KSTA Newsletter

Volume 21, Issue 2 February 2017

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SAVE THE DATE!
KSTA 45th Annual Conference and Professional Development
Nov. 9th – 11th, 2017
At the Lexington Center and Hyatt Regency
Lexington, Kentucky

Kentucky Science Assessment System

Use this link to the KSTA website to access documents and websites that provide information about the Kentucky state science assessment system. The system will be piloted in the spring of 2017 and go into effect for accountability in the 2017 - 2018 school year.
https://www.ksta.org/SAS976.cfm

Summer Research Program for High School Students

Details, application, and more at the end of this newsletter.

Designing Partnerships and Building our Future

By Brian McDowell, NBCT

In search of a sustainable response to the lack of engineers in my eastern Kentucky community, my school district has invested resources into the creation of a K-12 STEM pipeline using Project Lead the Way. My role was to develop the middle school program. Although I attended training, I am not an engineer, and it became obvious quickly that the program would be stronger with the help of local industry.

But, what does that relationship look like? How should I start?

As I networked with other STEM teachers, the most common suggestion was to bring in guest speakers. From past experience, I knew this wasn't always a great idea. Although guest speakers are incredibly knowledgeable, they are not professional teachers and tend to overwhelm the students with technical jargon or bore them with unimportant details. I've watched my middle school students' facial expressions change from excited to distressed minutes into a presentation. I knew there had to be a better way.

After a visit to a local manufacturer, Stober Drives Inc., my belief was confirmed. What my students needed were engineers as coaches, not lecturers. My challenge, then, was to create an experience that allowed this collaboration to happen. After a few discussions with Adam Mellenkamp, a mechanical engineer at Stober, we had our plan. The engineer Skyped into our classroom and described a problem his company couldn't figure out. He asked the students to design a way to attach tools to the gear boxes Stober created, and my students accepted the challenge.

During the next few classes, we brainstormed and tested possible solutions. Students' measurement skills grew as they realized their solutions had to match the measurements given in the blueprint. As students built prototypes, they explored advantages of different material's properties (foam, wood, plastic). My middle school students like to test prototypes but are terrible at using what they learned to re-design. Having the engineer advise our students through the re-design process showed them the recursive cycle of learning from and responding to evidence.

As I walked through the school, I caught students discussing possibilities during passing periods. Parents asked about the project and were amazed by the connections to our own community. As a capstone experience, our students presented their solutions to the engineer, practically overflowing with the confidence they'd gained.

Most importantly, this collaboration was not difficult. I facilitated the experience as I had done for my own the lessons. The engineer advised us as he advised his own employees. I asked questions to prompt organization, testing, and reflection, while the engineer supplied the experience to make the solutions possible.

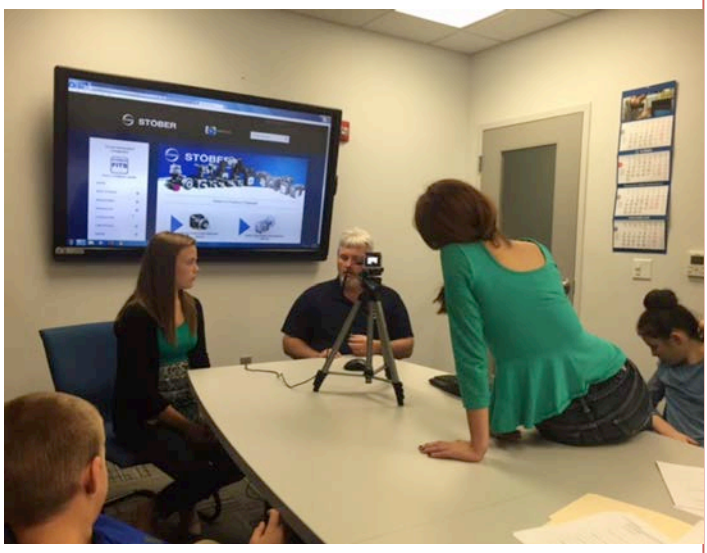
The positive response from community partners and students prompted me to build on our success. Could we make celebrities out of engineers?

Traditionally, STEM courses have students do web searches to find multiple examples of careers within a given field. I took that idea and made it more local by creating "Engineer Baseball" cards.

I started with parents of students who worked as engineers. They sent me selfies taken at work, and I added some basic facts. After exploring the engineering baseball cards, I challenged students to find other engineers in our community, introduce themselves, ask them their questions about their careers, and take a selfie to prove it happened. If we want our local engineers to be role models, why not treat them like sports stars?

As parents and community members began to talk about our program, other partnerships were added. Another manufacturing plant, Mitsubishi Electric Automotive, sponsored the bus transportation for students going to Engineering Day at the University of Kentucky. Many students who attended would have been unable to without the generosity of Mitsubishi.

We partnered again with Stober to create a submission for a regional video contest entitled, "What's Cool about Manufacturing?" Students planned, shot, and edited the movie after a tour of the plant. The final version was award winning and will be used as a recruiting tool for Stober for years to come.



