

Fall 2021

# CEMAST CONNECTIONS

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## Director's Letter

Dear STEM Enthusiasts,

It seems like this fall season has been relatively short, going from warm summer-like temperatures to dreariness and cool temperatures that seem a lot like winter. Nevertheless, I hope the fall season is treating you well and that you have all found a way to experience some fall color and outdoor past times.

The work of the ISU's newly formed newly formed STEM Diversity, Equity, & Inclusion (DEI) Taskforce has been on my mind a lot lately. While there is ample national discussion and literature on the subject of STEM underrepresentation and, increasingly, minoritization of some groups within STEM, there is less understanding about the nature of these phenomena at ISU, particularly in how they might differ from national trends. Therefore, this past summer, we had the

good fortune to be able to use a grant from the Howard Hughes Medical Institute to hire our colleagues, Dr. Brea Banks (Psychology), Dr. Erin Quast (Teaching & Learning), and Dr. Allison Antink-Meyer (Teaching & Learning) to extend and deepen the STEM self-study I had begun a year before, to try to deepen our collective understanding of STEM underrepresentation and minoritization at ISU. These researchers conducted a mixed methods study involving interviews of stakeholders (e.g., STEM faculty, students, alumni, high school counselors) as well as analysis of institutional data to provide next steps in our path toward equity in STEM. This self-study was presented to the newly formed STEM DEI Taskforce in September. The taskforce is composed of faculty and staff from most of campus's STEM units. This taskforce is now acting upon those self-study findings. Under guidance from Dr. Doris Houston, Interim Assistant to the President for Diversity and Inclusion, the Taskforce has chosen its goals for this year's work: foster a commitment to care, respect, trust, and authentic relationships, and to enable inclusive and equity-centered curricula and student engagement.

A recommendation of the self-study was to establish a social justice-oriented STEM curriculum, and I have been spending a lot of time pondering what this would look like at ISU. Research on how different pedagogies impact minoritized STEM students has put forth convincing arguments about how conventional instruction creates [an "exclusive" STEM classroom](#) that has privileged some student groups while marginalizing others, and many alternatives, such as [the implementation of CUREs](#) (course-based undergraduate research experiences), have been investigated as ways to create more inclusive STEM learning spaces. However, pedagogy is different than curriculum, and I have noticed that [only a few STEM educators](#) are questioning whether we are teaching inclusive content, in addition to asking if we our teaching methods should evolve to meet the needs of our current student body. I suspect that because cultural and social phenomena are not the topics of investigation in our disciplines, there is a tendency to assume that STEM disciplines are therefore culture-free. I challenge this assumption, first simply because we too are human and subject to bias, just like all other humans. But more substantively, there are many examples throughout our disciplines' histories in which important knowledge was ignored or misconstrued due to race- and gender-based discrimination. I apologize in advance for my examples being drawn from biology, but I am willing to bet this phenomenon is not unique to only my scientific discipline.

One example is [explored by Drs. Annie Jamison and Greg Radick](#), in which they detail how ideas about inheritance put forth by a contemporary of Gregor Mendel, W. F. R. Weldon, were largely ignored because they were not so conveniently used to support the eugenics movement that was in vogue at the time. While use of Mendelian ideas to support white supremacy and eugenics is not scientifically accurate and requires a corruption of the scientific knowledge itself, this use of Mendel's ideas nevertheless led to his ideas becoming enormously popular and to Weldon's ideas being swept under the rug, despite their scientific validity. Nowadays, most geneticists and genetics students alike do not know who Weldon is, let alone how his ideas about inheritance are more akin to our current understandings of inheritance mechanisms than those of Mendel. This story aptly demonstrates how scientific ideas are not only subject to support or criticism as new evidence emerges within the scientific community. The staying power of scientific ideas is also determined by the sociopolitical forces occurring outside of the scientific community.

