UNIVERSITY OF NEBRASKA AT OMAHA
STEM TRAIL CENTER

Information Booklet

2021

The STEM Teaching, Research, and Inquiry-based Learning (TRAIL) Center

University of Nebraska Omaha

THE STEM TRAIL CENTER: LEADING THE FUTURE

The interdisciplinary Science, Technology, Engineering, and Mathematics (STEM) initiative at UNO has long been a beacon for the campus and surrounding community. UNO identified "STEM" as a priority area in 2012, reflecting the national needs for improved education in STEM fields, and the need for innovative training models to best support the workforce of tomorrow. The STEM initiative began with an intense focus on preparing teachers of STEM disciplines to reach the children of Nebraska and support their goals. This focus was set in motion and subsequently helped UNO to be highlighted as a center of excellence surrounding teacher preparation, and in-service teacher support, as recognized by substantial funding from the federal government for these initiatives. Beginning in 2018, the STEM priority expanded to include a greater emphasis on outreach and research participation for all. This aim is in an effort to build sustainability and a pathway for success for all students. The STEM initiative remains ever interdisciplinary, bringing individuals together from various disciplines and expertise to shape the STEM fields for decades to come. Our reach has grown exponentially, and in an effort to truly be synergistic and allow for sustainable growth, we gained approval for formation of the STEM Teaching, Research, and Inquiry-based Learning (TRAIL) Center in May of 2019.

Given these successes to-date, the campus recognized the STEM TRAIL Center as a **Signature Area of Excellence** and has added support to the initiatives. Ultimately, we all seek to support and improve human potential through lifelong learning. How we do that takes the form of various programs, scholarships, fellowships, and reskilling (and "train-the-trainer") opportunities. While we work with many groups and stakeholders, and on many projects, the following pages help to tell our story through various lenses to share the happenings of the STEM TRAIL Center.

ABOUT US

Advancing STEM capacity, competency, innovation, and literacy at all levels for the betterment of our metropolitan, regional, national, and international communities.

The Science, Technology, Engineering, and Mathematics (STEM) Teaching, Research, and Inquiry-based Learning (TRAIL) Center is a Board of Regents approved Center at the University of Nebraska at Omaha.

As an administrative unit, the STEM TRAIL Center provides resources and materials to undergraduates, graduates, and faculty members at UNO, and lifelong learners (cradle through career) through engaging programming, training, re-skilling, outreach, research, and entrepreneurial ventures. The Center serves as a catalyst for course innovations by working with faculty of different disciplines to design interdisciplinary coursework.

The STEM TRAIL Center supports the community, as well as other schools and universities. Thousands of faculty, staff, educators, and students value our continuous programming offerings. Additionally, the Center provides a unified voice for STEM needs in the metropolitan area while providing a shared space for housing STEM professional development initiatives and coordinated financial support for STEM research initiatives.

ELEVATING HUMAN POTENTIAL THROUGH LIFELONG LEARNING

It is no secret that the Nebraska economy is at a critical pivot point. Without proper infrastructure, sound investment, and a comprehensive education system to move forward, we will continue to struggle to attract and retain talent in our state. We aim to prepare our students for the jobs of the future, many of which will not even be designed or available until they graduate.

Students Ready for the Workplace

We provide workshops catered to career development and career placement, and support students through a network of mentors to connect them to the best opportunities.

Teaching Effectiveness

We aim to make UNO the place for effective teaching and learning–thereby serving as a national leader in active learning instruction.

Contributing to Diversity

Diversifying the STEM workforce remains a critical focus for many groups. The STEM TRAIL Center has been strengthening our recruitment pathways and working to support and retain our UNO students through our guided learning communities, where students gain professional development. Our internships provide access to an expanded network that supports job placement. In just one of our existing programs, NE STEM 4U, 77% of our undergraduate mentors are from groups traditionally underrepresented in STEM, and we've retained 97% of our students in the workforce.

Learn in Place

We focus on interdisciplinary teaching, experiential learning, and a strong focus on collaboration and problem solving.

Reskilling and Retooling

To support lifelong learners, we offer certificate style programs and workshops focused on reskilling the workforce.

OUR PURPOSE

To serve as the leading edge for best practices in teaching, research, and engagement. We do that through:

Teaching and Learning

Creating, embedding, studying, and implementing best practices in instruction across the PK-16 STEM pipeline.