There can be financial advantages, also. Teachers are amazing at creating incredible classroom experiences with few resources. For many industry partners, contributing funds to education is not just doable, but part of their annual giving plan. As partnerships develop, industries are more willing to invest in your program because they understand and appreciate your school's track record. My school has added a 3D printer, multiple robots, and numerous inquiry areas along our nature trail because of community partnerships.

Ultimately, my experiences have changed my teaching practice. As I began a design project about collisions for my sixth grade students, it seemed natural to reach out to one of my parents who is an engineer at Ford Motor Company. I don't worry about being the content expert; I design the interaction between the expert and my students and watch where the genius takes them.

If you would like guidance in setting up partnerships like this at your school, it is part of my job as a teacher leader on special assignment for the Kentucky Department of Education to help. My experiences have been in the STEM field, but community connections enrich any subject through project-based learning and thoughtful interdisciplinary connections.

Want to be my partner??

For more information, please explore http://teachinginmargins.weebly.com/

or contact me at Brian.Mcdowell@education.ky.gov

Brian McDowell, a National Board certified teacher**,** is a STEM and Project Lead the Way teacher for Mason County Middle School. He has received the Kentucky Science Teachers Association's Middle School Teacher of the Year Award, the National Science Teachers Association's Inquiry Based Teaching Award, was a Presidential Award Finalist and has been awarded more than $70,000 in grants over the past eight years.

2016 Conference Review

Kelly Taylor, Executive Director

If someone had said back in August that we would see a major attendance increase at the 2016 conference I would have said they were dreaming. Then came word from the folks at KDE that they would like to use the conference to roll out the final plans for the new science assessment system. Suddenly, interest and registrations exploded and we began some intensive planning for what would turn out to be a very successful conference. A couple of things were initiated this year that could pay dividends in the future. One was an all-day workshop for administrators put together by KDE personnel and the Partnership Institute for Math and Science Education Reform (PIMSER). This session on Thursday during our "pre-conference" program drew a standing room crowd.

In addition, we offered a special registration incentive for administrators. If they would bring two teachers from their school or district, we would refund the registration fee for one administrator. A good number of principals, assessment coordinators, curriculum coaches and others took us up on the offer. Besides the workshop for administrators, there was full capacity attendance for another Thursday all-day workshop by PIMSER, which was designed to help teachers at all grade levels develop strategies for teaching the "new" standards.

Over the course of Friday and Saturday, our conference attendees got a wealth of information about the new science assessment system from KDE folks and others. Our own board member, Dr. Tom Tretter from U of L, put in hours and hours of work preparing and presenting information about the Classroom Embedded Assessments. We are very grateful to Mindy Curless, Rae McEntyre, Christine Duke and Sean Elkins, as well as others from the Department of Education who did a tremendous job of presenting the new system and answering a multitude of questions. Our other presenters continued the long-standing tradition of excellence that has characterized the KSTA conference program for literally decades.

There were a couple of other highlights that I must mention. The keynote speaker for this year was Dr. Michelle LaRue from the University of Minnesota. She gave an inspiring and interesting talk about her work as an ecologist studying the penguin populations in Antarctica and how she enlists the help of classroom students to aid her work.

On Saturday, our Commissioner of Education, Dr. Stephen Pruitt, spoke to a large gathering of attendees about the goals of the new assessment system and his vision for what science education in Kentucky can be.

The planning for this year's conference has already begun and we're excited about furthering our collaboration with the Department of Education, PIMSER and others who help us assemble the best professional development experience for the science education community in Kentucky.

2016 KSTA Science Educator Awards

Kim Sword
Outstanding Elementary Science Teacher

Ellen Allen
Outstanding Elementary Science Teacher

Carly Baldwin
Outstanding High School Science Teacher

Dr. Melinda Wilder
Sherry Fox Distinguished Science Educator

Barbara Hill
KSTA Past-President

New Science Assessment System Information and Resources Available at KSTA.org

The KSTA website is featuring a page with links to helpful information regarding the new assessment system for science. Links can be found to documents at the KDE website as well as other helpful locations on the web. Just click on the rotating banner at the top of the KSTA homepage. If you know of other sites to add to the page just email the link to: admin@ksta.org

GEEO Travel Program Information

Travel the world affordably, earn professional development credit, and bring global understanding into your classroom!

Founded in 2007, Global Exploration for Educators Organization (GEEO) is a 501c3 non-profit organization that has sent over 1600 teachers abroad on adventurous travel programs. With GEEO educators can earn professional development credits and optional graduate credit while seeing the world. GEEO's trips are 7 to 21 days in length and are designed and discounted to be interesting and affordable for teachers. In addition to amazing tour leaders, many of the programs are accompanied by university faculty that are experts on the destination. The deposit is $250 for each program and then the final payment is due 60 days before departure.

GEEO also provides teachers educational materials and the structure to help them bring their experiences into the classroom. The trips are open to all nationalities of K-12 and university educators, administrators, retired educators, as well as educators' guests.

