Welcome to the Spring issue of CeMaST Connections.

2021 is the start of a new chapter in our lives, and we continue to strive to maintain connection during the pandemic. Together we can keep empowering, conducting, and supporting STEM education and scholarship for all students across the K-16 continuum.

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Dear STEM enthusiasts,

I start off this second issue of CeMaST Connections by wishing you a happy spring! It feels like we have escaped an unusually long winter, and I often feel like I am high on sunshine. If you are looking for a fresh STEM-related outdoor activity, check out geocaching – a relaxing way to combine hiking and deep observation. TrailLink has great resources for finding the best geocaching trails in Illinois.

At CeMaST, the long winter has been busy. Back in 2019, two teams of our STEM leaders applied for two separate funding opportunities offered by the Howard Hughes Medical Institute (HHMI). The Driving Change initiative seeks to “drive genuine and lasting culture change on university campuses so undergraduate students from all backgrounds, particularly those who belong to historically excluded groups, will excel in STEM and graduate from college well prepared to pursue advanced degrees and eventually assume leadership roles in STEM.” The Inclusive Excellence initiative seeks to “foster a learning community of college and university faculty and administrators who are engaged in the process of increasing their institution’s capacity for inclusion of all students, especially students who belong to groups underrepresented in the sciences.” In both cases, we were invited to submit full proposals, after which both opportunities were suspended due to the COVID-19 pandemic. Despite this disappointment, HHMI has worked to generate learning communities among the institutions who were invited to submit full proposals, and their community gatherings have provided opportunities to discuss shared challenges and potential solutions across institutions. Further, HHMI has provided modest mini grants to participating institutions, so that we can improve understanding of why underrepresentation exists within the specific contexts of our institutions. Toward that effort, you are invited to share their ideas in this anonymous ISU STEM Self-Study Survey. This study will be ongoing throughout the summer and fall of 2021, with the goal of adapting best practices to our specific ISU context.

The second action arising from these HHMI mini grants is that this fall, we will pilot optional recitation sessions co-facilitated by mathematics and science (biology or chemistry) graduate students. These GAs will support students’ solving of problems assigned in introductory science courses (BSC 196, CHE 140) that require application of mathematics skills. The goal is to foster foundational mathematics skills (i.e., algebra and manipulating units; scale, exponents, and logarithms; reading and creating graphs and tables; counting and probability) that are necessary for persistence in the science majors.

A further step toward the goal of adapting best practices from the literature to enhance diversity, equity, and inclusion within the specific contexts of ISU’s STEM programs, we have assembled a STEM Diversity, Equity, and Inclusion Taskforce composed of representatives from the Schools of Biological Sciences and Information Technology; the Departments of Chemistry, Mathematics, Physics, Technology, and Geology, Geography & the Environment and STEM Alliance. This body will begin its work by transforming results from the STEM Self-Study into actions that seek to eliminate under-representation in STEM at ISU.

In the vein of evidence-informed practice, CeMaST is also assisting STEM units in aspects of their program evaluations. For example, the School of Biological Sciences was interested in the measuring student outcomes of undergraduate research, so starting this fall, we will assist in data collection of student outcomes for those who register for BSC 290: Research in Biological Sciences, using the Entering Research Learning Assessment. This effort is enabled by our in-house data wrangler, Kate Edler, who has availability to assist other STEM units in similar ways. If a unit is interested in discussing this further, please do not hesitate to drop me an email.

Finally, I close this message with a hearty farewell to Dr. Brad Christensen, who has been an Integrated STEM Instructional Designer at CeMaST for ten years. Brad has taken a position as Director of STEM Education at Hebron Christian Academy in Dacula, Georgia, and we will miss him. I encourage you to check out his Staff Spotlight in this issue of CeMaST Connections.

I hope you all have restorative summers, and I look forward to a renewed appreciation for in-person learning in the fall.

Take care,

Rebekka Darner, PhD
Brad started his work at CeMaST on the Integrated Mathematics, Science, and Technology (IMaST) project in 1997 while pursuing his doctorate degree. He edited and authored the 7th and 8th grade books and was involved in the first 2 years of the 3-year process of writing the 6th grade IMaST books. Brad graduated in 2001 and accepted a faculty position in technology teacher education at Berea College in Berea, KY.