Last year, a perspective was published in *Science* that provides another example of how valid and transformative disciplinary knowledge was nearly lost due to racial discrimination. The article recounts the pioneering [contributions of Dr. Charles H. Turner \(1867-1923\)](#), a Black animal cognition scientist who published over 70 articles throughout his lifetime and put forth intriguing evidence regarding individual variation in behavior, learning, and intelligent problem-solving. Despite successful publication, likely thanks to blind review, his ideas did not become incorporated into the disciplines investigating animal behavior, despite their importance. For example, he published his research on insects' use of landmarks in spatial learning in 1908; Niko Tinbergen was awarded the Nobel Prize for this finding in 1932, with no attribution or mention of Turner's work. Nowadays, investigations of individual variations in behavior have become popular within the field of behavioral ecology, but Turner's work remains uncited. This lack of attribution is unlikely due to outright discrimination but rather ignorance of his work because it was never incorporated into the educational canon. Such is how bias becomes institutionalized.

Biology students learn about the works of Gregor Mendel and Niko Tinbergen in a standard undergraduate biology curriculum, but the scientific knowledge generated by Weldon and Turner are all but forgotten, despite it being just as accurate and potentially transformative for their respective disciplines. I cannot help but wonder what scientific discoveries have been overlooked due to our personal or societal biases and therefore, how are our current scientific understandings flawed, due to the institutionalization of those biases in our curricula? How can we revisit those discoveries through the lens of today's desire to eliminate bias? To what extent can authentic attribution be incorporated into our curricula? And finally, to what extent should we be teaching our students these stories of how scientific knowledge is both generated and forgotten, so that they develop more nuanced and accurate conceptions of the nature of science and scientific knowledge? I do not have answers to these questions, in part because I stumbled upon the stories of Turner and Weldon only serendipitously. But I do feel that a genuine and thorough attempt at repairing the past biases in our disciplines must recruit the help of historians and sociologists of science. I struggle to envision how we might create a social justice-oriented STEM curriculum, as suggested in our self-study, without their help.

So consider this letter an invitation to join the conversation. I realize I have put forth some provocative ideas in this note, so please bring your questions, concerns, and comments up with your STEM DEI Taskforce representative (if you are a member of one of the represented units) or feel free to just drop me an email. I think a foundational requirement, if we are to create diverse and equitable STEM classrooms at ISU, is for us to communicate and trust each other.

Thanks for reading, and I hope to hear from you soon!







*By Matthew Hagaman*

There are some common threads, but every day at CeMaST is different. Or, to be fair, every hour at CeMaST is different. Some hours you might draw blueprints or organize data, while others might be spent painting whole cities worth of plywood or writing newsletter articles.

Roy Spencer is a great example of the breadth of knowledge and skill found among CeMaST's staff. Roy has worked with us nearly every day of every summer since 2017, and it was his skill and dedication that made the design and assembly of much of the portable Smart Grid for All program possible. Roy built 100 doll houses complete with home automation systems, as well as the 600 building models that comprise the SGFA hands-on grid construction sets. He helped build plywood motorcycles, heliodons, and countless other items, all of which were designed to create unique STEM learning opportunities. And to top it all off, he is a co-author of the how-to-build manuals for many of our hand-on SGFA materials, which industrial technology students and hobbyists can use to build their own versions of the electrical grid.

Roy is a quiet worker, except if he is using power tools, of course, but his results speak loudly. His engineer's mind is always busy, working to make things better, cheaper, stronger, and faster. The newest Smart Home is largely his design. It is a shorter house, but it adds stylish dormer windows and easier access to make repairs, compared to its predecessors. It retains many of the functions of previous models, such as lights, HVAC, and vehicular sensors, while adding a few new ones. It accomplishes our goal of publishing a how-to-build manual that relies only on equipment that has been available for at least a decade. This was a need because previous iterations of the SGFA smart home have performed the same functions, but with more expensive smart home equipment that was discontinued.