GEEO is offering the following travel programs for 2017: Bali/Lombok, Bangkok to Hanoi, China, Costa Rica, Eastern Europe, The Galapagos Islands, Greece, Iceland, India/Nepal, Bhutan, Ireland, Armenia/Georgia, Italy, Multi-Stan, Morocco, Myanmar (Burma), Peruvian Amazon, Peruvian Andes, Southern Africa, Vietnam/Cambodia, Balkans and, a Mt. Kilimanjaro climb. The registration deadline is June 1st, but space is limited and many programs will be full well before the deadline.

Detailed information about each trip, including itineraries, costs, travel dates, and more can be found at www.geeo.org. GEEO can be reached 7 days a week, toll-free at 1-877-600-0105 between 9 AM-9 PM EST.

GEEO.org
Global Exploration for Educators Organization

Jesse Weisz
Executive Director, GEEO Teacher Travel Programs
Phone: 1-877-600-0105
Email: jesse@geeo.org
Website: www.geeo.org

Recently left the Science Classroom? Retired? Are You Interested in Teaching Teachers??

Become a STEMscopes Trainer!! We are looking for passionate science educators with availability during August and the school year to train on the implementation of the award winning, digital science curriculum, STEMscopes™. We serve Pre-K through high school teachers. This is a consultant position with the Professional Services Team that allows you to make your own schedule and has opportunities to grow with the company, Accelerate Learning Inc. For more information and interest please send your resume and inquiries to pd@acceleratelearning.com. To learn more about our products please go to www.acceleratelearning.com.

STEMscopes™ K-12

Call for Nominations for the 2017 National Association of Geoscience Teachers' Outstanding Earth Science Teacher Award

Nominate an outstanding teacher online at:
http://nagt.org/nagt/awards/oest.html

Read bios of inspirational 2016 OEST winners here:
http://nagt.org/nagt/awards/oest/2016.html

If you have questions or need additional information, contact Susan Wolf at SusanWolf@Augustana.edu.

The **deadline for 2017 OEST applications is May 1st.**

Online Learning Opportunity

Kentucky science teachers now have the opportunity to advance STEM teaching skills, learn effective new strategies for teaching physics, and receive graduate credits with new online courses: https://njctl.org/teacher-education/online-courses/

The courses are taught by The New Jersey Center for Teaching and Learning (CTL) - a nonprofit run by teachers to advance student achievement in math and science, and provide a simple, scalable solution to our country's immense STEM teacher shortage.

CTL is the leading U.S. provider of free, editable course materials for K-12 math and science instruction; and has become the #1 producer of physics teachers in the country.

Now, a partnership with Colorado State University - Global Campus is enabling teachers around the country to fully benefit from CTL's offerings with online courses.

You can choose your level of study to improve your students' outcomes and advance your career:

• **Learn a highly effective student-centered teaching methodology for STEM** that is applicable from kindergarten through early college that reduces the stress of lesson planning with free, editable course materials.

• **Achieve a strong grounding in the core principles of algebra-based physics** – Teachers with backgrounds in a full range of academic fields can not only learn physics themselves, but also how to engage and inspire all high school students to master physics.

• **Learn proven methods for teaching AP Physics 1 and AP Physics 2**, and how to boost student outcomes.

All courses can be pursued on your own schedule, provide graduate credit and are applicable to a Master's Degree at CSU–Global.

Now you have an opportunity to take your skills to the next level and give your students access to the life-changing empowerment of high quality STEM education.

NEW JERSEY CENTER
FOR TEACHING & LEARNING

Designing NGSS Phenomena Based Instruction

Melissa Harris, KSTA Board Member

The Beginning

When I began the journey of converting my curriculum to NGSS three years ago, I encountered so many new ideas, concepts, skills, and vocabulary words. I was just overwhelmed! Trying to find answers, I read the book " Translating NGSS for Classroom Instruction" by Rodger Bybee. As I read this book, I continue to discover more new concepts like natural phenomena, models, engineering, and systems. I had no idea where to begin utilizing any of these new strategies in my classroom! Every resource I read stated NGSS lessons were to be driven by natural phenomena. What are natural science phenomena? Paranormal phenomena? So, this is where my journey truly began. I realized to be an effective teacher I had to dedicate myself to discovering how to develop lessons using the three dimensions of NGSS and natural phenomena. Phenomena driven lessons provide students the opportunity to develop and ask questions as well as problem solve increasing student engagement and driving student success.

Why Phenomena Based Lessons?

In the past, science instruction has been mostly fact based or as I call it "spoon feeding" students. If our task as teachers is to prepare students for the future, this teaching strategy is probably not very effective. Students need to be provided opportunities to problem solve, ask questions, build objects, design solutions, be engineers, interpret data, and just think! At the beginning of the year, my students did not know how to attack a task on their own.

They were uncomfortable with trying and failing. To alleviate this problem, I began to design and implement phenomena based lessons. Because of these changes, student engagement increased which has led to problem solving and risk taking.