While teaching at Berea, Brad continued involvement with ISU and CeMaST by leading the implementation of IMaST at the local school and serving on steering committees for other curriculum development projects at ISU. When STEM became a popular educational movement, Brad returned to CeMaST in 2011 to “blow the dust off IMaST.” This task soon grew into the development of a K-8 STEM curriculum that was approved for mathematics and/or science adoption in California, Florida, Georgia, North Carolina, and Texas. Brad led the Real Numbers Algebra I project and the Real Science project. In each of these 2-year programs, teachers visited numerous sites in the Rockford area looking for the application of academic concepts. When (if) they found it, they wrote hands-on learning cycles to teach the concept in the way it was used. Another unique curriculum project was the “Teaching with Toys” program coordinated with ROE 9 in Champaign. This program resulted in the development of 175 lessons that specifically address math and/or science content at each grade level K-8 using fun toys as the vehicle for learning.

In 2014, ISEIF provided CeMaST with funds to develop the Smart Grid for Schools program. Brad was involved in designing and building each itineration of this program over the past 7 years. SGFS started with a full-size “rooms” that filled a trailer and has evolved to table-top models that are shipped to schools and virtual simulations accessed through the www.smartgridforall.org website.

As an exploration of how students can experience large-scale STEM projects, Brad developed the Muscle Karts, Redbird Choppers, and $TEAM Trike programs. Each of these non-consumable kits allow students to build something large enough to sit on and/or drive. They have been used by thousands of students and hundreds of teachers in the classroom and for professional development events across Illinois and in California. Brad worked with Matthew Hagaman to develop a banking simulation that allows students to “buy” their parts on debit or credit, transfer funds, invest in mutual funds, and secure loans. Brad has spent far too many hours on the road but has enjoyed providing unique, engaging, and exciting STEM projects to schools regardless of their ability to cover expenses.

The Engineering Design: Electric Vehicle Challenge book is a collaborative effort between Brad and Dr. Aldeman in the Technology Department for teacher professional development. In this project, teachers carve a model from clay and then use it to gather data. A student edition was written later. Brad has also developed the
Wind STREAM program using wind-powered vehicles and the Air-STREAM program using aircraft projects for K-8 instruction. Both were implemented at St. Patrick’s School in Decatur, IL.

For the past three years Brad has served as the Integrated Curriculum Specialist on the Innovative CTE Curriculum Resources Committee funded by the Illinois State Board of Education. This position involves writing and leading several professional development events for CTE teachers and the review and editing of dozens of new lessons.

None of the work that Brad has completed in his 14 years at CeMaST would be possible without the tremendous support, encouragement, ideas, and funding provided by all other workers ranging from the student employees to the Director. All are critically important for CeMaST to function.

When not at CeMaST, Brad enjoys doing projects including furniture construction, house remodeling, and building and restoring boats. Brad and his wife, Libby, are active in their church and spend as much time as possible hiking, traveling, sailing, motorcycling, and visiting their three grown children and (so far) one grandchild.

Brad has recently accepted a position at Hebron Christian Academy in Dacula, GA as the Director of STEM Education. He will lead the development of the Academy of Science and Innovation, involving the creation of new courses, teaching one or two each semester, and working with all teachers PK-12 as they explore how to effectively use projects as a vehicle for instruction.

Thank you Brad! We will miss you!

Congratulations to the following CeMaST student employees on their graduations!

Sayali Ahirro, M.S. Information Systems in Dec 2020

Daniyal Baig, M.S. Information Systems in Dec 2020

Ashley Dumas, B.S. Biology, May 2021

Wishing you all the best as you navigate the next chapter in your life. Thank you for making CeMaST a part of your education journey.
If you like telling stories, or making your friends laugh, or maxing out your odds, or solving riddles, or throwing fireballs - you should play D&D. Dungeons and Dragons is a fun and engaging game because it’s basically just sitting in a group of people and telling a story together. CeMaST started a STEM-themed Dungeons and Dragons club for middle schoolers this semester, and I am the Dungeon Master (DM) for our two inaugural groups of adventurers. Before I get into an example of the scenarios and concepts I’ve intentionally included to make the game “STEM-themed,” I want to talk about some of the learning topics and skills that are innate features of tabletop Role Playing Games like Dungeons and Dragons.