With the end-of-funding quickly approaching for the 9-year Smart Grid for Schools/All program, we are uncertain if we will be able to leverage Roy's unique abilities during the summer of 2022, but we and tens of thousands of students will be forever grateful for the work Roy contributed to making STEM learning fun!

# The Center for a Sustainable Water Future

By Dr. Joan Brehm, *Professor & Department Chair, Sociology & Anthropology*

**The Center for a Sustainable Water Future** is an interdisciplinary initiative formed in 2018 that brings together academically diverse faculty from across campus to advance research, creative expression, teaching, and outreach activities. The Center promotes effective water solutions and fosters stewardship, within Illinois and within our regional, national, and global partners. Through action research, our interdependence and relationship with water will be explored, investigated, and shared, promoting a broader sustainable water ethic for the future. The Center for a Sustainable Water Future not only promotes research, but it equally promotes education and engaged scholarship through community engagement and active learning. This model is inherently interdisciplinary and integrates faculty roles of teaching, research, and service.

**The primary goals of the Center for a Sustainable Water Future that guide all activities are:**

1. Encourage cross-disciplinary engagement and collaboration among and between faculty, students, and community/regional/national/global partners.
2. Increase educational opportunities and support instruction that focuses on a water theme across campus by further enhancing and supporting existing courses and curricula.
3. Promote the outstanding work of the Center to all stakeholders.

Since its formal inception, the Center for a Sustainable Water Future has met several important benchmarks in support of our three goals. First, we have successfully created a new interdisciplinary minor in Water Sustainability which includes a new General Education core course that is team taught, SOC/GOE/POL 103: Thirsty Society. Second, in support of our outreach goal, we curated and hosted an art exhibit in Schroeder Hall Gallery that showcased a variety of artistic mediums and interpretations of 'water,' and we facilitated a community-focused project that [engaged students in work to help reduce fish kills in the pond at a local golf course](#). Finally, in support of our scholarship goal, we have co-sponsored the summer research of undergraduate Jo Hoberg with the Office of Student Research, supporting his work to study how to reduce the amount of farm fertilizer that travels in the groundwater and into bodies of water that feed into local lakes and end up further downstream in the Gulf of Mexico.

In January 2021 we received our first interdisciplinary externally funded research grant from the Illinois Innovation Network ([IIN](#)) to support the project "Mitigating Future Threats to Biodiversity: The Role of Headwater Streams and Land Management Practices in the Kaskaskia River Watershed". This project involves researchers from both Illinois State and the University of Illinois with a mix of expertise in the areas of natural resource and environmental sciences, agricultural and biological engineering, sociology and anthropology, and recreation, sport, and tourism. The goal of this project is to stimulate active and ecological land management practices among agricultural landowners of the Kaskaskia River Watershed in Illinois. The specific focus is on the

protection of vital headwater streams to mitigate the negative impacts from rising temperatures and increase the productivity of these waterways that are critical to native biodiversity. This study extends an existing research project “Enhancing agro-ecosystem services using integrated hydro-ecologic and socio-cultural models” (USDA/NIFA funded), which examines the role and value of headwater streams as primary sources of biodiversity and fisheries resources. Protection of these smaller feeder streams represents an investment to mitigate the larger and more dangerous impacts from future events such as climate change.

During the summer of 2021, researchers and a graduate research assistant conducted eight key informant interviews with farmers in Shelby County that had land adjacent to Mitchell Creek, Becks Creek, or Richlands Creek to gather a more in-depth understanding of how they view these feeder streams, their identity as a “good farmer,” and how they view conservation practices and their willingness to engage in practices that extend beyond water quality protection to include promotion of biodiversity and ecological resilience in the smaller feeder streams that dissect large swaths of agricultural land in the Kaskaskia River Watershed.

