



COLLEGE OF EDUCATION ENGAGEMENT REPORT 2022



**PURDUE
UNIVERSITY.**

College of Education

FOREWORD

Consistent with Purdue’s Land Grant Mission—and because P-16 education is a public good—engagement is absolutely central to the mission of the College of Education, and we are committed to making the College an equitable and welcoming environment for all. Indeed, much of the scholarly work of our faculty occurs in P-12 schools and classrooms, and in collaboration with P-12 teachers and administrators. Examples of this work include: (1) the \$24.5 million federally funded GEAR-UP grant designed to better prepare youth from under-served communities for post-secondary education, (2) the Indy STEM Teacher Residency program—funded by a \$5 million federal grant—designed to prepare secondary STEM teachers for work in Indianapolis Public Schools, and (3) \$3.5 million and \$2.8 million federal grants focused on increasing access to gifted and talented education services for students from under-served communities. These are but a few notable examples of how essential engagement is to the success of the College.

The College of Education acknowledges that Purdue University is located in the traditional homelands of the Woodland People. We honor and appreciate these indigenous caretakers which include the Bodéwadmik (Potawatomi), Lenape (Delaware), Myaamia (Miami), and Shawnee people. This acknowledgment shall be used by faculty, staff, and students at their discretion.

PHILLIP J. VANFOSSEN, PH.D.

INTERIM DEAN & J.F. ACKERMAN PROFESSOR,

COLLEGE OF EDUCATION

PURDUE UNIVERSITY

WEST LAFAYETTE, INDIANA

COLLEGE OF EDUCATION ENGAGEMENT REPORT – 2022 YEAR



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COLLEGE OF EDUCATION ENGAGEMENT REPORT – 2022 YEAR

Purdue’s College of Education is dedicated to launching the future through the discovery and development of human potential. That’s a lofty vision, yet one that equitable access to education can make possible. Through our research, scholarship and teacher preparation, we work to effect positive change and transform the lives of learners of all ages and ability in a variety on contexts both formal and informal. For nearly 110 years, we have seen that vision become reality – and realize that even as much is accomplished, there remains much to do. With respect to our engagement and impact as we meet the land grant mission of Purdue University, it is important to note that approximately 80% of our teacher education graduates choose to remain in Indiana, working as education professionals, including teachers and administrators. Our Strategic Plan for 2021-2026 outlines a mission, vision, and strategic goals consistent with engagement.

The mission of the College of Education at Purdue University is: Moving. Together.

We advance inclusive and sustainable learning communities through high impact scholarship, inspirational teaching, vision-driven service, and collaborative community engagement.

The vision of the College of Education at Purdue University is: Launching Giant Leaps. Together.

The College of Education at Purdue University is a national leader in modeling inclusive excellence and nurturing sustainable educational practices and systems for a just society and better world; the scholarship of discovery, learning, and engagement; and the development of human potential.

Strategic Goals for 2021-2026 are:

Goal 1: Implement teacher education innovation as a means of improving sustainable practices in education that impact the world around us.

Goal 2: Increase student enrollment and retention with recruiting emphasis on historically underrepresented groups.

Goal 3: Promote positive climate practices that value and showcase work in support of inclusive excellence.

P-12 Schools

- **Clinical Partnerships:** Program faculty and our P-12 partners work together to design, implement, and evaluate candidates' field experiences and clinical practice. Program faculty and school partners design and implement a unique set of course-related field experiences that allow candidates to apply and reflect on content, professional knowledge, pedagogy, content pedagogy, and professional dispositions throughout the Teacher Education program. Field experiences that are connected to foundational courses allow candidates to observe in-service teachers and assist with basic instructional tasks. As candidates gain more experience working in classroom settings, their fieldwork and clinical practice spiral to match.

Purdue has multiple partnerships within the local area, the state, and nationwide. The standard agreement and partnership are articulated through our Affiliation Agreement. This document details the roles of both the Office of Clinical Practices and the partner school corporations. Purdue ensures mutually beneficial partnerships in a variety of ways. The tuition credit voucher program is in its twenty-sixth year. It is a way of saying "thank you" to school corporations for the mentorship they provide to Purdue students in early field experience courses. A tuition credit voucher allows a teacher to take a class at Purdue for free.

The Innovation Initiative, the complete revision of our undergraduate teacher licensure program, launched a new component of clinical experience, beginning in the 2021-2022 academic year. For the first time, our teacher candidates had structured engagement with non-school community partners. The College worked with over 60 local agencies, non-profits, and youth organizations so our candidates could gain first-hand experience and knowledge with local k-12 students and their families outside of a school setting.