Math is probably the most obvious one, with the classic imagery of D&D accurately including a handful of dice. Probability is an important part of D&D and is used in almost every move a player will make. Addition and subtraction come into play as well, and even geometry has a role in D&D when considering the angles of spells and ranged attacks in combat. Monster and player “stats” refer to their scores in different traits, such as Hit Points or Armor Class. The players must be able to quickly compare the stats of monsters and themselves to judge which actions to take during play. Physics comes up fairly often as well, with the way creatures and objects move around the world. Examples of scenarios involving physics include: what happens when you shoot a fireball through an open flame? If an object falls, would it break and be destroyed, or would it bounce? Creativity and performance are also inherent parts of the game, with each player developing a unique (and sometimes quite elaborate) backstory for their character that goes on to affect how they interact in the story’s world.

Despite some of the old school stereotypes of D&D, the game also fosters social skills for the players. Players must listen and follow along with what other players are doing so that they can make the most of their own turns – which also means respecting others and not talking over each other. Examples of in-game scenarios that require teamwork and social navigation include: who should get a healing potion from a limited supply? If an ally is making the wrong move, should you talk them out of it, cover them, or retreat and let them take damage? Research skills are another interesting facet that regularly comes up while playing D&D. When leveling up their characters, the players use indices and table of contents in books, as well as key word searches online, to determine which spells or actions they will add to their character from the appropriate lists and tables. Finding and correctly transferring that information to their character sheet is the kind of data research and data management skills that are applicable to a wide range of fields. Finally, playing the game and succeeding on adventures will often require problem solving skills. Some problem-solving scenarios are straightforward, like including puzzles similar to breakout rooms to retrieve treasure. Other scenarios are more general and could be solved in a number of ways, such as: Who can sneak past the guards, and would a distraction by another player help? How can I avoid setting off another flying dart trap in this room? As players learn and develop these skills in-game their teamwork improves, and the stories progress in exciting ways. Of course, the extent to which the players will pick up any of these topics or skills varies from person to person – as exemplified by the following statement, made by a player after our first session: “I don’t know what we were supposed to be learning, but I do know that I’m really bad at shooting fireballs.”

D&D is a flexible system to work with, so to incorporate the as promised “STEM-themed” aspect I started off with concepts that were familiar and interesting to me. My research is in the field of ecology, which lends itself pretty easily to terrifying monsters and thrilling battle grounds. I’ve previously conducted a research project on bromeliads – a beautiful plant that stores water in its cup-like leaves and acts as a mini ecosystem with resource fluctuations and a food web. I used my knowledge of the bromeliad system to build an adventure that taught the students about predator-prey relationships and physiological characteristics of insects. The monsters were real world arthropods, with attacks based on their behavior and morphology. For example, dragonfly nymphs have an extendible lower jaw that they use to catch prey in ambush attacks. In the game, a dragonfly nymph could attack from two squares away and if a player was hit, they would be taken into the nymph’s mouth and trapped. There were also mosquito larvae present, which didn’t attack the heroes (because they’re filter feeding scavengers). However, if the mosquito larvae were killed it would produce a predator cue, causing the dragonfly nymph to move closer and increase the likelihood the heroes would be attacked.
For our next adventures, I am looking for inspiration from the Next Generation Science Standards for middle schoolers. The first one on the list, MS-PS1, is about chemical reactions and I think there are a lot of fun things to do with that. I’m still planning out the exact mechanics for the adventure, but this week our Tuesday group was delighted to meet the Noble Council, made up of Lord Helium, Lord Argon, Lord Neon, Lady Xenon, Lady Radon, and Lady Krypton.

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more teachers return to the classroom, we are shipping more hands-on materials to schools across the state. Hands-on materials can include four smart homes, enough models to build four complete grid lines, four hand-crank generators, a steam engine, and one or more solar farm simulators. The online reservation process is now set up so teachers can request tools individually in any quantity and for extended duration depending on their needs. Traditionally spring is a very busy time, but this year there are items still available for shipping.

Eight training sessions for online tools have been conducted since the last edition of CeMaST Connections was published, and the digital tools have seen increased use over that time. Students across the state and around the world are using the Virtual Grid Construction Game and the Virtual Smart Home to learn how electrical energy is produced, used, and conserved. The next training session will be conducted March 29 and hosted by Regional Office of Education (ROE) 28. On April 19, ROE 9 in Champaign will be hosting a training session. Training is required to use the hands-on tools and is recommended for using the virtual tools. A stipend is available for training, and only trained teachers can receive a stipend for using the tools. Any ROE or other organization interested in hosting training is encouraged to contact CeMaST for more information.