Following the interviews and analyses of the qualitative data, along with data analyses from the larger USDA/NIFA funded project, we hosted a Stream Conservation and Best Management Practices Field Day in collaboration with the Shelby County Farm Bureau and the Illinois Farm Bureau to share information with attendees about the significance of headwater streams and practices that can be implemented to protect them. Additionally, presenters shared updates of ongoing research in the Kaskaskia River Watershed and engaged farmers in discussions about benefits and barriers to the adoption of these stream-focused conservation practices. At the end of the program, attendees joined in a walking tour of Mitchell Creek to further discuss a variety of practices aimed at improving biodiversity and conservation. The field day was attended by 50 farmers from Shelby County and the surrounding areas. The next steps in the project are to prepare the executive summary report of the findings and identify the next steps in the research process, along with suitable funding sources.

In Spring 2022, the Center for a Sustainable Water Future has another exciting interdisciplinary event planned in conjunction with World Water Day. Canal by Canal will be an exhibition of photographs by [Jason Reblando](#), an Assistant Professor of photography in the Wonsook Kim School of Art. The photographs were published in a book authored by Erik Nordman, a professor in the Natural Resources Management program at Grand Valley State University, titled *The Uncommon Knowledge of Elinor Ostrom* (Island Press, 2021). The photos were taken in Valencia, Spain, and they feature irrigation waterways that Elinor Ostrom, a Nobel Prize laureate, studied as part of her seminal research on governing common-pool resources around the world. The exhibition will take place at Milner Library during March of 2022, and Erik Nordman will deliver a lecture at Milner Library on World Water Day, which is held every year on March 22. Reblando and Nordman’s collaboration is precisely the kind of interdisciplinary research and creative work that the Center for a Sustainable Water Future seeks to support and expand. Nordman’s visit will be generously funded by a grant from the Fell Trust.

MARK YOUR CALENDARS!



# Dr. Ebony Omotola McGee

**SPEAKING FEBRUARY 18, 2022**

Dr. Ebony Omotola McGee, Professor of Education, Diversity, and STEM Education in the Department of Teaching and Learning at Vanderbilt University, as well as author of *Black, Brown, Bruised: How Racialized STEM Education Stifles Innovation* and co-editor of *Diversifying STEM: Multidisciplinary Perspectives on Race and Gender*, will be delivering a virtual seminar on **February 18, 2022 at 1:00 p.m.**

The one-hour seminar will be followed by a Q&A until 3:00 p.m.

The seminar will be delivered via Zoom, will be open to the public, and will be free, although registration will be required.

**CeMaST will be providing copies of her book to the campus community FREE OF CHARGE**

Stay tuned to your monthly CeMaST updates to learn how you can get one!

# Between the margins

with Todd Eddy

rainy afternoon

playing chiropractor

on a new book





## My Experience as a Stevenson Center Intern Helping to Steer the Innovation Hub

By Lindsey Kren, Applied Community and Economic Development Fellow at the Stevenson Center for Community & Economic Development

As a second-year graduate student with the Stevenson Center for Community and Economic Development, I was chosen to take part in the University's efforts to steer regional economic growth through the creation of its Innovation Hub. During my 11-month professional practice I am playing a supportive role in building the capacity for community innovation, economic development, and cultural identity in Bloomington-Normal, McLean county, and the region.

The development of an innovation hub, community startup incubator, and makerspace between ISU and its surrounding communities have come out of an initiative to improve the state's economy. Back in 2018, the Illinois Innovation Network (IIN) was launched as part of a statewide initiative through the University of Illinois system to drive economic growth through innovation, entrepreneurship, workforce development, and research. The network is comprised of 15 hubs across the state largely centered on university campuses while taking a collaborative approach between university, industry, and community. To encourage inclusive economic development in the region, IIN and its members seek to meet regional needs through public-private partnerships, collective research, and training programs; promote the value of higher education; and support hub collaboration in sharing best practices.