To ensure close relationships and participation in the assessment and decision-making process of clinical experiences, the COE sponsors the Teacher Education Advisory Board (TEAB). The charge and design of this board are outlined below:

Purpose of Advisory Board: to participate in and collaborate with the Teacher Education Program (TEP) at Purdue on decisions related to the development, implementation, and revision of its programs and operations, particularly clinical partnerships and practice to ensure P-12 student learning.

In the Spring of 2022, the Teacher Education program hosted the inaugural Rural Education Summit. This gathering of rural school administrators, teachers, and stakeholders examined the challenges and opportunities facing the schools and communities in underfunded rural areas. The summit presented directly applicable research and practices to address the needs of English learners, gifted populations, and the teacher shortage pipeline. One outcome of the summit was the award of an Indiana Department of Education "Attract, Prepare, and Retain" grant. Intentionally designed to collaborate with partners in rural districts, the goal is to pilot and expand the 121 GYO program in order to increase the number of rural and first-generation students as well as other underrepresented populations enrolling in educator preparation programs.

The Susan Nierstheimer Memorial Book Fund: During the 2021-22 fiscal year, the Susan Nierstheimer Memorial Book Fund was able to deliver 2,358 books to 262 students from

six different local schools.

Since 2006, the Susan Nierstheimer Memorial Book Fund has gifted over 13,000 books to nearly 3,000 students from various central Indiana elementary schools.

Each year, first graders that have participated in school-based reading intervention programs receive books to recognize their progress and encourage them to continue to develop their reading skills. The books are purposefully chosen from children's literature to facilitate the students' progress.

This year, with help from College of Education faculty members, nine new titles were selected to deliver to each child. The bags included six books that the student should be able to read independently and three that could be read to them. Also included were two nonfiction books and one book that is in both Spanish and English. The new titles chosen were:

- *Big Red Barn* by Margaret Wise Brown
- *The Very Busy Spider* by Eric Carle
- *Mi Corazon se Llena de Alegria/My Heart Fills with Happiness* by Monique Gray Smith
- *Biscuit* by Alyssa Satin Capucilli
- *Let's Go Mo* by David A. Adler
- *Wemberly Worried* by Kevin Henkes
- *One is a Pinata: A Book of Numbers* by Roseanne Greenfield Thong
- *Same & Different* by National Geographic
- *I Believe I Can* by Grace Byers
- *Alma and How She Got Her Name* by Juana Martinez-Neal

As always, the books were presented in the familiar bright blue bag imprinted with the book fund logo. Each book includes a custom bookplate with the following inscription: "A gift for you from the Susan L. Nierstheimer Book Fund. Fulfilling a dream by putting books in the hands of children."

Asunda, Paul, Faculty in Engineering and Technology Teacher Education

- NSF (2022), \$199,996: Research Initiation: Developing Spatial Visualization and Understanding of Complex Systems via Interactive Mixed Reality Modules: The Professional Formation of Engineers: Research Initiation in Engineering Formation (PFE: RIEF): Dr. Paul Asunda, is a coPi as well as mentoring (Dr. Farid Breidi -PI) on this project. Spatial visualization is the ability to mentally maneuver two- and three-dimensional objects, and thus is an essential skill for engineering technology students. Research shows that students with poor spatial-visual skills feel discouraged because they cannot complete tasks that seem easy to their colleagues. Consequently, the lack of spatial visualization skills may negatively

impact students' performance. This research demonstrates a digitized-based technique to develop spatial visualization in engineering technology students. The research will examine the efficacy of integrating state-of-the-art MR technology into advanced engineering technology courses. Interactive MR modules will be employed as a pedagogical tool to study and enhance students' visualization skills. The proposed research will have a broader influence that benefits society in different aspects, including (1) developing spatial visualization skills that are needed in everyday life situations, (2) advancing the infrastructure of STEM instruction and research, and (3) progressing discovery and promoting learning through the implementation of interactive visual representations.