The Solar Farm Construction Virtual Reality Experience is wrapping up production, and we should begin enlisting teachers for a pilot program in April. Using a cell phone and glasses provided by CeMaST, students can travel through time and space to observe the construction of a solar farm. Also, students can “visit” with workers at the site about their work. Check the www.smartgridforall.org website for updates. Progress is also being made on the Career/Switch video game. Through the game, players engage with three different careers, guided by three different video game mentors. First, players take on the role of a power engineer. They create a micro grid by buying the power generating equipment and battery storage required to meet their community’s needs. Next, players take on a _engineering role. They experiment with operating the microgrid and learn to set up assistive switching technologies to manage assets during weather events. Last, players take on the role of an energy trader. They program their switches to respond to events within the system, plus external events. Ameren Illinois and S&C Electric Company have been key partners on the project, and our team has been grateful to consult with Associated Energy Developers, Caterpillar and Trina Solar, as well as Dr. L.C. Yang on campus. The game’s early April release will be a public beta, and the whole game should be completed in May. Finally, a book is being written containing instructions and diagrams for how to build the grid construction set. This book will allow others, such as industrial technology teachers and their classes, to build their own SGFA models for use in their communities. It includes a description of each piece, the bill of materials, specific instructions, assembly drawings, wiring diagrams, and photographs. This book will be available for free download on the SGFA website.

One of the benefits of participating in the Noyce Scholarship program is the opportunity to attend regional and national conferences that bring the Noyce community together for inspiration, collaboration, and sharing between projects. Planning for the 2020 Midwest Regional Noyce Conference began in fall of 2019, with the conference scheduled for October 2020. As the COVID-19 pandemic became the new reality, the call was made to delay the conference until February 2021, with hopeful optimism for an in-person conference. That optimism quickly faded as the Midwest conference planning committee made the decision to host an all-virtual conference – the only Noyce region in the country to attempt holding a conference in a virtual format.

The 2021 virtual Midwest Noyce conference took place February 5-11 with the theme of “Fostering Equity and Culturally Relevant STEM Practices for COVID-19 and Beyond.” Over 200 Scholars, Fellows, and Principal Investigators from Noyce projects across the Midwest registered for the conference, along with attendees invited from the Western Regional Noyce Alliance (WRNA). The conference kicked off Friday evening with a virtual poster session embedded in Padlet technology, including Zoom links with each poster that enabled attendees to have conversations with presenters. While this format does not compare to the face-to-face social interactions of typical poster sessions, it certainly proved to be a nice alternative based on positive feedback from attendees and presenters.
The conference continued through the weekend, starting with the opening plenary hosted by Dr. Jessica Krim (Southern Illinois University Edwardsville), who skillfully moderated the sessions designated for all conference attendees. Dr. Samuel Museus, Professor of Education Studies at the University of California in San Diego, gave an inspiring keynote speech on how to move to a more inclusive and equitable STEM education, acknowledging the significant role of STEM fields on sociopolitical issues that impact marginalized communities, yet often fail to value and include diverse perspectives in their endeavors. Dr. Museus spoke on the role of teachers in helping to support “Cultural Engagement” in STEM, stressing that “equity is not an add-on”. It should be an integral component of STEM teaching that emphasizes cultural connections, relevance to the community, and a collaborative mindset.

The weekend included four breakout sessions, a networking social event, and a Plenary to wrap things up on Sunday. Dr. Sandra Richardson, Program Director for the National Robert Noyce Scholarship Program, spoke to Principal Investigators with a concurrent plenary for Noyce Scholars and Fellows, providing information on the sub-grant opportunity (see below) and submission of a shared resource stemming from the conference experience and inspired by the theme. With Monday being an off day, the last three days of the conference included twelve breakout sessions, ranging in start times from 10:00am to 8:00pm. This provided flexibility for attendees, understanding that participants could not attend all sessions but the times would accommodate all schedules to some degree. This proved to be a good approach to the virtual conference, with most breakout sessions having around 20 participants throughout the conference week.

Tuesday included a second keynote speaker, Dr. Natalie Johnson, Department Chair and Assistant Professor of Mathematics at National Louis University. Her many accomplishments include receiving the U.S. Presidential Award for Excellence in Mathematics and Science Teaching and founder/CEO of READit, an education consulting firm specializing in closing the achievement gap across the U.S., college and career readiness, and financial literacy. Dr. Johnson shared her perspective and insight on the conference theme of Fostering Equity and Culturally Relevant STEM Practices for COVID-19 and Beyond, acknowledging how Culturally Relevant Teaching empowers students to succeed and provides access to STEM fields that are lacking diversity.

