



Center for Engineering Education Research (CEER)

AY 2025-2026

Interim Report: May, 2026

CEER is a collaboration between the College of Education & Human Development (CEHD) and the College of Engineering & Mines (CEM) that aims to transform PK-20 engineering education and broaden pathways to engineering through research partnerships and outreach.

CEER is a North Dakota State Board of Higher Education designated center (awarded May 2025). It was founded in January 2024 through a strategic investment by the University of North Dakota (UND).

Leadership Team

Director: Julie Robinson
Frank Bowman (CEM)
Beth Klemetsrud (CEM)
Rachel Navarro (CEHD)
Ryan Summers (CEHD)

Personnel

Postdoctoral Researcher: Caitlin Brecklin
Grants Analyst: Rosemary Schultz
Graduate Assistant: Adesola Adetunji
Graduate Assistant: Sike Olateru-Olagbegi

Faculty Affiliates

*New affiliate

**External Affiliate

<i>CEHD</i>	<i>CEM</i>	<i>Other</i>
Amber Adgerson*	Enrique Alvarez Vazquez	Bridget Brooks (ITaDA)*
Tugba Boz*	Nagabubu Andraju	Jacob Carstens (Atm. Sci.)
Woei Hung	Vida Atashi*	Dan Ewert (South Dakota Mines)**
Cheryl Hunter	Sattar Dorafshan	Marcos Fernandez-Tous* (Space Studies)
Joshua Hunter	Mahmut Ersan*	Mark Kaemingk (Biology)*
Min Jung Lee	Gamze Ersan*	Asher Kingery (International Water Institute)**
Christine McGrail	Ertan Ozturk*	Ryan Striker (South Dakota Mines)**
Anthony Perry	Prakash Ranganathan*	
Renuka de Silva	Will Semke*	
Kathy Smart		
Elizabeth Suazo-Flores		

Advisory Board

CEER’s Advisory Board provides guidance and advice on CEER’s vision and mission as an organization to help guide next steps and direction related to organizational systems, research productivity, sustainability measures, and expansion of CEER’s network and affiliations.

The CEER Advisory Board met on February 9, 2026 to discuss CEER’s ongoing progress and direction.

Advisory Board members include: Manuel Figueroa, Ph.D. (The College of New Jersey), Lucy Fredericks (ND Department of Public Instruction), Rebekah Hammack, Ph.D. (Purdue University), Randy Hermann, P. Eng. (University of Manitoba), Scott Simpson, Ph.D. (Black Hills Special Services Cooperative), and Sharla Steever (Black Hills Special Services Cooperative).

Steering Committee

CEER’s Steering Committee will comprise a small group of stakeholders that provide direction and decision-making related to outreach, professional development (PD), and CEER-school-industry partnerships.

The Steering Committee is still being formed, and will ultimately include 4 - 6 members. Current members include:

- Megan Odermann, STEM teacher at Hatton Eielson High School
- Erin Lacina, Director of Northeast Educational Services Cooperative (NESC)
- Hope Burdoloski, STEM Education Specialist, North Dakota’s Gateway to Science

UND Center Leadership and Collaboration

CEER is a campus leader in developing inter-center collaboration. Director Julie Robinson has been invited to serve on the Advanced Transportation Infrastructure Center (ATIC) advisory board and the Artificial Intelligence Research (AIR) Center education thrust committee. CEER is also spearheading efforts to connect UND research center directors, including through monthly meetings and a proposed Centers Day.

Grants and Other Funding

CEER leadership in bold; CEER affiliates underlined

Awarded

<i>Program</i>	<i>Project</i>	<i>Total Award (Amount to CEER)</i>
NSF Translation and Diffusion	<i>Understanding the Impact of Professional Learning Programs on Teacher Decision Making and Practice</i> (partnership with Purdue University) P.I. (UND): Julie Robinson P.I. (Purdue University): Rebekah Hammack Co-P.I.s: <u>Anthony Perry</u> , Stephanie Oudghiri Scherer	\$749, 817 (\$247,817)
NSF EPSCoR Research Fellows	<i>Expanding Pathways for Rural Students into Engineering</i> P.I.: Julie Robinson Co-P.I.: Caitlin Brecklin	\$299,999 (\$299,999)

Other Financial Support

<i>Source</i>	<i>Purpose</i>	<i>Total Funding (Amount to CEER)</i>
ND-EPSCoR	Purchase materials for STEM kits developed by CEER for pre- and in-service teacher use, as well as development of a CEHD lending library or makerspace.	\$10,000 (\$5,000-\$6,000)