Over the years, government policy makers and economic development officers have come to realize that economic prosperity and job creation have far greater potential through entrepreneurial development and innovation districts than large corporations. That's where hubs like the one positioned at ISU come in. Like most hubs in the network, ISU is focused on its existing strengths as a leader in socio-scientific sustainability. CeMaST is partnering with Heartland Community College and local high schools to develop a makerspace and educational center to provide entrepreneurship education programs in addition to workforce development programs to meet local and regional needs. Keeping with the theme of economic sustainability, a community startup incubator will be built to play a primary role in assisting in the development of small business owners and entrepreneurs as well as university researchers. The overall purpose of the hub, incubator, and makerspace is to create growth, retention, and workforce attractiveness while supporting creative ideas and improving the overall quality of life within the region.

As a Stevenson Fellow and AmeriCorps Member with the Innovation Hub and steering committee, I hope to leverage my previous knowledge and experiences to contribute to the vision of educating communities, driving innovation, and creating sustainable growth. Working in communities both domestic and abroad, as well as my time with non-profit organizations, I have been inspired to continue working in community-based settings focused on capacity building, holistic health, sustainability, equity, and inclusion. It is also my hope that, throughout my time here, I gain further experience in strategic planning, project management, and building my proficiency in marketing and business development. All of this ties in with my career goals as I plan to have a role in leading projects and implementing initiatives that focus on building equitable communities based on sustainable economic practices.



# Summer STEM Camps Offered in Partnership with Local School District

By Gary Derwin and Jessica Ochoa

This past summer, CeMaST had the wonderful opportunity to collaborate with Bloomington School District 87 to host a hands-on STEM camp for incoming fourth grade students in the region. With the assistance of pre-service educators from ISU, Dr. Kara Baldwin and Dr. Rachel Sparks, CeMaST was able to lead three fantastic weeks of STEM learning. One of the main objectives of this STEM camp was to give students the chance to learn that STEM is present in their everyday life. It is critical for children of all ages to acknowledge how the world works and for them to know that they can reason and answer their own questions through STEM. Over the course of the three weeks, camp staff was able to aid students in the process of expanding their knowledge through a series of interdisciplinary and problem-solving activities.

Week one of camp consisted of the students' exploring angles in the world around them. We started off with the basics and had them identify angles around the school. Students found angles present in the letters of their names, classroom furniture, and in various toys. One of the best ways to engage students in their learning is through helping them build connections between concepts and their everyday life. After the basics, the students designed straw rockets. Here, students used plastic straws and clay to make a rocket to be launched using pressurized air. They then launched the rocket several times to see what would happen to their rocket's height and distance at various launch angles. Week one concluded with a thrilling activity where students used two-liter soda bottles to create water-bottle rockets. The students were tasked with testing the effects of features such as nosecones and tailfins on their rockets' heights. Students had the opportunity to make prototypes and then use trial-and-error to increase their rockets' height.

As week two rolled around we changed our focus to energy. To introduce how energy is used in our everyday life, we explored the relationship between Earth and the sun, including the rotational process between the two. From there, students worked as engineers and designed their own windmills. Students took a variety of approaches during this project, and it was great to see them applying the design process. Student groups then constructed wired cities using components of CeMaST's Smart Grid for All ecosystem. Using the construction set component, the fourth graders worked with their peers to wire and power their own miniature city, complete with working factories, shops, houses, and more! The students were given the autonomy to get as creative when it came to building their cities, some even going as far as adding main roads and buildings that were not included in the set. The camp wrapped up with nature week. Students started the week by learning the identifiable characteristics of an insect; they learned how to use animal identification charts which allow you to identify an animal's species based on characteristics.

To help students understand the different invertebrates that live in the area, we had our STEM mentors venture out to local creeks and collect various water invertebrates. Through small group teamwork, magnifying glasses, and classification charts, students were able to identify the different types of invertebrates. For many of these students, it was the first time getting their hands on science equipment, which in the end aided them in expanding their scientific knowledge. Additionally, students were given the opportunity to hold cockroaches, courtesy of ISU's School of Biological Sciences' Dr. Benjamin Sadd, who visited camp and gave a demonstration showing students a wide variety of insects from all around the world!