One of the unique features of the 2021-2023 Midwest Noyce Conference plan is the addition of weekend and weeklong summer professional development workshops, hosted and led by Noyce Project P.I.s from institutions across the Midwest. Five workshops will take place in 2021 and seven in 2022. These workshops are cost-free and open to any Noyce Scholar, Fellow, or project personnel in the Midwest region. A fellowship grant is offered to attendees to cover materials, food, and travel expenses. Most workshop leaders held a preview session during the 2021 conference to give participants a taste of what to expect during the workshops. The 2022 conference will preview the workshops taking place in summer 2022. Registration for the workshops is open and accessible through this link, along with details about each workshop:

Click here for information and to register for a 2021 or 2022 summer workshop.

The conference wrapped up on Thursday evening with the announcement of winners of the Midwest Noyce sub-grant opportunity. The purpose of sub-grants is to encourage collaboration between Noyce projects and to make curricular connections to the community, emphasizing the teaching and learning of STEM practices in culturally relevant ways. Attendees at the Midwest Noyce conferences are eligible to apply for funds ranging from $1,500-$3,000 to support curricular projects stemming from conference themes. Two projects won awards in 2021. Tiffany Sulser from Sesser-Valier School District #196 and Craig Kirchner from DuQuoin High School C.U.S.D. #300 were awarded $3,000 for their project entitled, “A Sense of Place: Using Place-based Instruction to Teach Life, Earth, and Environmental Sciences in Rural Elementary and High School Classrooms.” A second award of $3,000 was given to Jessica Hesler from Elkins High School for her project, “Connections of STEM Learning Across the District and the Community.” Ms. Hesler will partner with multiple teachers from Elkins Primary, Elkins Elementary, and Elkins Middle School. A new round of sub-grant awards was announced at the 2021 conference, with a submission deadline of March 8, 2021. Overall, the 2021 virtual Midwest Noyce conference was a huge success, with attendees raving about the quality of presentations and the inspiring words of keynote speakers. None of this was possible without the hard work and collaboration of the conference planning committee members. A huge thank you to everyone involved in making the most of a challenging situation – holding a conference meant to bring people together in a virtual format. We look forward to next year’s in-person conference near Mammoth Cave in Kentucky, which will focus on rural STEM education as well as urban STEM education.
On January 1, 2021, Dr. Sarah Boesdorfer, Chemistry, and Dr. Rebekka Darner, CeMaST, began their three-year term as co-editors for the journal *Innovations* for Science Teacher Education (https://innovations.theaste.org/). And thankfully, Amanda Fain, CeMaST, serves as the technical editor for the journal. This collaboration provides an opportunity for ISU and us to continue to impact and advance science teacher education. Published four times a year, *Innovations* is the online practitioner development journal of the Association for Science Teacher Education (ASTE). ASTE began this journal about five years ago to serve and support their members and all educators who train teachers of science at all grade levels and all experience levels. *Innovations* serves as an outlet for science teacher educators to share the creative, novel, and effective work they do to prepare preservice and/or inservice science teachers. Each issue of *Innovations* features concrete ideas and strategies that are easily replicable by science teacher educators in their own setting, context, and with their unique science teacher population. The activities, ideas and strategies described in the manuscripts are based on a firm foundation of scholarly work in science education and describe innovative efforts to advance the field and enhance science teacher education.