Proposals Submitted

<i>Status</i>	<i>Program</i>	<i>Notes</i>
Under Review	NSF Innovations in Graduate Education (IGE)	PI: <u>Enrique Alvarez</u> (CEM, BME)
Under Review	NSF Research Infrastructure Improvement Program (FEC)	PI Sattar Dorafshan (CEM, CE), Co-PIs Julie Robinson , Paul Snyder \$2.8 million
Under Review	NSF Research in the Formation of Engineers (RFE) EDP + AI	PI Tugba Boz (CEHD, IDT), CoPIs Julie Robinson , Tafique Mahmood (CEM) \$750,000
Under Review	EPA Water Quality	PI Mahmut Ersan (CEM), CoPIs Gamze Ersan Julie Robinson , Sattar Dorafshan \$250,000
Under Review	USDA	PI Linqi Lu, CoPIs Julie Robinson , Prakash Ranganathan, Nathaniel Johnson, Sicong Shao \$2 million
Under Review	National Security Agency GenCyber Camp	P.I.: <u>Prakash Ranganathan</u> Key Personnel: Tanzim Hassan, Julie Robinson \$60,000
Under review	NSF NQNI Northern Plains Quantum and Nanotechnology User Facility	PI Nuri Oncel, Co-PIs/Research Team: Julie Robinson , Daphne Pederson, Ryan Summers , Maria Morrell, Mehmet Ozdogan, Rajendra Dulal, Alessia Provino
Unfunded	Bush Foundation	PI Frank Bowman , Co-PIs Julie Robinson , Bethany Klemetsrud , Christine McGrail, Erin Lacina \$750,000 Positive reviewer feedback - encouraged to pilot program and resubmit to Bush Foundation with broader scope across the state.

Unfunded	NSF Research Initiation in Engineering Formation (REIF)	PI: <u>Sattar Dorafshan</u> (CEM, CE) Co-PI: Julie Robinson \$300,000
Unfunded	William T. Grant Foundation–Research Grants on Reducing Inequality–Officers’ Grant	PI: Julie Robinson Co-PI: Caitlin Brecklin \$50,000

Proposals in Preparation

<i>Program</i>	<i>Project</i>	<i>Notes</i>
NSF Research in the Formation of Engineers (RFE)	Community Relevant Engineering and Teacher Education Research	P.I.: Bailey Nafziger (Georgia Southern) Co-P.I.s: Julie Robinson , <u>Christine McGrail</u> , Anna Brady (GSU), Alesia Moldavan (GSU) Key Personnel: Caitlin Brecklin Proposal is being revised for resubmission based on positive reviewer feedback.
NSF Research in the Formation of Engineers (RFE)	Cultivating STEM Career Interest in Middle School Students using AI-Based Imagery Recognition with Unmanned Aircraft Systems	P.I.: <u>Woei Hung</u> Co-P.I.s: Julie Robinson , <u>Tugba Boz</u> (NSF EPSCoR grant awarded to support revision and resubmission (\$9,000))
Department of Transportation - University Transportation Centers (UTC)	Autonomous Technologies for Resilient, Durable, and Safe Transportation Infrastructure	PI: <u>Sattar Dorafshan</u> , CoPIs Julie Robinson Partnership with CEM
NSF STEM K-12	AI Decathalons	Research Team: <u>Anthony Perry</u> , Julie Robinson , Ryan Summers , <u>Tugba Boz</u> , <u>Nagabubu Andraju</u>
NCRAC	Biology/Aquaponics Workforce and Literacy Development	PI: Ryan Lefers (SDSU), CoPI Mark Kaemingk, Educational Consultant Julie Robinson
NSF STEM K-12	Cultivating STEM Career Interest in Middle School Students Using AI-based Imagery Recognition	PI: <u>Woei Hung</u> , Co-PIs <u>Tugba Boz</u> , Julie Robinson
NSF E-RISE	Increasing Autonomy in Infrastructure Monitoring, Design, and Construction	PI <u>Sattar Dorafshan</u> , Co-PIs Julie Robinson , Ryan Anderson (MSU)