Since I feel this method works, I would like to share with you my insight on what is meant by a phenomena based lesson and how to develop a lesson on your own.

What is Meant By Phenomena Based Lessons?

Natural science phenomena are defined as observable events occurring in the universe, and teachers can use them to drive student learning. The goal in science is to develop ideas, based on evidence, that can explain and predict phenomena.

Ok, so what exactly does this mean? It means all science concepts are driven by phenomena. Science phenomena are just a science event or a concept in any science unit. For instance in a unit covering Newton's Laws, the concepts to cover are acceleration, gravity, and friction. A wooden rollercoaster would be a perfect example of a phenomena for this unit. Select a familiar rollercoaster for the students to research and have them make a claim as to why only a chain is needed to keep the rollercoaster in motion. Other natural phenomena examples would be a rocket launching or air bags.

What makes the lesson phenomena driven is how the lesson is implemented. When using phenomena to drive instruction, the phenomena should be introduced in the beginning of the unit. Think of a typical demonstration used during any unit. Could this demonstration be used as the phenomena at the beginning of the lesson to drive student learning? Throughout the rest of the unit, students work towards explaining the science concepts behind the phenomenon in their own words.

Phenomena-driven instruction leads to engagement with the material because it motivates the students to figure out rather than passively learn about core ideas in science. Instead of giving students the answers, we need to give them questions. Centering science education on phenomena, students are motivated to explain the phenomena. The focus of these learning shifts from learning about a topic to figuring out why or how something happens. By using phenomena driven lessons, students are made

to think for themselves! This can be difficult sometimes because students often just want you to give them the answers!

Choosing the Correct Phenomena

Phenomena are only as effective as the unit it is embedded. Science phenomena do not have to be phenomenal to make students think. Good science phenomena can build upon everyday experiences. Students should not be able to explain the phenomena in one lesson and the answer should be just beyond the reach of what students can figure out without instruction. Also, searching online should not yield a quick answer. In other words, students should not be able to "Google" the explanation to the phenomena. A non-example of phenomena based lessons is the typical cell cake model or the DNA model teachers have built for years. There is no three dimensional learning with either of these assignments. To provide some examples, here is a link to good resource page. https://www.ngssphenomena.com

Designing a Lesson

In designing phenomena based lessons, there are six simple steps to follow. First, identify the topic and standard for the unit. Often, several mini-units are needed to teach one Performance Expectation. To break the standard into mini-units, research the topic to find the storyline then select the real life phenomena to guide student learning. Once you have decided on the exact content to be taught, you can design or plan phenomena. From the phenomena, you develop a storyline or your unit.

Keep in mind the lesson is driven by the phenomena and student questioning. The last step is planning the anchoring day or the day the phenomena is presented. This must be scripted and designed to drive student engagement and questioning.

Two Types of Phenomena

When choosing phenomena, keep in mind there are two types of phenomena. The first type is called anchoring phenomena. This type of phenomena requires an entire unit for students to be able to explain the science behind it. The other type is called a lesson-level phenomena which are smaller and lesson-level phenomena to help students figure out smaller pieces of the larger picture. When planning a storyline, there maybe overlying phenomena can drive a whole unit but sometimes a lesson driven phenomena maybe more appropriate.

In Retrospect

I know implementing NGSS is a challenge. This journey has been frustrating and confusing. The goal of this article was to provide helpful information to teachers. From experience, I can tell you my students have adapted to this new method of teaching. At first, I had to teach the students how to take risk, to think on their own, how to do their own work and to accept the possibility of being wrong! By doing this, students have learned to design and test prototypes then learn from their mistakes. I am not saying this is an easy path, but one I feel is necessary to prepare students for the future.

2017 Kentucky Junior Academy of Science Annual Meeting
Saturday April 15, Kentucky State University, Frankfort, KY

Registration for the Kentucky Junior Academy of Science meeting is now open, to ANY Kentucky Middle or High School student who wishes to present their research. Students present a 10-minute scientific talk about their research and winners are eligible to participate in the American Junior Academy of Science meeting the following February. (Teachers or students who are new to the Junior Academy, we are offering you help if you would like to find mentor scientists. Check out our Science Speakers Bureau - http://kyacademyofscience.net/programs/kentucky-science-speakers-bureau/ - and get in touch with us!)
Registration is $5. Registration deadline is March 15, 2017.

Building Confidence in Elementary Science Educators: Advice from a Once Reluctant Science Teacher

Angela Green, KSTA Board Member

To say that I was reluctant when my principal asked me 19 years ago to teach 4th grade Science would be an understatement. I didn't have a strong background in science, and I had even fewer positive experiences in science class when I was in elementary school. I was from the generation where you read the chapter and did the questions at the end. I tried everything I could think of to try to get out of teaching science. Sure, I had one science methods course in college, but I felt totally inadequate and unprepared. After all my begging and bargaining, being forced to teach science ended up being the best thing that ever happened to me in my career.