Research

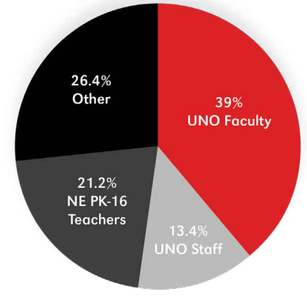
Designing, conducting, analyzing, and disseminating timely research to inform decision-making in the classroom and in industry.

Community Engagement

Providing unique, high-quality community engagement via a variety of platforms: from STEM programming for youth, to ongoing seminars that welcome the community to our campus.

TEACHING AND LEARNING

Some of the ways that the STEM TRAIL Center supports the best teaching practices is through the monthly Teaching Practices Workshop series. We host speakers from around the world to share timely research on teaching strategies, and then take the participants through a hands-on workshop to help embed these practices into their teaching. Importantly, while our focus is STEM, instructors who teach outside of the traditional STEM fields are most welcomed at all of our events, and we have great representation from across a range of fields (e.g. Human Rights/ Philosophy, Biomechanics, Teacher Education, Engineering, Economics, Business Administration, Geography/Geology, Neuroscience, Information Systems, and Quantitative Analysis, etc).



Typical participant distribution by attendee.

Instructors looking for a more catered approach in an ongoing way can also be mentored by our Instructional Coaches to help them develop a growth mindset and implement best practices in instruction. This program is improving learning outcomes within the STEM disciplines.

Additionally, the STEM TRAIL Center supports a series of Fellowship Programs for effective teaching and learning. The Center supports a fellowship dedicated to non-tenure track instructors to continue their professional development, including travel. Additionally, the Center provides fellowships for pre-service STEM teachers (i.e. undergraduates) majoring within a STEM discipline and interested in teaching at the middle level and above (grades 5-12) thanks to funding from the National Science Foundation's Noyce program. In-service teachers can participate in sponsored research with researchers each summer via the Teacher-Researcher Partnership Program, and students of any major can enroll in the cross-listed high-altitude ballooning course.

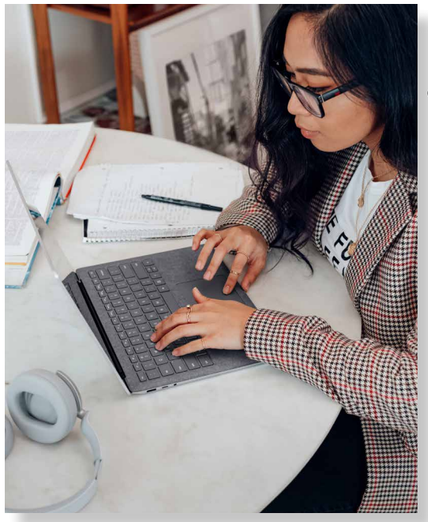
Attending the workshop "Reaching the Failing Student" really opened my eyes to what students are dealing with from abuse, homelessness, hunger, loss of job, no family support, drug use, etc. Additionally, before the "Small Teaching in STEM: Don't let perfect be the enemy of good", I would hesitate to bring change in the approach to a subject, because not all the details were figured out. After this workshop, I started making small changes to how the in-class room activities were delivered. This helped me be more creative and get the students work together more. Now we are redesigning the class to be interactive and inquiry based. (I'm) Really grateful for the motivation that this lunch seminar provided.