As the name implies, *Innovations* focuses on innovating science instruction through how we educate the educators. The COVID-19 pandemic and continued struggles against racial injustice and systemic racism are just a few challenges for science teachers and in our society as a whole; *Innovations* is well positioned to provide science teacher educators with tools to empower their students to contribute to scientific solutions to these problems. We, the new editors, are eager to continue to build and expand the reputation of the journal that founding editors Drs. Rommel Miranda and Ron Hermann established. We hope to broaden the journal’s audience, increase its visibility, and build its reputation as the “go-to” resource for new ideas and conversations related to science teacher education. We hope to enlist guest editorials on issues related to science teacher education, along with calls for special issues related to these topics. We welcome ideas from authors, reviewers, science teacher educators, science education reformers, and others. *Innovations* has provided some solutions for science education in some context, but more ideas and solutions are needed to address the issues. *Innovations*, in alignment with ISU’s values and goals, will be leading the way to improve science teacher education to improve science education for all students, and we are always looking for contributors to this work. Have you had success educating preservice or inservice teachers online or in hybrid situations in content courses or methods courses? Have you found a new and effective way to provide clinical hours in our current situation? What about supporting science teachers’ culturally relevant pedagogical practices? These are just a few ideas of the many activities, ideas, or strategies you could submit to *Innovations* to share and inspire other science teacher educators.
I recently attended a seminar sponsored by the Society for the Advancement of Biology Education Research entitled The influence of kindness and community in broadening participation (you can watch the recording on SABER’s website). In this seminar, Dr. Mica Estrada likened teaching to gardening; she discussed how gardens deal with weeds, how all of the living things in the garden are interconnected, and that anything that happens to one part of the garden impacts the rest of the garden. In the days since, this comparison has stuck with me, particularly as the lilies in my backyard peek up from the soil and leaf buds cautiously emerge from the trees. Just as we cultivate our gardens each year, we have the opportunity to cultivate students to be lifelong learners immersed in the wonder of the world around them. To me and probably to many of you, that is the allure of STEM – the continual curiosity and exploration of the world, the process of wondering and discovering, and the satisfaction of seeing the leaf buds emerge and understanding how that occurs. In our role as educators, we have the power and the responsibility to show our students that same beauty that we see in the world, but to do so, we must examine how we cultivate that sense of wonder.

In our gardens, we carefully consider what our plants need to grow, recognizing that different plants will need different resources, and determining how we can provide them with the resources that they need. Further, we don’t expect them to just grow – we expect them to transform, to use the resources that we provide them to experience the world differently. We can apply this same framework to our students through considering what resources they need to transform their understanding of the world. Unlike the plants in our garden that we cultivate from seed to flower, students enter our classrooms with prior knowledge and experiences that affect the way that they view the world. This prior knowledge is a powerful educational resource when it is welcomed in the classroom, because students can build on that knowledge to gain a deeper understanding of the world. This deeper understanding, referred to as expansion of perception, is one type of transformative experience that can result when students apply scientific concepts to their everyday lives.

The Teaching for Transformative Experiences in Science (TTES) model encompasses three types of transformative experiences: expansion of perception as described above, active use in which students spontaneously apply course material outside of the classroom, and experiential value in which students appreciate content for its ability to impact one’s worldview. Through modeling and facilitating transformative experiences in our classrooms, we can provide our students with the resources to see STEM as a way of understanding the world on a deeper level and explore their natural curiosity about the world.

Providing opportunities for transformative experiences may sound complicated, but it doesn’t need to be. Over several semesters of using the TTES model as an instructional framework, I have found that one of the simplest ways of eliciting transformative experiences is through creating reflection questions for students to consider after a learning experience (preferably one utilizing active learning strategies). Educational research shows that providing students with reflection questions to extend their learning can promote deeper understanding of scientific concepts (Sabel et al., 2017). Thus, I suggest a short three-question reflective assignment, with one question per type of transformative experience. For example, I provided the following reflection questions after exploring sources of genetic variation:

1. **To prompt active use:** Using your knowledge of how cancer works, genetic variation, the sources of genetic variation, and the following information about breast cancer (note: information omitted for brevity), discuss how genetic variation is related to cancer.

2. **To prompt expansion of perception:** In class last week, we discussed how traits are inherited from parent to offspring, how some mutations can be dominant or recessive, and how mutations are passed down through generations. How can knowledge of the evolutionary principle of variation, including the sources of genetic variation discussed in the lecture video, impact your understanding of how genetic inheritance works?

3. **To prompt experiential value:** How has learning about genetic variation and its role in evolution influenced the way you think about these or related topics in your daily life? (i.e., how has learning about these topics changed how you view the relevance, value, etc. of these and similar topics in your daily, nonacademic life?)

I hope this framework can be as useful in your classroom as it has been in mine; I am happy to brainstorm ways to implement the TTES model and foster transformative experiences in your own instructional setting. As winter ends and we turn toward a spring full of promise and new beginnings, I encourage all of us to consider how we can continue to cultivate growth and transformation in our students and ourselves.
Can you introduce yourself and share a bit about yourself?

Tae’lor: My name is Tae’lor Allen, and I am a senior here at ISU. I’m majoring in Biology, in the Physiology, Neuroscience and Behavior sequence, with a minor in Sociology. I am from North Chicago, Illinois.

Ashley: My name is Ashley Dumas. I am a senior Biology major and African American Studies minor from Chicago, Illinois. I am currently a member of the Black Student Union and Student Government Association RSOs. I am also a leader in Anti-Black ISU, a student-led movement to call out racial discrimination on our campus.