Now, with the new science assessment model, many elementary teachers are facing the added stress of teaching science for the first time. Let's face facts, for years, many schools have been focusing solely on the tremendous task of teaching kids to read, write, and do math. Science instruction has fallen mainly on the shoulders of the 4th grade teacher. We know that this isn't best practice, but it has been reality in our assessment-driven world of accountability. With the new assessment model, every teacher must become a science teacher. While learning how to navigate the world of NGSS, CEAs, and TCTs may be challenging and even a little bit intimidating, if you jump in with an open-mind, you will find it to be very rewarding and empowering.

As elementary teachers, we can pretty much pick up any content or topic and design a lesson for it. But, when looking at the NGSS for the first time, you may feel like you have entered another world. Then, the added stress of through course tasks and classroom embedded assessments can really cause panic. Don't worry! With a little support, education, and teamwork, you will be teaching science like the pro that you are.

There are some things that you can do to build your confidence as a new science teacher:

- Take the initiative to educate yourself. Don't rely on your curriculum coach or administrator to tell you what you need to know. Prepare yourself by learning everything there is to know about the new assessment system.
- Participate in KSTA's annual science conference or join your regional cooperative.
- Actively seek out professional development opportunities. Organizations like PIMSER offer trainings throughout the school year.
- Find a support system. Partner with other teachers in your school or district. Share strategies, lessons and ideas, and successes and failures.
- Be willing to try new things. Try new strategies without fear of failure. This new assessment is a learning curve for all of us.
- Expect your classroom to be noisy and your hands to get dirty. That's why kids love science!
- Get organized. Find space to store all of the materials that you will collect teaching hands-on activities.
- Have fun! You have been blessed to teach the best subject there is.

Now, if you find yourself reluctant to teach science like I was, you don't have to try to get out of it. You have some steps to follow to prepare yourself for the new science assessment. You don't even need a degree in science to be a great science teacher! With hard work, you can overcome your self-doubt, and teaching science could turn in to one of the best experiences of your career.

KSTA on Facebook and Twitter

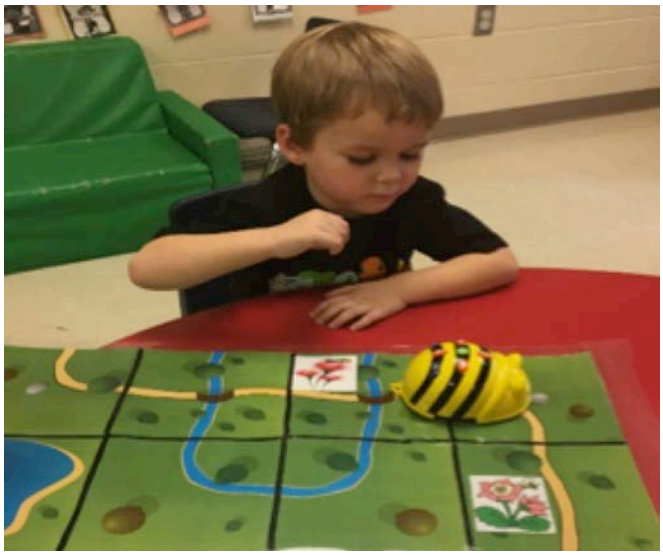
Find KSTA by searching "Kentucky Science Teachers Association" on Facebook (don't forget to select "get notifications" to keep up with the latest from KSTA) and KYSciTeachAssoc @KySciTA on Twitter. Invite your KY science friends!

Buzzing Around! Using Beebot to Explore Needs of Bees

Carrie Holloway, KSTA Board Member and Associate Principal of SVA, Kenton County

Summit View STEAM Academy preschool classrooms were buzzing with excitement recently as we introduced for the first time, Beebot, a robot designed especially for a young children to learn the basics of coding through selection of up to 40 commands for their Beebot to follow.

The goal was for our students to program the Beebot to complete a journey on an illustrated mat to model the journey of bees as they try to meet their needs in the environment in which they live. This lesson was part of a "guest scientist" experience that is done monthly in our preschool classrooms. It is in correlation with the Amazing Animals unit in our preschool curriculum, Big Day in Pre-K.



Before programming began, students engaged in a discussion about what they knew about bees, where bees live and what kinds of plants bees need. We introduced words like hive and nectar to help students name resources in the environment that honeybees need. Working in stations, student groups were given the opportunity to explore and problem solve together to create a sequence that would move the Beebot from the hive, to flowers, and then back to the hive to produce the honey.

Students programmed the sequence by inputting the directions up, down, left, and right to complete the journey in sections. Students used critical thinking and perseverance as they programmed, tested, and reprogrammed for success. They were able to work collaboratively when the test run didn't go as planned and offered suggestions on how to make the next run even better.