Research, Evaluation, Educational, and Other Activities

Research

<i>Project (Funder)</i>	<i>Personnel, Activities and Outcomes</i>
Expanding Pathways for Rural Students into Engineering (NSF EPSCoR Research Fellowship)	<ul style="list-style-type: none"> ● P.I.: Julie Robinson; Co-P.I.: Caitlin Brecklin ● Research trips to Montana State University (Oct.-Nov. 2025; March - April 2026): Professional connections made across multiple colleges and departments; plans made for future training and collaboration between institutions ● Professional development attended by CEER staff: CBPR online workshop, MSU Centers Day, Rural West Conference
Understanding the Impact of Professional Learning Programs on Teacher Decisionmaking and Practice (NSF Translation and Diffusion)	<ul style="list-style-type: none"> ● P.I. (UND): Julie Robinson; P.I. (Purdue University): Rebekah Hammack; Co-P.I.s: <u>Anthony Perry</u>, Stephanie Oudghiri Scherer ● Research trips to Devils Lake, Spirit Lake Nation, Rolette, Rolla, Starkweather (Oct. 2025, Dec. 2025, March 2026): Field work and data collection in schools.
Exploring Preservice Teachers' Self-Efficacy for Teaching Engineering Design Through Engagement with Culturally Relevant Engineering Design Pedagogy (CEHD Mini-Grant)	<ul style="list-style-type: none"> ● P.I.: <u>Christine McGrail</u>; Co-P.I.s: Julie Robinson, Caitlin Brecklin ● Initial data analysis ● Continuing data collection ● Presentation: McGrail, C., Robinson, J., & Brecklin, C. (2026) Exploring preservice teachers' self-efficacy for teaching engineering design through engagement with culturally relevant engineering design pedagogy. CEHD Research Conference, Grand Forks ND.

Evaluation

<i>Project (Funder)</i>	<i>Activities and Outcomes</i>
NSF S-STEM	Project Evaluation for QUEST Project PI Rebecca Simmons, Co-PIs Alena Kubatova, Daphne Pederson, Lavinia Iancu, Shaina Mattingly

Professional Development, Teaching, and Educational Services

<i>Date</i>	<i>Audience</i>	<i>Topic</i>	<i>Notes</i>
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Spring 2026	CEHD MSTL	TL 557 Introduction to Engineering Education	Course developed and offered for graduate students, taught by Julie Robinson in collaboration with CEM faculty
Jan. 15, 2026	CEHD and CEM Faculty	Designing Broader Impact Statements	Workshop offered by Julie Robinson
Feb. 3, 2026	Faculty	Crescendo professional development sessions: <ul style="list-style-type: none"> ● Finding Your EM Resonance ● Instilling Curiosity with Team-Based Classroom Techniques ● Resiliency: Fortifying Grit and Persistence for Yourself and Students ● Creative Problem Solving 	Presented by representatives from KEEN in partnership with CEEER
Feb. 6, 2026	K-12 Teachers	Professional learning on community and culturally relevant engineering design in K-12 classrooms	Provided via Zoom to teachers at Rock Creek Grant School
Feb. 12, 2026	Students grades 3-5	Engineering and design activities including: <ul style="list-style-type: none"> -Lunar rover design activity -Making slime and boba -Engineering building tour 	Provided on campus to students from Minto Public School by faculty from CEHD, CEM, and ND space grant
March 5, 2026 April 9, 2026 May 7, 2026	Faculty	CEER Drop-In Hours	Provided to CEER affiliates for proposal support and networking
April 29, 2026	High school students	Engineering and STEM activities including: <ul style="list-style-type: none"> -Pencil electrolysis and using a scanning electron microscope -Polymer experiment -Space drone activity -Visit with representatives from Collins Engineering 	Provided on campus to students from Hatton High School by faculty from CEHD, CEM, and ND space grant.
Summer 2026	CEM Faculty	CEM Teaching Council Summer Development Workshop - Implementing KEEN Concepts into the Classroom	Workshop to be offered by Julie Robinson and Enrique Alvarez

Spring 2025	CEHD	Makerspace Survey	Survey of current CEHD students about their interests and preferences for a college makerspace
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Outreach and Events

<i>Date</i>	<i>Event</i>
Oct. 8, 2025	CEHD SEA OTRR <ul style="list-style-type: none"> ● Marble run activity
Feb. 9, 2026	CEER Advisory Board meeting
Feb. 25, 2026	CEHD SEA OTRR <ul style="list-style-type: none"> ● Community Relevant Engineering Design - Water Filtration
April 25, 2026	Grand Forks Hand-On Learning Fair <ul style="list-style-type: none"> ● Engineering challenge activity
April 28, 2026	Valley Middle School STEM Night <ul style="list-style-type: none"> ● Engineering challenge activity ● Marble run activity

Publications, Presentations, and Press

CEER leadership in bold; CEER affiliates underlined

Peer-Reviewed Publications and Presentations

Robinson, J. & Brecklin, C. (2026, May). Expanding pathways for rural students into engineering. Poster to be presented at the Established Program to Stimulate Competitive Research (EPSCoR) Annual Summit. New Orleans, LA.