What are you trying to figure out, or what questions are you trying to answer in study?

Tae’lor: ISU was labeled once before as a super-spreader with one of the highest number of cases in all of Illinois. In my study, I was trying to figure out how different university students are reacting or dealing with COVID-19 in comparison to students at ISU.

Ashley: The study is aimed toward understanding how ISU students have been navigating and experiencing the COVID-19 pandemic. I specifically asked them questions about their demographics and safety practices to potentially find any correlations amongst these variables.

What have you been able to conclude so far in your research?

Tae’lor: So far, I have learned that ISU students have been practicing social distancing and other safety guidelines more than other universities’ students, at least at the other universities in our sample.

Ashley: So far, it has been concluded that ISU students that have had close relations to the virus (know someone who tested positive) have the worst social distancing practices compared to others that do not know anyone who has tested positive.

Besides this knowledge, what do you think you have gained from doing this research, personally or professionally?

Tae’lor: I have gained a great opportunity to conduct research outside of my normal lab and work with people who want to help me succeed throughout my remaining time here at ISU.

Ashley: Engaging in research has taught me a great deal, but specifically discipline. Being a student while working and being a researcher has been a challenge but has kept me grounded. Also, working with Dr. Darner has been very rewarding. She offers great advice and has introduced me to new possibilities for my career and educational goals.

What are your career goals? What do you hope to do after you graduate from ISU?

Tae’lor: I plan to become a physician. After I graduate from ISU, I am looking towards a public health graduate program or going straight to medical school. I have yet to decide.

Ashley: I plan to pursue a master’s degree in Public Health. I want to aid in creating equitable policies and standards in healthcare. I eventually want to pursue medicine as an osteopathic physician, while using my degree in Public Health to continue my mission of changing the scope of healthcare in the U.S.

Tae’lor and Ashley’s poster can be found here, along with other student research projects:
Rachel Sparks

My name is Rachel Sparks and I am a fifth-year PhD candidate in the School of Biological Sciences. I conduct biology education research, and my dissertation specifically investigates how nonscientists and future elementary teachers think about evolutionary concepts and apply it to their everyday lives and future careers. I’m really interested in how students think about evolution because scientists view it as a concept that unites all of biology, but we don’t often convey this to nonscientists; therefore, I restructured our introductory biology course to teach all introductory biology content through the lens of evolution. I utilize the Teaching for Transformative Experiences in Science model, which is an instructional framework that encourages application of evolutionary ideas to students’ daily lives (check out my other piece in the newsletter for more about this framework!). Results thus far show that using this model allows students to experience the world differently after learning evolutionary concepts. I have one peer-reviewed paper published on and am currently finishing up my dissertation to graduate this summer!

I wanted to attend the National Science Policy Symposium because the focus of the symposium this year was on science policy for racial justice. As an educator and educational researcher, I am committed to developing curricula and teaching strategies that use science to combat institutionalized racism, inequity, and injustice, so the idea of creating science policies that foster racial justice fit right in with my values. I am also potentially interested in pursuing public office in the future, so this symposium seemed like a great opportunity to learn about how scientists can be involved in various levels of government.

One of the workshops I attended was called Scientists as Citizens: Equity Through Local Engagement. This was led by a group called Engineers and Scientists Acting Locally and gave attendees concrete ways to get involved with advocating for science-based policies in their local communities. They have a ton of resources for STEM professionals interested in advocacy, and I was excited to learn about this organization that can help scientists like me enter the field of public policy. I also attended a panel that included a fabulous anti-racist educator, Victoria Alexander, who I’ve learned a lot from through social media; I didn’t even know she was presenting at the symposium, so it was exciting to learn from her in the context of science policy as well!

Kate Evans

My name is Kate Evans, and I am a PhD student in the School of Biological Sciences at ISU. My graduate research is on investigating ecological dynamics that affect when mosquito control efforts will work, and when they will be counter productive. I hope to inform the mosquito control community (e.g. abatement districts, companies, etc.) about how to implement control that is effective. I am particularly interested in control approaches that target one species at a time, because they may reduce how much non-target species (like bees or butterflies) are affected by mosquito control efforts. One such approach that has gotten a lot of media attention is genetically modified mosquitoes, and there are others approaches that work similarly without the genetic modification. So far my research has shown that there are natural conditions where the approaches will be counter-productive, (i.e. unintentionally produce more adult mosquitoes.) I’ve been using field experiments and modeling to narrow down which environmental conditions are likely to lead to counter-productive results of mosquito control efforts.