With only one Beebot, SVA preschool teachers and instructional assistants were able to run a variety of other stations to keep our littlest learners engaged on the same topic. Students drew a path from the bee to the flower to the hive for Ozobots to travel, they engineered their own honeycombs out of toilet paper tubes and paper clips, and kept tallies of Ozobot's journey through a pre-drawn maze. Our littlest learners loved exploring about how bees, flowers, and their surroundings make up a system of support for our bees while engineering and engaging with new technology.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

https://www.bee-bot.us

Developing a Scientific Argument: Putting the Practice into Practice

Stephanie Harmon, KSTA Board Member, Rockcastle Co. High School

Implementing the Science and Engineering Practices in our classrooms adds another layer of richness to what we are teaching. Sometimes this can be a daunting task. However, if we think about the nature and intent of the NGSS, we know that the Practices are intended to "establish, extend, and refine our knowledge of the world (Quinn, et.al. 26)." So how do we provide meaningful experiences for our students that build their capacity in the practices – particularly the practice of scientific argumentation?

How do we do this?

As science educators we understand the importance of teaching our students how to construct scientific arguments. This is what scientists do as part of their daily routine. But how do we approach this task? If you look at the grade level progression for this practice you will notice that is begins with students interpreting their own data. From there, we must be deliberate in teaching them how to go beyond making a claim to using evidence to support their reasoning. It is interesting to listen to students share their thinking as they work through this process. Students must understand what evidence is. Evidence isn't opinion rather it is scientific data that comes from observations and measurements.

From the Classroom

In my Earth Science classes, I have been using a series of free online lessons and simulations from High Adventure Science which is part of the Concord Consortium (www.has.concord.org). The lessons are designed to stand alone or can be incorporated into an existing curriculum. I have been incorporating them into my existing Earth Science curriculum and have found them to be an excellent tool in helping students develop the ability to craft a scientific argument. Each lesson series begins by examining a phenomena such as "Will There Be Enough Fresh Water?" This was used this as part of our Water Quality unit. Students were asked to make a claim and determine what type of evidence would be needed to support the claim.

Students shared their thinking and began to examine factors that influence the quality of water. One of the factors used by the Kentucky Division of Water is conductivity. Some students made the claim that the conductivity measure does not have a significant impact on water quality. Other students made the claim that a high conductivity measure indicates pollutants in the water. They began researching the issue and discussed why conductivity is included and what circumstances can result in an unsafe conductivity measure.

They tested the conductivity of a variety of water samples (ponds, streams, city water supply) as well as commonly consumed beverages (bottled water, Gatorade, soda). As the students shared their results other questions were raised:

- What are the sources of the metal ions that lead to unexpected measures in the water samples?
- Which ingredients in the beverages result in higher than expected conductivity measures?
- What determines if a conductivity measure is too high?

This led to more claims being made and opened discussion about other factors that affect water quality. Students talked about what they would need to do to gather evidence to determine if these claims are valid.

After these classroom experiences, students began using the High Adventure Science lessons. The lessons include authentic data sources and a variety of models for students to examine. As the student works, he is asked to make claims and support the claims with the evidence that is provided. In addition, the student is asked to rate how certain he is that the claim is correct and explain the certainty rating. So an element of self-assessment is built into the lessons.

Instructional Implications

This is the type of experience we want our students to have as we teach argumentation. It demonstrates a cyclic approach to science were evidence is constantly being examined and claims revisited. It teaches them that science is not a fixed step-by-step process dictated by the scientific method.

It also offers us the opportunity to help students explain their reasoning. It can be difficult for students to explain how or why the evidence supports the claim. The types of questions we ask can guide student through this process and gives us insight into misconceptions they may hold.

Conclusion

One of the things I have gained from facilitating this process is the opportunity to see students make connections between what they are doing and where it is useful outside of the classroom. They understand the relationships between variables and pose new questions to investigate. Teaching students how to develop a scientific argument by making claims, using evidence and explaining their reasoning is a skill that will serve them well beyond the science classroom.

References:

Quinn, H., Schweingruber, H., & Keller, T. (Eds.). (2012). A framework for K-12 science education: Practices, crosscutting concepts and core ideas. National Academies Press.

Zembal-Saul, C., McNeill, K., & Hershberger, K. (2013). What's your evidence? Engaging K-5 students in constructing explanations in science. Pearson Education.

ASM Materials Camp

Greetings, Teachers:

You are invited to attend a 5-day professional development workshop (ASM Materials Camp-Teachers) this summer at Princeton High School, Cincinnati, OH on July 17-21, 2017!

Register at
https://www.surveymonkey.com/r/8XRC7JB

Join the fun this summer in Cincinnati, OH where you will learn the basics of Materials Science Technology as taught at the high school level. During this cost-free, week-long camp, you will work hands-on with metals, ceramics, polymers, and composites. Participating teachers will leave with a comprehensive series of low/no cost laboratory demonstrations in applied science to use in chemistry, physics, math, technology, and industrial arts. You will also have an opportunity to earn 4 CEU credits through the ASM's Education Department.

For those who have attended before, please forward this on to anyone you think would be interested.

"I've attended several PD - by far this was the BEST training I've ever attended. I gain so much knowledge - at the end of the training - I felt empowered, enlighten and motivated! I felt totally prepared to begin the new school year!"