–Dr. Becky Brusky, Instructor of Mathematics

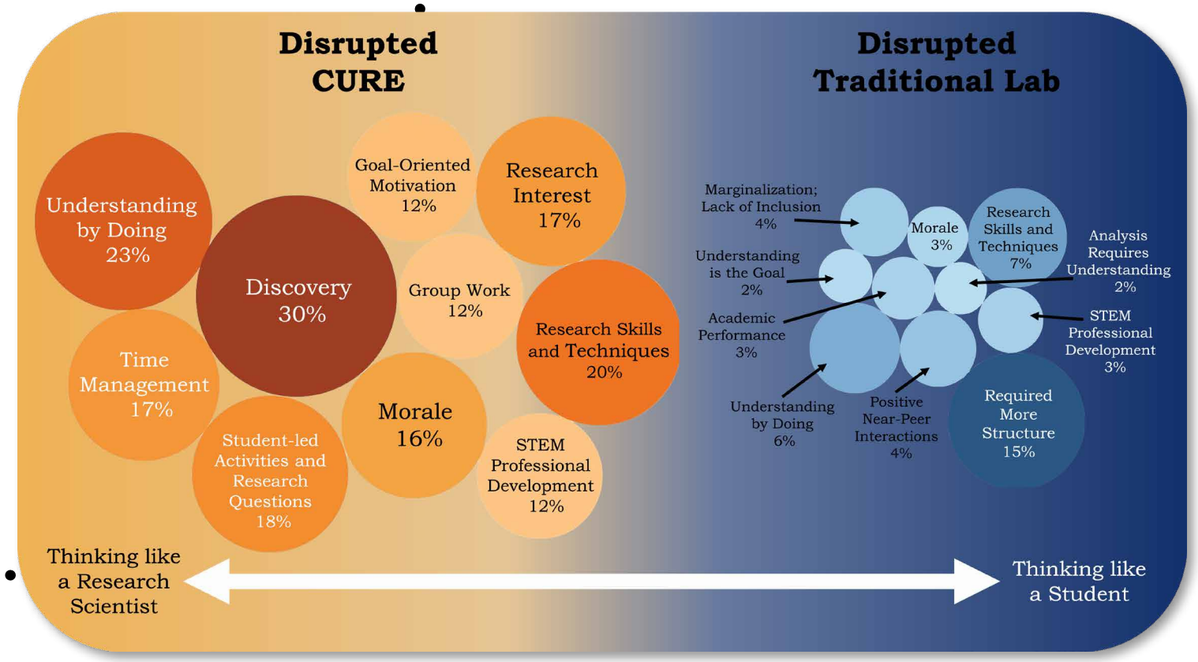
RESEARCH

The STEM TRAIL Center conducts and supports research across a broad range of STEM programs and disciplines. The signature research area is Discipline-Based Education Research (DBER).

Students are invited to participate in active research projects, and as a result, gain skills ranging from research ethics and safety to data analysis and how to disseminate their work to an international audience. Similarly, the teams at the Center work with collaborators around the world, further expanding the network of all involved. Students gain hands-on experiences learning to work as researchers, and become well prepared to join the workforce post-graduation.

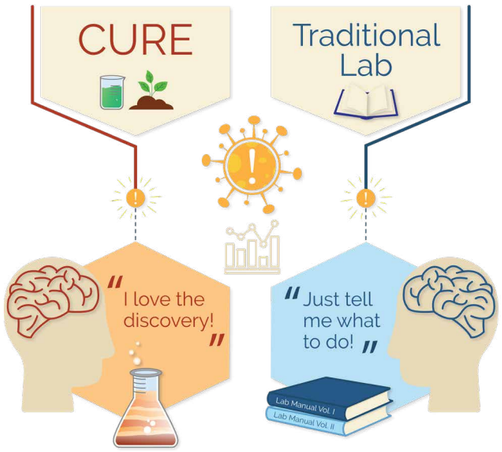


Examples of data collected from discipline-based education researchers at the STEM TRAIL Center; see our website for direct links to research publications. Photos by ThisisEngineering RAEng and surface on Unsplash.



These qualitative data capture student learning gains from our course-based undergraduate course sections (CUREs) compared with those in traditionally taught labs (Sommers et al 2021).

Scan the QR code for more information and to view the research publication.



Researchers from around the world can come to study on-site to learn more about the new field of DBER and build research collaborations. The Center hosts a monthly research seminar series to build a community surrounding DBER, and routinely welcomes individuals from across the U.S. Further, the Center expects to begin hosting Fulbright Scholars in 2022.

In addition to the monthly DBER seminar Series, the Center hosts a STEM Grants Workshop Series to support new research program development, aid in research strategy, form research partnerships, and share best practices surrounding STEM grant proposal preparation. Much like the Teaching focus via Instructional Coach mentors, there is also a Research Mentor cohort to match new investigators with those outside of their disciplinary area to help further foster creativity while supporting interdisciplinary work.