I wanted to attend a conference on science policy because the policy side of regulating species-specific mosquito control approaches are still in the early stages. The first experimental use permit for genetically modified mosquitoes in the United States was just given last year. I am interested in helping to inform the governing bodies that will be regulating these new mosquito control efforts with the ecological contexts of when and where the control approaches are likely to be effective.

I attended a workshop on writing science policy memos. I think the most important takeaway from the science policy memo workshop was how to frame the relevant research for the topic you’re discussing to make your argument, and how to write the memo for a non-science audience. I think having an outline for what a good policy memo looks like and listening to the speakers talk about how to write one makes the process a lot more approachable.
Lucas Do

My name is Lucas Do; I was a visiting grad student and am now a lab tech with the School of Biological Sciences. My research investigates the climate vulnerability and adaptive potential of fish in Illinois. As the climate changes, there will be increased pressure on fish to disperse in order to maintain optimal environmental conditions; I compare the rate at which local conditions will change with the rate at which populations can disperse to get an estimate of how vulnerable they may be. I’m particularly interested in climate change’s role as a threat multiplier, looking at how it interacts with other stressors such as invasive species and habitat fragmentation.

One of my preliminary conclusions is that the species in Illinois currently protected at the state, federal, and international level don’t accurately reflect future vulnerability. This showed the importance of integrating climate risk into existing conservation policy in order to prepare for changes to the ecological landscape. I’m pursuing a career in climate adaptation consulting, and want to be more familiar with the science communication and policy side of research to be able to effectively turn information into action.

My most valuable experience at the Symposium was listening and talking to speakers during the flash talks. Several groups were presenting their work on water policy in the Great Lakes or Midwest. Because climate and water issues are deeply interdisciplinary, I believe it is crucial to share knowledge and best practices on building resilience between fields.

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Between the Margins with Todd Eddy

Haikus

- a fly goes dancing across the smoky barroom diggin’ some t. monk
- plinkety - plink - plunk a cat on the piano thelonious monk
- biting winter wind flannel shirt keeps nothin’ out got no one to call
- first one sneeze, then two the cats and dog turn and look but no gesundheits

- todd eddy

The Dr. Fred Gletten Memorial Scholarship

The Dr. Fred Gletten Memorial Scholarship aims to support the success of students from underrepresented groups seeking biomedical careers.

All applicants are encouraged, but preference will be given to students from Eisenhowers High School, Blue Island, IL, where Dr. Gletten himself graduated, or a school located on the south side of the City of Chicago and/or its surrounding suburbs.

Award of $1000 will be given end of Spring semester

Eligibility:
- Enrolled and in good standing at Illinois State University
- Undergraduate Student
- At least 30 credits earned from Illinois State University
- Demonstrated strong academic achievement, as evidenced by at least 3.3 GPA in major coursework and a cumulative GPA of at least 3.0 on a 4.0 scale.

Applicants will be selected based on academic achievement, potential need

Application Deadline: April 9th, 2021

Applicants must submit:
- A copy of resume
- A Personal Statement (500 words max) describing future career goals/plans in STEM and how these funds will impact ability to succeed as a STEM undergraduate
- Two references one must be a faculty member in your major. Names and emails are required. Ask their permission before using them as your reference.

Please contact Dr. Ben Sadd, bmsadd@ilstu.edu, with any further inquiries.

Unwind and Enjoy Todd’s Latest Playlist

National Science Policy Network
CeMaST Family Photos

Thank you to our staff for submitting their photos!

It’s wonderful to connect with each other during this time as we wait for in-person work to resume.

Kate Evans

Todd Eddy

Kate Edler and family

Bekky Darner

Rachel Sparks

Tanya Josek

Jeffrey Barrett

Chris Merrill

George Rutherford
The CeMaST Team

CeMaST Leadership Team

Dr. Rebekka Darner, Director
Dr. Jeffrey Barrett, Associate Director (Mathematics representative), Department of Mathematics
Dr. May Jadallah, Associate Director (Education representative), Department of Teaching & Learning
Dr. Chris Merrill, Associate Director (Technology representative), Department of Technology
Dr. George Rutherford, Associate Director (Science representative), Department of Physics

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Ellie Marsan, Smart Grid for Schools Assistant
THANK YOU

The next issue of CeMaST Connections will be published.
Summer 2021

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