Bryan, Lynn, Faculty in Physics Education and Director of CATALYST

- U.S. Department of Education (2022) \$5,177,290: The Indianapolis STEM Teacher Residency (ISTR) Program is a collaborative partnership between Indianapolis Schools (IPS) and Purdue University, led by Drs. Lynn Bryan (PI) and Selcen Guzey (Co-PI). The overall vision of the ISTR Program is to strengthen the educational outcomes of students IPS by preparing culturally competent, highly qualified career STEM teachers who will elevate student achievement in middle and high school science (including computer science), technology, engineering, and mathematics. ISTR participants complete an Interdisciplinary Master of Science degree in Secondary STEM Education with Initial Licensure and the K-12 Integrated STEM Graduate Degree Certificate within 18 months. Participants also complete an academic year-long residency in an IPS school. Immediately after completing residency, state licensure requirements, and university coursework, ISTR teachers are employed full-time in IPS.
- NSF (2022) \$2,641,415: 2022 was a no cost extension year. Teachers received professional development in science content as well as the pedagogical content knowledge for teaching states of matter and phase changes using modeling-based, discourse-rich science instruction that includes iPads and a tool called the Thermoscope. In addition, teachers taught the unit over the course of 4 weeks in their Kindergarten classroom, while my team provided materials set-up, instructional coaching, and just-in-time teaching support.
- General Motors (2022) \$10,000: With funding from General Motors, we partnered with Wabash Valley Education Center to provide opportunities for 4th and 5th-grade students to learn, explore, and engage in inquiry-/project-based STEM activities. Students participated in Robot Artist and Wildlife Rehabilitation in Spring 2022 and Clean Cut and Emergency Flashlight in Fall 2022. Purdue graduate student volunteers from the College of Education led these engaging, designSTEM sessions.

Case, Amanda, Faculty in Counseling Psychology

- U.S. Agency for International Development. (4/1/21-7/31/23). \$1,061,309. Dr. Case role: Technical Advisor (\$15,000) Pambas, T., Raman, A., & Yih, Y. R. Tanzania Early Grade Social and Emotional Skills and Phonics-Based Literacy Learning Agenda, Long-term Assistance and Services for Research (LASER) Partners for University-Led

Solutions Engine (PULSE), PRIME AGREEMENT NO. AID-7200AA18CA00009.

Exter, Marisa, Associate Professor of Learning Design and Technology, Curriculum & Instruction

- National Science Foundation (2021-2024) app. \$3,100,000: “Collaborative Research: IUUSE: A Data-Driven Employer-Academia Partnership for Continual Computing Curricular Change.” This multi-institutional grant includes PIs from Purdue University, as well as George Washington University, Rochester Institute of Technology, Tuskegee University, University of Alabama, University of Illinois, and University of New Hampshire. Dr. Exter is the Purdue PI. She was initially responsible for \$527,620 to fund work done at Purdue. In December 2022, she received \$104,995 in additional funding to assist in the creation of instructional materials to be freely shared with computing educators across the United States and around the world. This grant is founded on research on competencies required by computing professionals, which is conducted by a Purdue team including Postdoc Shamila Janakiraman, Research Assistant Deepti Tagare, and volunteer graduate students Suzhen Duan, Ankita Kotangale, and Jafar Tavakoli. The team has also held workshops for University of Alabama and Tuskegee University and created instructional materials which are being piloted in those two institutions but will be shared freely online. The additional staff that are funded from 2023-2024 will aid in creating more instructional materials, while the Purdue team also continues to conduct research.

Guzey, Siddika Selcen, Faculty in Science Education

- NSF (2022) No cost extension year: Professional development program. This is an online program for inclusive middle school science teachers. Purdue collaborated with Tippecanoe School Corporation, Rossville Schools, and Anderson Schools.

Newby, Tim, Faculty in Learning Design and Technology

- Indiana Governor’s Emergency Education Relief Fund (GEER) (03/2020-09/2022). \$1.6M. *Becoming an Online Teacher Even When I Didn’t Sign Up for It*. During the pandemic, it became necessary for P-12 teachers to be able to efficiently convert much (if not all) of their classroom instruction from face-to-face to hybrid and online. A hybrid and online teaching hub was created that offered teachers support, instruction, guidance, and materials to facilitate their efficient and effective transition to hybrid and online class instruction.