Although it was a fantastic three weeks of working with fourth graders at STEM camp, there were of course some challenges when it came to the ongoing pandemic. Our number one priority throughout the three weeks was to ensure the health and safety of the children and our ISU students. Collectively, we had to be flexible and able to adapt to any adversities we came across. One of the more extensive issues encountered was having to help the students readjust to in-person learning after countless months of learning remotely. Although the students' learning was also a priority, we had to keep in mind that the students had been deprived of social interaction and the concept of "play", so being back in a school setting was a major adjustment. Nevertheless, our CeMaST STEM staff made the most of the three weeks and successfully pulled off the camp.

Overall, it was an amazing opportunity to collaborate with Bloomington School District 87 and provide local fourth grade students with hands-on STEM activities that made them ask questions and reason to solve those questions. Not only did this camp help the students expand their STEM knowledge, but it also gave our pre-service teachers the ability to dip their toes into teaching with inquiry and project-based learning. Our hope is that these pedagogies will be their go-to approaches when they have their own classrooms in the coming years. Pre-service Biology Education major Mayra Hernandez stated, "Working at the summer camp was a learning experience for not only the students but myself. The students got to learn STEM in a fun and interactive way, one that requires more hands-on, independent learning. They got to be creative while figuring out what makes a rocket fly higher, what makes a town light up, and what gives us day and night. I think the way we practiced STEM education in the D87 summer camp should be implemented in more schools, so students are more involved in their learning,". This year's camp was truly a learning experience for many.

On behalf of CeMaST, we would like to say a tremendous thank you to Dr. Diane Wolf, Assistant Superintendent at District 87 for thinking of us when identifying community partners, as well as everyone that made our STEM summer camp possible!

# Farewell to the Energy House



by Matthew Hagaman

From August 2017 through August 31, 2021, CeMaST had a workshop in the garage of the former Energy House at 300 E Shelbourne Ave in Normal. The property was last occupied by ISU's Center for Renewable Energy. It was originally built to be the most energy efficient building on campus and as legend goes, the property was built at least in part by Dr. Franzie Loepp, one of the founders of CeMaST. Later, it was home to the Wellness Program and the Construction Administration Department. The property is now pending sale in accordance with the State Property Control Act.

When employees returned to campus in June 2020, CeMaST was granted access to the whole of the property, and it provided a valuable workspace. We were able to spread out in the larger space, which was important for social distancing reasons, but also because we had so much educational equipment to repair and reinvigorate while schools were out of session or unable to use shared physical materials.

With the loss of the workshop and office space, our operations have been constrained for a while, but we must thank Ashley Waring, doctoral student in the School of Biological Sciences, who spent time reorganizing our workroom at the Campus Religious Center. CeMaST is continuing all operations from the CRC office, but if you see someone running a table saw or belt sander in a campus parking lot, do not be alarmed!

# Seeking Recommendations for Climate Change Documentaries

Dear Colleagues,

The Office of Sustainability and the Center for Science, Mathematics, and Technology (CeMaST) are co-hosting a series of documentaries on the topic of climate change to expand the student body's knowledge base about the causes of climate change, its impacts, and potential solutions. The tentative plan is to screen one documentary every month in the spring and fall of 2022 and potentially spring 2023.

We invite all faculty and graduate educators in every department to suggest documentary films on climate change. We are asking for these recommendations now to encourage ISU educators to include the documentaries in their syllabi for next spring and fall and to encourage students to attend and then perhaps discuss some of the screened documentaries as they relate to the different courses.

We invite recommended titles by November 15 with the following information: (1) Nominator, (2) Department or Unit, (3) Title of Documentary, (4) Summary of documentary (can be copy and pasted from film's online description), (5) Website or link to documentary, (6) Spring or Fall preference for screening purposes. [Please fill out this form to provide the documentary information.](#)

Please share this email with all faculty and graduate workers in your departments to invite them to propose their preferred documentaries to help us start planning for 2022.