"Every science instructor should attend this course. It is top-notch in all respects, and is incredibly helpful for teaching students and simply encouraging as a teacher. This is not only because of the knowledge, but the content is very accessible and enjoyable!"

"Through the lab activities and discussion sessions, I was able to reflect on my current teaching practices and find ways to make 8th grade physical science more meaningful for the students."

Camp Schedule:
8:00 AM – 5:00 PM – Monday-Thursday
8:00 AM – 3:00 PM - Friday

What's Included:
4 CEUs, demonstration materials, lunch & snacks

Application Deadline: As Soon As Possible!! Early application is encouraged because capacity is limited to 30 participants. If you have attended before and want to repeat the same camp, use the link above. If you want the Year 2 camp, that is a separate application form.

If the Cincinnati Camp doesn't work for your schedule, there is a list of other camps to apply for as well.
http://www.asminternational.org/foundation/teachers/teacher-material-camps/schedule

Eligible Teachers:
High School teachers: Science (especially Chemistry and Physical Science), Engineering, and Industrial / Career and Technical Education
Middle School Teachers: Physical Science
Pre-service science teachers
Art, Math, and community college teachers as space allows

Graduate Credits: Two semester credits will be available through the University of Missouri—Kansas City. Participants must pay $250 for the UMKC graduate credits.

Faculty: Primary faculty are experienced high school "Master Teachers" who have taught materials science courses for many years and helped develop this innovative approach to hands-on learning of applied science principles.

ASM Materials Camp®

Your **FREE** attendance at this workshop is made possible by the generous contributions of individual ASM members, ASM Chapters and many partners of the ASM Materials Education Foundation!

Got Questions? Contact Jeane L. Deatherage, Administrator, Foundation Programs, ASM Materials Education Foundation jeane.deatherage@asminternational.org, 1-800-336-5152, ext. 5533

Talking Points Regarding the Statewide Assessment System for Science

Reprinted from KDE released document, October 2016

- The Kentucky Science Assessment System is a 'system' because first and foremost the emphasis must be on instruction at every classroom level, K-12, i.e., teaching and learning.
- The entire Kentucky Science Assessment System is built around and applied within the context of clear, defined learning expectations based on Kentucky's Academic Standards for Science.
- A deliberate effort has been made to include assessments for classroom use for every grade level, preK-12, in order for teachers and schools to better understand and support student learning progress continuously over time and evolve teacher growth and effectiveness.
- In this system, it is important to realize that the components are less about defining 'tests' or 'item types' and more about the substance of information elicited from students. There are only so many ways to ask questions and design tasks. Items and tasks utilized in each component of the system may not look substantially different from traditional or past learning experiences/assessments on the surface, but the expectations for how students approach them and respond will be reflective of the three dimensions of the standards.
- Throughout the system, careful consideration must be given to what inferences and claims about student science achievement can be made from the responses that students generate.
- The system does include a summative assessment component, per ESSA requirements, at grades 4, 7 and HS*
  *KDE is evaluating the assessment plan for high school as a new accountability system is designed.
- Classroom Embedded Assessments (CEAs) support both *teaching and learning*** and are for classroom/school use only (note: *KDE may invite submissions of student work for research purposes only*). Teachers and principals gain information about learners' strengths and needs so that they can revise next teaching/instructional steps. Students use the information to gain a clearer picture of expectations and utilize feedback to help them reach the expectations.
  **Teaching precedes learning in this component as CEAs are intended to be an integral part of TEACHING that is designed intentionally to elicit evidence of particular learning targets/objectives in order to move learning forward.
- It will be important that educators avoid 'lethal mutations' (i.e., significant misunderstanding/misrepresentation of the concept/purpose of CEAs as not just THINGS but PRACTICES/PROCESSES and the decisions/inferences that can/should be made) or the power of the CEAs to impact teaching and learning at every level, preK-12, may not be realized.
- Kentucky's definition of formative assessment (SB 1, 2009) is: a process used by teachers and students during instruction to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes. This process is manifested in instructional practices that both teachers and students engage in routinely.
- Beware of products labeled or marketed as 'formative.' No task or test or item is inherently formative (or summative for that matter). It is the way it is USED that determines the appropriate label.
- The Through Course Tasks (TCTs) are intended to provide rich experiences for students to demonstrate science skills and concepts – focusing on *learning and teaching**** - yielding information for classroom use. Success criteria are designed to:
  1. Promote calibration of expectations across classrooms/schools throughout the state
  2. Clearly articulate task specific expectations so that resulting information can be used by both students and teachers via formative processes

  ***Learning precedes teaching in this component as TCTs are intended as a 'check' of student LEARNING and their ability to transfer the use of practices, core ideas, and crosscutting concepts to new phenomena. Student responses to these tasks inform teaching by enabling teachers to 'check' their own expectations of the students' ability to transfer and communicate effectively their learning by using common success criteria. Teachers may find they are not holding the same high expectations for students that the standards call for and then can adjust their teaching to address that issue.
- Statewide Summative Assessment results will be most useful in reviewing each school's science curricula, courses, and programs.