Obenchain, Kathryn & Barce, Jennifer, Associate Dean for Learning, Engagement, & Global Initiatives and Assistant Dean for Teacher Education

- Indiana Department of Education (2022) (\$916,453) *1-2-1 Grow-Your-Own Teacher Pipeline Program (121 GYO)*. This grant is designed to aid Indiana’s schools and community partners in supporting local initiatives to attract and retain educators in school buildings across the state. The proposed program will 1) expand our 121 GYO pilot for elementary and special education programs to additional rural school districts and 2) expand to secondary level content area licensure programs, with an

emphasis on the STEM areas, as Purdue continues to roll out its revised curriculum and in anticipation of two semester/full year student teaching beginning in the fall of 2024. Program partners include five schools from four school corporations: Tippecanoe School Corporation (TSC), Frontier School Corporation, Clinton Central School Corporation, and Whitley County School Corporation. Three of these corporations are designated as rural schools (locale codes 41 and 42).

Rapoport, Anatoli, Faculty in Social Studies Education

- US Department of State (2022) Part of \$250,000: Benjamin Franklin Transatlantic Fellowship (BFTF). This is a 4-week international summer program for 55 students from 46 countries. It includes academic, social, and cultural components. The program impacts 55 students from 46 countries and 110-120 Indiana residents (host families). Indirectly – 1200-1500 students in the U.S. and Europe through community projects developed and conducted by BFTF alumni.
- Office of VP of Engagement (2022) (Funds on my discretion): GK-12/ Graduate Engagement in K-12. Involvement of graduate students in education; introduction of Middle School students to research; university – local school collaboration

Wang, Hui Hui, Faculty in Agricultural Education

- In partnership with Purdue Polytechnic High School, Dr. Hui Hui Wang (PI) and co-PIs Drs. Neil Knobloch, Roger Tormoehlen, Betty Feng, Petrus Langenhoven are leading this project (2019-2022, \$20,000) that combines developing problem-solving skills and entrepreneurial thinking through Incubation Design Challenges (IDCs) in high school classrooms.
- WHIN with Local STEM is a \$ 65,649 project (2019-2022) led by Dr. Hui Hui Wang, with co-PIs Drs. Neil Knobloch, Roger Tormoehlen, Betty Feng, and Petrus Langenhoven developed a data-based integrated STEM learning experience with high school teachers/students. WHIN with Local STEM partnering schools include: Benton Central High School, Frontier High School, TriCounty High School

Wessel Powell, Christy, Faculty in Literacy and Language

- Indiana Department of Education Grant totaling \$1,123,774 for three school districts from 2021-2023; collaborators include five co-PIs in the College of Education and 12 school district leadership collaborators in TSC, LSC, and Frankfort Schools.
- Spencer Foundation Research Practice Partnership, three years (2021-2023) \$400,000: Hearts and Minds Campaign for Equity Hub. My Role: PI, responsible for 33%, in collaboration with Indiana University, University of South Florida, and community partners.
- College of Education CLEAR prior funding, faculty grants from state and federal Departments of Education (2022-23) The College of Education CLEAR carryover: \$143,000 over 3 years; LLDC IDOE grant: \$26,000; PILAR ELL USDE grant: \$20,000; The Center for Literacy and Language Education and Research commits to enhancing the overall quality of literacy and language instruction for PK-12 students through its research, policy transformation, and high-quality teacher development. While the

Center focuses primarily on research and dissemination of findings, its activities also include attention and resources for teaching/learning and providing services for schools and educators. The Center aligns with Purdue's College of Education as a "national leader in modeling and nurturing sustainable educational practices and systems for a just society and better world through inclusive excellence, scholarship of discovery, learning, engagement, and development of human potential" specific to literacy and language education (from the College of Education strategic plan Vision, 2021). This includes: (1) Research and dissemination, (2) Teaching and learning, (3) Services for schools.

Signature Programs and Centers

Evaluation and Learning Research Center (ELRC)

Active Evaluation And Learning Research Center Projects:

- **PERU-Hub**, with over \$15,000,000 in funding from USAID, PERU-Hub will enhance the capacity of higher education institutions in Peru to engage in participatory development research that works with farmers and producers to create and use research that enhances the biodiversity of the Amazon, the engagement of native and women farmers, and the quality of life for farmers in the Peruvian Amazon. Through the USAID funded LASER
- **The Arequipa Nexus Institute for Food, Water, Energy, and the Environment** project (\$83,000), Arequipa Nexus Institute is a partnership between Purdue and Universidad Nacional de San Augustin to build capacity and the strategic, long-term collaborations needed to address key environmental, agroeconomic and social challenges that will support development of adaptive, profitable and sustainable food energy-water systems in the Arequipa region of Peru
- **LASER Evaluation of Accelerated Education Programs in Somalia** (\$3.6M), This project will examine the effectiveness of educational models in Somalia to allow USAID and the Somali Ministry of Education and Higher Education to make data-driven decision-making about replication and scale-up and to provide foundational data that informs benchmarking and policy decisions.
- **Long-Term Assistance Services for Research (LASER) PULSE** (\$20,000,000), LASER (Long-term Assistance and Services for Research) PULSE (Partners for University-Led Solutions Engine) is funded through USAID's Innovation, Technology, and Research Hub, to deliver research-driven solutions to field-sourced development challenges in USAID interest countries. ELRC engaged with International Programs in Agriculture to develop and deploy an
- **LASER Buy-In: Building the Evidence Base on Effective Public-Private Sector Engagement** (\$1,012,422R), this project examined influential factors leading to positive and productive relationships among USAID, stakeholders, and the private