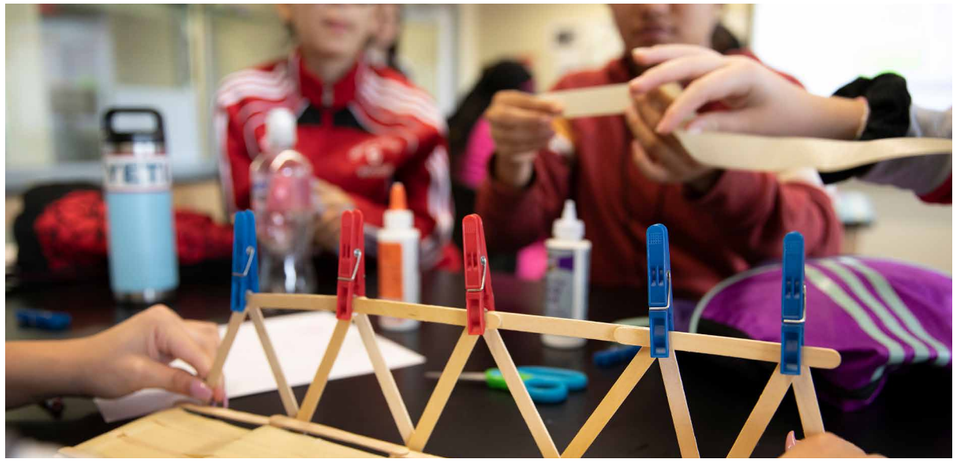
COMMUNITY ENGAGEMENT

The mission of the STEM TRAIL Center is to support lifelong learning. To achieve this, the Center hosts a range of speakers and workshop facilitators within the STEM disciplines.

This list of recent speakers helps to capture the breadth of invited scientists, researchers, educators, and experts:

Agnes Lenagh, Ph.D.,
Business Development and Intellectual Property Analyst, Streck
Alaina G. Levine,
Science Careers Writer, New York Times best selling Science writer, and Entrepreneur
Alan Lightman, Ph.D.,
New York Times best selling Author, and MIT Professor
Bonni Stachowiak, Ph.D.,
Dean of Teaching and Learning, Vanguard University, creator and host of the Teaching in Higher Ed podcast
Carl Wieman, Ph.D.,
Nobel Laureate, Professor of Physics at Stanford University, & former Associate Director for Science in the White House Office of Science and Technology Policy
Stephanie Cutler, Ph.D. and Sarah Zappe, Ph.D.,
Exuberant Ventures and the Leonhard Center for the Enhancement of Engineering Education

In addition to our speaker series and events, the Center also co-hosts, sponsors, plans, and/or provides programming for various outreach activities, including the Robotics Expo, the Metropolitan Science and Engineering Fair, the Nebraska Science Festival, LightsOn Afterschool, and other community-wide events.



STATE OF NEBRASKA

Proclamation

WHEREAS, A critical workforce shortage of current and future professionals in the fields of Science, Technology, Engineering, and Math (STEM), is an increasingly complex issue facing Nebraska employers who rely on a tech talent pipeline to fill open positions; and

WHEREAS, STEM skills promote the critical thinking needed to spark innovation and solve the complex problems of our world; and

WHEREAS, The Omaha STEM Ecosystem believes in the power of connection, collaboration, and communication to address the critical shortfall and create strategic partnerships to make Omaha a robust center of STEM excellence and innovation; and

WHEREAS, The Omaha STEM Ecosystem's mission is building a stronger STEM community by connecting education and business development for tomorrow's workforce; and

WHEREAS, The Omaha STEM Ecosystem will celebrate its 5th anniversary in 2021, continuing to identify critical workforce skills, align curriculum content with career opportunities of the future, and provide access for all members of our community to quality STEM education programs.

NOW, THEREFORE, I, Pete Ricketts, Governor of the State of Nebraska, DO HEREBY PROCLAIM November 8, 2020 as

OMAHA STEM ECOSYSTEM CELEBRATES NATIONAL STEM DAY

in Nebraska, and I do hereby urge all citizens to take due note of the observance.

IN WITNESS WHEREOF, I have hereunto set my hand, and cause the Great Seal of the State of Nebraska to be affixed this Third day of November, in the year of our Lord Two Thousand Twenty.

Attest:
Secretary of State
Governor

The Omaha STEM Ecosystem is co-led by, and housed within, the STEM TRAIL Center and includes nearly 80 STEM workforce development institutional partners, such as Omaha Henry Doorly Zoo and Aquarium, Union Pacific, Gallup, the Omaha Public Power District and many others who often partner with UNO for STEM related workshops and instructional activities. In recognition of the outstanding work and leadership of the Omaha STEM Ecosystem in Omaha, the Nebraska Governor declared a proclamation in recognition of STEM in 2020.

In addition to the programming for adults, the Center also offers a range of programming for youth. The programming is year-round, and is focused on helping youth to learn what scientists do through immersive experiences. Additionally, the Center provides a range of activities that parents, teachers, and guardians can use with youth, such as our cartoons, activity books, and STEM kits.

The ongoing demand for student support programs, reskilling of the workforce, experiential learning for current and future STEM professionals, and engaging activities for lifelong learners demonstrate the niche that the STEM TRAIL Center fills. We welcome partners that share our passion for making Nebraska the place for lifelong learners in STEM!

Interested in learning more?

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STEM TRAIL Center

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