If you have any questions, comments, or ideas about this initiative, please contact May Jadallah at [may.jadallah@ilstu.edu](mailto:may.jadallah@ilstu.edu) or Ela Przybylo at [emprzy1@ilstu.edu](mailto:emprzy1@ilstu.edu).

On behalf of Elisabeth Read of the Office of Sustainability and Rebekka Darner the Director of CeMaST, thank you for your collaboration,

**May Jadallah**

**Ela Przybylo**

**Associate Director, CeMaST**

**Assistant Professor**

**School of Teaching and Learning**

**English and Women's, Gender, and Sexuality Studies**



# What's going on with STEAMtalk this semester?

by Courtney Ossola, GA for CeMaST,  
co-producer and co-host of STEAMtalk

## STEAMtalk Podcast

Subscribe today!

**Celebrating  
our research  
community  
at ISU.**

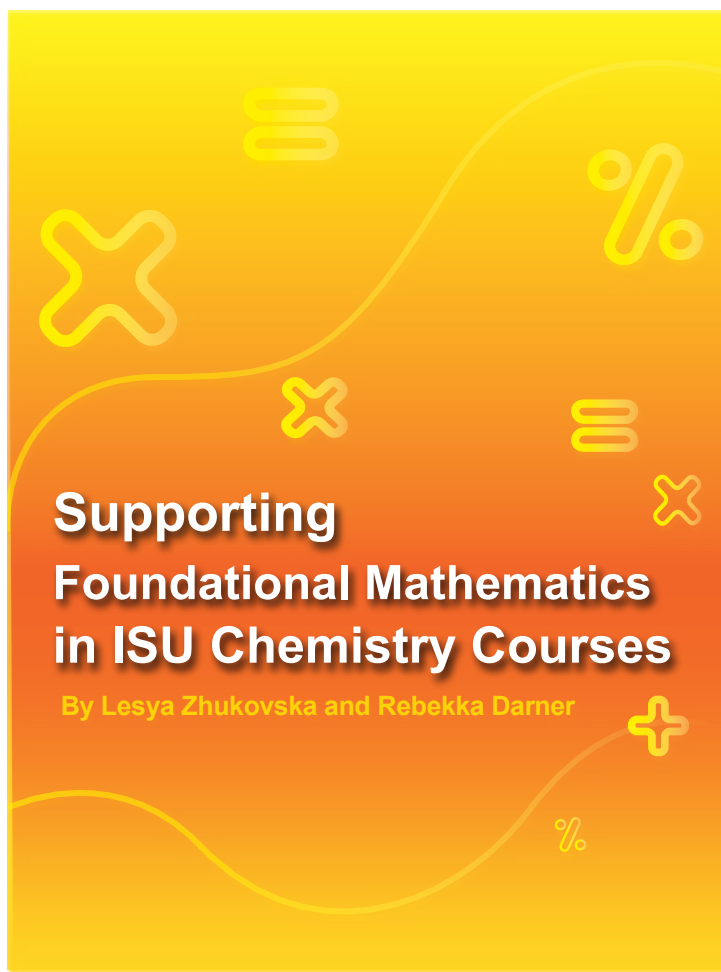


Welcome to STEAMtalk, a podcast brought to you by Illinois State University's Center for Mathematics, Science, and Technology. This semester will be the third season of our show, currently being cohosted by Dr. Kara Baldwin and me. We have two interviews premiering this semester featuring two brilliant researchers on campus. Be sure to subscribe to the show on your preferred podcasting platforms to get alerted to the latest episodes.