sector through synthesis of detailed desk reviews of the literature from both business management and social science perspectives.

- **Intercultural assessment of an undergraduate overseas STEM research experience for U.S. students** (\$2000), This project will explore the impact of an international research experience on cultural competencies, attitudes and beliefs, and career plans of undergraduate students.
- **Sustainable Medicines in Africa Project** This collaboration between Purdue University and the Kilimanjaro School of Pharmacy focuses on capacity development for the manufacture of quality medicines in Africa, by and for Africans. The project is developing, evaluating and implementing an educational ecosystem that supports the enhancement of regulatory and technical competency of African professionals, the creation of a collaborative culture for drug quality in manufacturing and regulation and accelerating and sustaining innovations in drug manufacturing developed by African professionals. The ELRC is contributing our expertise in development and evaluation of high impact educational practices, as well as, the monitoring and evaluation of learning networks for capacity development in underserved and under-resourced communities.

Gifted Education Research and Resource Institute (GER²I)

GER²I's mission is the holistic development of giftedness, creativity, and talents among individuals throughout their life span. GER²I delivers enrichment programs for gifted, creative, and talented youth; graduate programs for future scholars and leaders; professional development and coursework for educators of gifted, creative, and talented students and cutting-edge research in psychology and education related to giftedness, creativity, and talent development.

GER²I's strategic plan area of engagement focuses on the intention to: **Build educational and financial partnerships to effectively meet the local, state, national, and global challenges in development of giftedness, creativity, and talent.** Highlights of the four engagement goal results are shown below.

Engagement 1. Establish and support exemplary talent development experiences for P-12 students and educators (innovative strategies to enhance academic and affective development; PD to GER²I program staff; secure DIGS funding; GER²I visibility;)

- HOPE+ grant activities
- Graduate assistants continue to be involved in program delivery.
- We have a continued Shell partnership in Chicago with the Murray Language Academy, and we were able to extend STAR/PULSAR scholarships to participants due to the Haviland Whiting Scholarships.
- INSTEM Project (funded by Jacob Javits Gifted and Talented Students Education Act) involves professional development opportunities for teachers and talent development programs for students in middle and high schools.

Engagement 2. Expand, state, Native American, and international components in programs and research (partnerships, active in organizations/agencies)

- Formalized partnership with Sault Ste Marie Ojibwe.
- Formalized partnership with Korean Department of Education, proposed professional development institute at the request of Busan Metropolitan City Institute for Gifted Education and Promotion
- Current Partnerships:
- Arizona: Ganado, Lukachukai, (Navajo Nation)*, Arizona State University*, Young Scholars Academy; Deer Valley Unified School District
- Brazil: State University of Sao Paulo* (UNESP) and Universidade Catolica Dom Bosco (UCDB)*
- Chile: Universidad Catolica del Norte*, Antofagasta; Universidad de Los Andes, Santiago
- China: Beijing Hope Star (Xiaodong); Jiangsu Tianyi High School, China; RDFZ School (Beijing); HiElites (USA & Guangzhou Province)
- Colombia, Ruta N, Medellin; Columbus School, Envigado; Secretary of Education, Medellin; National University of Colombia
- Greece, Thessaloniki
- Illinois: Morton Grove; Murray Language Academy*
- India through www.ei-india.com
- Indiana: Attica*, Benton County*, Blue River Valley*, Brownsburg, Cedar Lake, Crawfordsville*, Danville*, Delphi*, Evansville, Frankfort*, Hamilton Heights, Indianapolis, Lafayette*, Tell City*, Tippecanoe County*, Tipton, West Lafayette*
- Jordan: Yarmouk University
- Korea: Korean Science Academy; Korean Academy for Gifted Education; Gwangju Science Academy, Korea; Korean Department of Education, Soonchunhyang University
- Michigan: Bahweting Anishnabe Public School Academy, Sault Ste. Marie*; Downtown Boxing Gym, Detroit*
- Minnesota: Mille Lacs Band of Ojibwe*
- (The) Netherlands: Radboud University
- New Mexico: Navajo Prep, Farmington; San Juan College High School
- South Dakota: McLaughlin (Standing Rock Reservation)*
- Spain: Campion International
- Texas: Houston Independent School District
- Tennessee: Memphis, REACH; Nashville, Vanderbilt University*
- Saudi Arabia, Mawhiba International Programs
- TSCG sites in GA, IA, IL, IN, MN, NE, OH, SC, WI*
- Los Angeles Unified School District (1 elementary and 1 middle school)
- Houston Independent School District (1 middle school, 1 high school)
- Herberger Academy at Arizona State University
- Private schools and agencies: Bridges Academy, Los Angeles; The Summit Center, Walnut Creek, CA