UofL High School Summer Research Internship Program 2017

To whom it may concern:

We would like to offer a unique opportunity to your students who are truly excited about science: the chance to work in a research laboratory through the ***Louisville Science Pathways (LSP)*** *Summer Research Internship Program*, sponsored by the Science Policy and Outreach Group (SPOG), a graduate student group interested in sparking interest in science careers.

This competitive program, runs for 8 weeks beginning shortly after the academic school year ends, offers students a hands-on research experience working with researchers both on the Belknap and Health Sciences Campuses. The goal is to enroll students who do have an interest in the sciences, but are not already adorned with experience and accolades. This is to be an opportunity to those students who may not feel qualified for the more competitive programs which offer a stipend and poster project. Students must commit a minimum of 20 hours per week to their research, and attend the full eight weeks of the program.

To apply, each interested (16 yr+) student must complete and submit an application, copy of transcript, consent-and-release form, and include a letter of recommendation from his/her primary science teacher. *Application materials must be received by Monday, March 28* to be considered. Send applications to: ***SPOG.UofL@gmail.com .*** Reliable transportation to the Clinical and Translation Research Building (505 S. Hancock St. or Belknap Campus 2301 S. 3rd St) is a must.

Decisions will be announced by May 1.

Please direct any questions you may have to Teodora Stoica - teodora.stoica@louisville.edu or SPOG.UofL@gmail.com.

Thank you for taking the time to share this information with your students and colleagues.

With best wishes,

Teodora Stoica

Teodora Stoica
Summer Research Internship Program Director

Additional information regarding the fellowship An applicant will be chosen based on the Statement of Interest, Letter of Recommendation, and grades. Consideration will be given to local and regional applicants and minorities, with the goal of improving participation of any underrepresented groups in science careers.

Louisville Science Pathways (LSP)
Summer Research Internship Program 2017

~ Application ~

Applicant Name

Home Address (street)

Home Address (city, zip code)

Email address (legibly please!) **Home or Cell phone number**

Name of Parent or Guardian **Phone Number or Email address in case of emergency**

Name of School you attend **Grade/Level (currently)**

Name of Primary Science Teacher **Email address** (in case of questions)

Science classes you have taken (including school year):

Have you worked previously in a research laboratory?

If so, where, with whom, how long, and on what topic

• **I am** interested in: __practicing medicine, __performing biomedical research, __both medicine and research, __other career path, or __have no plans at this time? (place **X** to select)

• I am applying because: __my school requires lab experience, __colleges require lab experience, __lab work interests me. (place **X** to select)

• **I would** prefer (place **X** to select) ___ ***bench research*** **OR** ___ ***theoretical/statistical/computer-driven research***

• **I will** commit at least 20 hrs per week for the 8 consecutive weeks of the program.
If not, please explain

If you will be gone during the program, please give date(s) and explain

• **How** many hours will you spend doing research/week? __20 __30 __40 __other (please explain)

Signature of Applicant **Signature of Parent or Guardian**

Date

ESSAY: Tell us about you – your interests, what excites you personally and scientifically, why you are attracted to type of research/this program, and how you hope this program will benefit you (please type, and continue on additional pages as necessary):

Submit this application (including essay), Consent & Release Form, copy of transcript, and a letter of recommendation from your primary science teacher to the address on the first page (scan or attach picture of signatures). Limited additional information may be included with the application if relevant. After being accepted into the program, you will be asked to rate your top three mentor choices based on research preference.

Louisville Science Pathways (LSP)

High School Summer Research Internship Program 2017

Consent and Release Form

I/We hereby consent to the participation by our child, _____, in the LSP High School Summer Research Internship Program either on the Belknap Campus (2301 South 3rd St.) or Health Sciences Campus (505 South Hancock Street), University of Louisville, for a period not to exceed June 1, 2017 through August 31, 2017. Should the project exceed this time period a new Consent and Release Form will be executed.

I/We understand that the individuals enrolled in this program will be exposed to biomedical laboratory facilities, and that this may include potential exposure to caustic or other potentially harmful substances. Although this program will be under the supervision of University of Louisville researchers, who will instruct the student(s) concerning the safe use of laboratory facilities and supplies, there is no assurance the student(s) will not be exposed to a potentially harmful substance. Notwithstanding the foregoing, this program is not intended to expose the students to substances that are unreasonably dangerous for individuals of their age and experience.

Therefore, in consideration of the educational benefits of our child being permitted to enroll in this Program, I/We hereby release the University of Louisville, SPOG and all laboratories hosting summer interns and its employees and agents from any claims for injuries of any nature, mental or physical, resulting from our child's participation in this program.

In witness whereof, I/We have executed this consent and release form on this, the _____ day of _____, 2017.

_____ _____

Parent Signature Printed Name

_____ _____

Parent Signature Printed Name

_____

Emergency Contact Phone Number

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