In addition to upcoming episodes, we recently have been interviewed for *The Vidette* about our podcast! Dr. Rebekka Darner, Dr. Kara Baldwin, and I will be featured in the upcoming article. One aspect of the interview that was important to me were questions about our personal experiences in creating the show. One thing that struck me in answering these questions was that being a part of this production has given me an education in so many ways. Not only am I learning along with the audience members about the topic of the episode, but I'm also learning how to become connected with others and celebrate the voices in our campus research community.

This semester marks my first semester in graduate school at Illinois State! Being a part of the Communication program has been an uplifting experience thus far. I have recently made a connection with one of my professors who invited Kara and me to speak with her mass media undergraduate class about what it is like to host and produce a podcast. From this small presentation, we received positive feedback and engaged with more students on campus who have an interest in podcasting.

After this meeting, I'm thrilled to continue to work with researchers and students on campus. Uplifting the voices in STEAM is an incredibly rewarding job, and we continue to appreciate all who allow this project to continue.



With a grant from the Howard Hughes Medical Institute (HHMI), mathematics education doctoral student, Lesya Zhukovska, and chemistry master's student, Joe Santarelli, are creating curricula to be implemented in study sessions for introductory chemistry courses. The studies aim to support students' foundational mathematical skills. ISU's CHE 140 and 141 courses are the focus because they are taken by a large proportion of all science majors. Through their Inclusive Excellence program, HHMI aims to support science PEERs—persons excluded because of their ethnicity or race—in STEM careers, and chemistry is one of the foundational subjects towards that path. All students, regardless of identity, are welcome to participate in the study sessions.

In a preliminary STEM self-study conducted by CeMaST in 2020, both STEM students and faculty cited rusty quantitative skills as a primary reason why students are challenged in our science courses and perhaps may change their majors away from a STEM field. Even when a student has achieved success in their math courses, they may still struggle to apply or make the connection between those quantitative skills learned in a math course and the science at hand. Both CHE 140 and 141 are heavily quantitative in nature and thus serve as an opportunity to build quantitative

skills as they are applied in science. To seize this opportunity, weekly 2-hour recitation sessions for both courses are being offered this semester that focus on the quantitative problem-solving aspects of the content covered in each course. Graduate students Joe and Lesya prepare problems that practice both the math and chemistry, and then coteach the study sessions. Students complete practice problems and have opportunity to work independently and with peers, ask questions about both the novel problems presented and homework problems, discuss and make sense of lab activities, and enjoy some snacks. These sessions are optional to attend for students but are heavily encouraged by their instructors, Drs. Willy Hunter (CHE 140) and Chris Hamaker (CHE 141).

This project serves as a unique professional experience for Joe and Lesya. While Joe's bachelor's degree is in secondary chemistry education, also from ISU, he is seeking his master's degree in chemistry and envisions teaching remaining a component of his career path. By participating in this project, he will have gained experience attending to the foundational mathematics skills that are often overlooked in science instruction. Similarly, Lesya, whose master's degree is in mathematics education and who is in her second year of the doctoral program in the same discipline here at ISU, has had to redesign mathematics problems so they have scientific meaning. Hopefully, they will have taken from this experience lessons that they too can apply throughout their careers.

While this is a pilot project and not likely to persist in its exact current form in the future, we intend for the pilot to demonstrate the benefits of recitation sessions in science courses that focus on problem-solving and allow time and opportunity to (re)teach math skills that may be forgotten or that may be difficult to transfer to the scientific context.

**GOODBYE & GOOD LUCK TO**

*Ellie!*

Ellie worked for CeMaST for almost 2.5 years! Her legacy will live on as the voice of the Virtual Grid Construction Game.



**migration**

such beauty  
this boy  
hair hanging  
long  
guitar  
in hand  
voice of a  
nightingale  
singing  
to the wind  
traveling on

*Between the*  
**margins**

by Todd Eddy



# CeMaST ▶ /// Family Photos

These are the moments that we celebrate together. Every semester brings us together in unique ways, and we always want to highlight our time as a community on campus.







# Thank you for connecting with **CeMaST**

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