Note. * Indicates research *and* engagement partnership

Engagement 3. Develop cross-cultural materials and workshops related to GCT studies (diversity training for staff and students; focus on underserved populations and talent development)

- MCA-Arabic validation study published, and it has been translated into Spanish and is being translated into Turkish.
- TSCG is in Arabic. HOPE scale in Arabic
- MCA-Korean; SPOCQ-Korean; LSI-Korean; MCA-Chinese; SPOCQ-Chinese, HOPE Scale-Korean (See Appendix E).
- HOPE+ Scale and Technical Manual are being used and presented by others, as well as translated and validated in Spanish.
- Certificate in Gifted, Creative and Talented Studies is in full operation.

Engagement 4. Emphasize talent development of P-12 students and their educators in Indiana

- Sponsor Hazel Feldhusen Classroom Teacher Award at IAG each year.
- GER²I graduate students serve as TA in undergraduate programs in Purdue teacher education.
- Formal professional development in 2019 in Morton Grove, IL and local schools (not including TSCG sites).
- INSTEM Project included partnerships with two schools in Indiana (Tell City and Danville): Professional development for teachers and talent development programs for middle and high school students.
- Kristen represents GERI well in Indiana and at Purdue as follows
 - Board of Directors, Indiana Association for the Gifted, summer 2019 - present
 - High Ability Virtual Learning Task Force, Indiana Department of Education, fall 2020 - present
 - Purdue College of Education Teacher Preparation Program Reform Work Group, June 2019–present
 - Faculty Preceptor, Purdue Honors College, fall 2020 - present
 - Purdue University Libraries Committee Member, June 2019 – present
 - Purdue College of Education/EDST Department Representative, Curriculum Committee Member, fall 2018 – present
- GER²I faculty and staff frequently speak to groups about GCT

Center for Advancing the Teaching and Learning of STEM (CATALYST)

The Center for Advancing the Teaching and Learning of STEM (CATALYST) focuses on improving STEM (science, technology, engineering, mathematics) education for students from preschool to college. CATALYST (1) conducts theoretically grounded research that contributes to our understanding and advancement of K-12 STEM education; (2) develops partnerships and research collaborations with other institutions, businesses, and agencies that support the advancement of K-12 STEM teaching and learning; and (3) informs policy and public support of STEM teaching and learning at the local, national, and global levels. In this document, we report the major engagement-related activities conducted by CATALYST from January 1, 2022 to December 30, 2022.

2022 Indiana STEM Education Conference

CATALYST sponsored the seventh annual Indiana STEM Education Conference on January 13, 2022. The theme for the 2022 conference was “STEM Education: Making Giant Leaps.” The 2022 Indiana STEM Education Conference provided opportunities for participants to learn about effective STEM education strategies, curricula, and resources to help teachers and students solve significant problems through STEM education. Our keynote speaker was Dr. Briony Horgan, Associate Professor of Planetary Science and a scientist on NASA’s Mars rover Perseverance. We engaged 10 Purdue undergraduates and 20 Purdue graduate students in the conference activities. And more than 420 STEM teachers/educators from the following 72 school districts attended the 2022 conference:

- Archdiocese of Chicago
- Archdiocese of Indianapolis
- Attica Consolidated School Corporation
- Beech Grove City Schools
- Benton Community School Corporation
- Carroll Consolidated School Corporation
- Center Grove Community School Corp.
- Clinton Central School Corporation
- Crawford County Comm. School Corp.
- Danville Community School Corporation
- DeKalb County Central United School District
- East Washington School Corporation
- Edinburgh Community School Corp.
- Evansville Vanderburgh School Corp.
- Faith Christian School, Lafayette
- Frankton-Lapel Community Schools
- Gary Community School Corporation
- Goshen Community Schools
- Greater Clark County Schools
- Greenwood Community School Corp.
- Hamilton Southeastern Schools
- Horizon Christian School, Marion
- Indiana Math and Science Academies
- Indianapolis Public Schools
- Jennings County School Corporation
- Kankakee Valley School Corporation
- Kokomo School Corporation
- Lafayette Catholic Schools
- Lafayette School Corporation
- Lake Central School Corporation
- LaPorte Community School Corporation
- Lebanon Community School Corp.
- Lewis Cass Schools
- MSD Bluffton-Harrison
- MSD Decatur Township
- MSD Lawrence Township
- MSD Martinsville Schools
- MSD North Posey County Schools
- MSD of New Durham Township
- MSD Washington Township
- MSD Wayne Township
- Noblesville Schools
- North Lawrence Community Schools
- North Vermillion Comm. School Corp.
- Plainfield Community School Corp.
- Portage Township Schools
- Purdue Polytechnic
- Randolph Central School Corporation
- Richland-Bean Blossom Comm. Schools
- Salem Community Schools
- School City of East Chicago
- School City of Hammond
- Shelbyville Central Schools
- Sheridan Community Schools
- South Knox School Corporation
- Southwest Dubois County School Corp.
- Southwest Parke Comm. School Corp.
- Tell City-Troy Township School Corp.
- Tippecanoe School Corporation
- Tri-Central Community Schools
- Twin Lakes School Corporation
- Union Township School Corporation
- Warrick County School Corporation
- Washington Community Schools
- Western School Corporation
- Westfield-Washington Schools

- Maconaquah School Corporation
- Medora Community School Corporation
- Merrillville Community School Corp.
- Michigan City Area Schools
- Yorktown Community Schools
- Whitley County Consolidated Schools
- Yorktown Community Schools
- Westfield-Washington Schools
- Whitley County Consolidated Schools

2022 DESIGN STEM Virtual Kids Conferences

CATALYST’s virtual DESIGN STEM Kids Conferences were held virtually on May 12 and 13, 2022, and November 10 and 11, 2022. With funding from General Motors, we partnered with Wabash Valley Education Center to provide opportunities for 4th and 5th-grade students to learn, explore, and engage in inquiry-/project-based STEM activities. In the spring, students participated in Robot Artist and Wildlife Rehabilitation. In the fall, students participated in Clean Cut and Let There Be Light. Purdue graduate student volunteers from the College of Education led these engaging, make-and-take STEM sessions during the two-day event.

In the spring, 29 teachers and 713 students participated from the following school districts:

- Clinton Central School Corporation
- Covington Community School Corp.
- Delphi Community School Corporation
- Kankakee Valley School Corporation
- MSD Warren County
- North Montgomery School Corp.
- Tri-Central Community Schools
- Union Township School District
- West Lafayette Community School Corp

In the fall, 20 teachers and 446 students participated from the following school districts:

- Attica Consolidated School Corporation
- Benton Community School Corp.
- Covington Community School Corp.
- MSD Warren County
- North Montgomery School Corp.
- Peru Community Schools
- Pioneer Regional School Corporation
- West Lafayette Community School Corp

CATALYST Network

In 2022 CATALYST launched the CATALYST Network, a communication network designed to share opportunities in STEM education with K-12 teachers and schools. Since the network began at the end of 2022, 50 teachers have joined and received information about 5 STEM programs.

Characterizing How Teachers Design Engaging Learning Environments in STEM Education

Funded by the National Science Foundation (\$325,009), Characterizing How Teachers Design Engaging Learning Environments in STEM Education is a Building Capacity in STEM Education Research Project. Dr. Paul Asunda, PI, is investigating teachers’ conceptions of integrated STEM teaching and learning and how their conceptions influence the design of classroom experiences that engage students in these learning environments. To date, Dr. Asunda has collaborated with eight rural and diverse K-12 Indiana schools (9 teachers and 300+ students) designated as STEM teaching schools by the Indiana Department of Education. The findings are anticipated to identify critical methodological issues and theoretical links

between integrated STEM instruction and learning environments that support student engagement for future research efforts, including teacher professional development opportunities in STEM education and student career choices in STEM fields.