Hammack, R., **Robinson, J.**, Gist, J., **Lee, M. J.**, Boz, T. (revisions submitted). Understanding how elementary teachers characterize science and engineering within classroom instruction. Journal of Science Teacher Education.

Hammack, R., **Robinson, J.**, Scherer, S., Gist, J., **Lee, M. J.**, Boz, T., & Cabrera, L. (under review). One teacher’s approach to supporting multilingual learners through community-connected culturally relevant engineering design. Science Education.

Robinson, J., Bowman, F., Adetunji, A., Olateru-Olagbegi, S., & Klemetsrud, B. (2026). Exploring the design and delivery of community relevant engineering design in elementary and middle school classrooms. Proceedings from the American Society for Engineering Education (ASEE) Annual Conference & Exposition, Charlotte, NC.

Adetunji, A., Bowman, F., Robinson, J., & Olateru-Olagbegi, S. (2026). Zone of self-efficacy development (ZSED) model: A framework for teacher growth in community relevant engineering design (CRED) implementation. Proceedings from the American Society for Engineering Education (ASEE) Annual Conference & Exposition, Charlotte, NC.

Gist, J., **Robinson, J., Hammack, R., Lee, M.** (2026). The impacts of on-going professional learning on rural elementary teachers’ engineering teaching self-efficacy. Proceedings from the American Society for Engineering Education (ASEE) Annual Conference & Exposition, Charlotte, NC.

Summers, R., Hammack, R., Robinson, J., Iveland, A., Macias, M., Lee, M. (2026). On-going investigation of elementary teachers’ engineering self-efficacy following their participation in an online professional learning program. Proceedings from the American Society for Engineering Education (ASEE) Annual Conference & Exposition, Charlotte, NC.

Robinson, J., Smart, K., & Luecke, D. (2025). Sacred Relatives: Learning about interconnectedness within the local watershed. *Climate Literacy Journal*, 3(3).

Robinson, J. & Brecklin, C. (2025). Center for Engineering Education Research: Advancing STEM education and partnerships in North Dakota. ND EPSCoR Annual Conference (Fargo, ND).

Other Presentations and Communication

<i>Date</i>	<i>Audience</i>	<i>Topic</i>
Fall 2025	CEHD Department Meetings	CEER introduction
Nov. 4, 2025	CEM Teaching Council	CEER introduction
Fall & Winter 2025 Spring 2026	Faculty and External Partners	CEER newsletter
March 18, 2026	UND School of Aerospace Sciences	CEER introduction

Press Appearances

CEHD Research in Press: 2025 October. <https://blogs.und.edu/cehd/2025/10/cehd-research-in-press-2025-october/>

CEHD Catalyst Quarterly Magazine: 2025 Winter Debut Issue

CEHD Catalyst Quarterly Magazine: 2026 Spring

Partnerships

Continuing Partnerships

- **Compass Partners in Learning**
Compass Partners in Learning provides development and support services to teachers and schools in South Dakota’s Black Hills Special Services Cooperative.
- **International Water Institute (IWI)**
IWI is a non-profit watershed education organization in Fargo, ND that provides water quality monitoring and educational outreach for schools and teachers across the region.

- **Keen Foundation and Engineering Unleashed**
This national foundation provides faculty development and resources to support engineering students in developing an entrepreneurial mindset (EM) “so they can create personal, economic, and societal value through a lifetime of meaningful work”. Through our work with KEEN, we continue to bring resources and training to CEM, support sending CEHD and CEM faculty to their national conferences and workshops, and are pursuing a full partnership with the KEEN network, which would provide CEER and CEM with funding support to conduct engineering education research and faculty development.
- **Montana Engineering Education Research Center (MEERC)**
Located at Montana State University (MSU), MEERC is a national leader in engineering education research. MEERC faculty have agreed to serve as mentors for the NSF EPSCoR Fellowship grant listed above, to collaborate on Community-Based Participatory Research in engineering education, and toward the development of a collaborative grant proposal.

New and Developing Partnerships

- **MSU Science Math Resource Center**
The Science and Math Resource Center is a STEM outreach center in MSU’s Department of Education dedicated to the advancement of science and mathematics teaching and learning; providing professional development for K-12 educators of tribal, rural, and urban communities; conducting educational research, and hosting the annual Science Olympiad state tournament at MSU.
- **Auckland University of Technology (AUT)**
AUT is a world-ranked university with innovative programming focused on authentic workplace experiences, industry partnerships, and engaging students in designing meaningful approaches to genuine challenges.