language teachers are able to see the process in a collaborative manner, the task is less daunting.<br>**Presenters:** Bryan Adams, Liz Miller | Humanities |
| | **Solving Mysteries & Saving Lives: How Scientific Inquiry and Student-Led Learning Enhance the Classroom Experience**<br>How can a newspaper, list of names and map be used to solve a mysterious disease outbreak? In this session, attendees will discover how to incorporate scientific inquiry, writing skills, public speaking, research and data analysis into a hands-on, student-led project that can be implemented in a science or research classroom. In this project students must determine the identity of a mysterious disease that's infected a fictitious city, then propose how to contain it and prevent future outbreaks. Session will include project design and how the project can be differentiated up or down to meet the diverse needs of learners.<br>**Presenters:** Brittany Joslin, Amanda Micsenyi | Science and Engineering |
| | **Engineering as a Stealth Language Art**<br>The language arts dimensions of engineering make it a powerful, if stealthy lever for building literacy. Lessons taught through the engineering design process can enhance students' abilities in language arts like exposition, persuasion, narration, analysis, and description, to name just some. Find out how the engineering design process can support the development of literacy skills, and vice versa, for native English-speaking students and English-language learners, alike. The session will include both a theoretical discussion of engineering as a stealth language art and several examples of specific programs that make it work.<br>**Presenter:** Eric Iversen | Science and Engineering |
| | **An Exploration of the Factors that Motivate Gifted and Talented Students from Underrepresented Populations to Engage in Science, Technology, Engineering and Mathematics.**<br>This presentation will examine the factors that motivate gifted and talented students from underrepresented populations (Black/Latino, low-income and rural students) to engage in STEM at the Illinois Mathematics and Science Academy. In order to continue bridging the gifted and talented URP STEM education and career gaps, the racially and geographically based STEM achievement gaps need to be understood and studied further. Thus, this presentation will examine why certain URP Students have the motivation to engage in STEM, how that motivation is defined and manifested as well as why they decide to pursue STEM.<br>**Presenter:** Adrienne Coleman | Wellness |
| 2:30 pm - 4:00 pm | **Virtual Reality Demos for Educators**<br>Teachers who work in technology and maker space areas will have the opportunity to learn more about hardware and software they may be considering for inclusion in their programs. However, all teachers and administrators could benefit from hearing about the current state of the art in the area of virtual reality. Both virtual reality (VR) and augmented reality (AR) are going to play a role in the future of education and this workshop will prepare them for further investigation of what role these technologies could play in their schools and school districts.<br>**Presenter:** Scott Lang | Computer Science |
| | **Makerspace round table** | Science and Engineering |
| | **Drone Demo** | Science and Engineering |
| | **Wellness round table** | Wellness |
| 2:30 pm - 4:00 pm | **Panel & Roundtable Discussions** | |
| 8:00 pm - 10:00 pm | **Second City Event (additional purchase at registration)** | |

# EXCURSIONS

## Wednesday, Nov. 1 | 1:00 pm - 3:00 pm
## Illinois Institute of Technology

Join us on a trolley ride down Michigan Avenue and famous Lake Shore Drive for a look inside Illinois Institute of Technology's prototyping and energy research labs.

The Wanger Institute for Sustainable Energy Research (WISER) is home to the nation's first functional microgrid. WISER works with students and faculty across disciplines to improve the quality of life in our nation while preserving the natural resources and the environment for future generations.

State-of-the-art rapid prototyping lab, The Idea Shop, is where students transform ideas into reality with 3-D printers, 3-D scanners, CNC milling machines, a vacuum former, and a laser cutter.

It's one-part entrepreneurial center and one-part gathering place, with full-time staff dedicated to testing the limits of student imagination.


## Saturday, Nov. 4 | 8:00 am - 1:30 pm
## IMSA/Fermilab

The mission of IMSA, the world's leading teaching and learning laboratory for imagination and inquiry, is to ignite and nurture creative, ethical, scientific minds that advance the human condition, through a system distinguished by profound questions, collaborative relationships, personalized experiential learning, global networking, generative use of technology and pioneering outreach.

IMSA offers a uniquely challenging education for Illinois students in grades 10 -12 talented in the areas of mathematics and science.

Fermilab is America's particle physics and accelerator laboratory.

Since 1967, Fermilab has worked to answer fundamental questions and enhance understanding of everything we see around us. As the United States' premier particle physics laboratory, we do science that matters. We work on the world's most advanced particle accelerators and dig down to the smallest building blocks of matter. We also probe the farthest reaches of the universe, seeking out the nature of dark matter and dark energy.

Fermilab's 1,750 employees include scientists and engineers from all around the world. Fermilab collaborates with more than 20 countries on physics experiments based in the United States and elsewhere.





# KEYNOTE SPEAKER

## Major Kenyatta "Deacon" Ruffin

Major Kenyatta "Deacon" Ruffin is currently a student at the prestigious School of Advanced Military Studies (SAMS) where he is studying military strategy and operational design.

Major Ruffin grew up outside of Chicago, Illinois and first began flying at age 13. At 14, he soloed a glider in a flight program affiliated with the national Tuskegee Airmen, Inc (TAI). He attended high school at the Illinois Mathematics and Science Academy, was a member of Civil Air Patrol and became one of the nation's youngest FAA Certified Flight Instructors (Glider) at 18 - two years before gaining his driver's license! He graduated from the US Air Force Academy in 2003, earning a degree in aeronautical engineering and also has a master's degree in military operational art and science, with a concentration in leadership from Air University.

Major Ruffin has been assigned to units in Arizona, Georgia, Kansas, Mississippi, New Mexico, and Texas, as well as stationed overseas in Japan and South Korea. Major Ruffin twice deployed to Iraq and once to Afghanistan, logging over 750 combat hours in the F-16 and MC-12 aircraft; he has earned seven air medals for his actions and most notably was the ISR mission commander for the second-largest special operations raid in Afghanistan history. His other military assignments include service as an Air Liaison Officer with the US Army and a T-38C Instructor Pilot at the Euro-NATO Joint Jet Pilot Training program.

With a passion for mentoring and inspiring youth, especially those interested in aviation and the military, Major Ruffin has worked with numerous youth programs and in 2012 founded the Legacy Flight Academy, a 501(c)(3) non-profit organization that conducts character-based youth aviation programs that draw upon the legacy of the Tuskegee Airmen (for more information see www.LegacyFlightAcademy.org). His combat experience and many other things in his life has deepened his faith and solidified the thing he cherishes most in this life - his family.

Major Ruffin is married to the former Tané Peterson of Philadelphia, PA, and they have five children, Tabitha and Lydia (9), Joanna (5), Thaddaeus (3), and Matthias (0).

# REGISTRATION

NCSSS
National Consortium of Secondary STEM Schools

The National Consortium of Secondary STEM Schools (NCSSS) was established in 1988 to provide a forum for specialized secondary schools focused on science, technology, engineering, and mathematics (STEM) disciplines to exchange information and program ideas.

## NCSSS Mission

Our mission is to advance STEM education by providing professional development and networking opportunities for educators and learning experiences for students; to serve as a national resource for STEM schools and programs in partnership with educational, corporate, and international organizations; and to inform policymakers on STEM education.

## NCSSS Vision

Our vision is to serve as the resource for secondary STEM schools by supporting collaboration and knowledge sharing and providing professional development for teachers and administrators to positively impact student achievement in authentic STEM educational environments.

**www.ncsss.com**