Citizen Detective

Citizen science provides the public with a unique experience in critical thinking, reasoning, and active learning and yields more scientifically literate individuals. Incorporating younger learners into citizen science promotes scientific knowledge, encourages nonscientists to be involved in a new learning process, and drives more significant interest in STEM disciplines and careers. This project, led by Dr. Hui Hui Wang and funded by a Purdue AgSEED grant (\$ 49,747.11), aims to develop a Citizen Detective education program that can be incorporated into middle and high schools and 4-H curricula. The Citizen Detective program will introduce forensic science as a means to explore different fields in STEM, employ a flipped classroom approach to learning with online modules and in-person experimental design and implementation, and evaluate the program's effectiveness in learning, career inspiration, hypothesis testing, and evidence-based reasoning.

Co-Developing a Curriculum Coherence Toolkit with Teachers (C3T2)

Co-Developing a Curriculum Coherence Toolkit with Teachers (C3T2) is an NSF-funded collaborative research project with mathematics education faculty and graduate and undergraduate students at Duquesne University, Michigan State University, and the University of Arizona. The research team, led by PI Dr. Jill Newton, seeks to understand how upper elementary teachers make decisions about their mathematics curriculum in the context of the limitless availability of online resources. In this study, the research team investigates how teachers use curriculum materials, think about curricular coherence, and how their decisions about curriculum lead to student learning. In Phase I of the project, they conducted a national survey of teachers to understand the range of curriculum contexts in which teachers work and the decisions teachers make when they select and adapt curricular resources. The team is currently working on Phase II of the project in which they have, to date, conducted individual and focus group teacher interviews at two elementary schools in diverse curricular contexts to explore both the quantitative and qualitative aspects of the teachers' mathematics curricular decision-making. Preliminary findings indicate teachers' use of multiple (as many as 14) mathematics curricular resources to provide rigorous and engaging mathematical experiences for their students, including (a) traditional online textbook resources (e.g., enVision); (b) supplementary applications (e.g., BrainPOP); (c) assessment resources (e.g., Edulastic); (d) online lessons created by teachers (e.g., Teachers Pay Teachers); and (e) self-created teacher materials. We are currently exploring the rationale (i.e., why) and strategies (i.e., how) for teachers' use of these curricular materials. Findings from this study highlight the complex curriculum work enacted by elementary teachers as well as the need for teacher support to assist in the navigation of mathematics curricular resources; they also have the potential to provide valuable insights for curriculum designers.

Co-Robots to Enhance Motivation and Self-efficacy in Formal STEM Education

Dr. Nathan Mentzer and a team of colleagues recently launched the project, *Co-Robots to Enhance Motivation and Self-efficacy in Formal STEM Education*. Funded by the National Science Foundation, this project is a partnership between high school teachers in Indiana, the Purdue College of Engineering, and the Purdue Polytechnic Institute. Teachers collaborate

with the Purdue team to learn ways of increasing and enhancing robotics instruction in high school schools, with the goal of attracting and sustaining underrepresented students' interest in STEM as well as developing awareness of STEM careers. Teachers will contribute to piloting, optimizing, and testing the efficacy of the robotics curriculum and associated robotics hardware. More than 20 teachers from Indiana and Georgia and over 1500 public-school students from diverse backgrounds will be reached. *Co-Robots to Enhance Motivation and Self-efficacy in Formal STEM Education* is broadening the participation of underrepresented students in engaging STEM learning experiences, including females and ethnic/racial minorities, by employing high-interest fields such as assistive and rehabilitation robotics, meaningful learning contexts such as improving human life, and hands-on learning facilitated with human-interactive robots. This project is funded in the amount of \$746,412 from NSF's National Robotics Initiative 3.0: Innovations in Integration of Robotics program and the Innovative Technology Experiences for Students and Teachers (ITEST) program, which supports projects that build understandings of practices, program elements, contexts and processes contributing to increasing students' knowledge and interest in STEM.

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Cultivating a National Collaborative for Research on Food, Energy, and Water Education

In this \$749,964 NSF-funded grant, Dr. Hui Hui Wang (Co-PI), along with collaborators Cory Forbes (PI, University of Texas Arlington), Nicole Sintov (Co-PI, The Ohio State University), and Hannah Scherer (Co-PI, Virginia Tech), will cultivate a new, transdisciplinary community, the National Collaborative for Research on Food, Energy, and Water Education (NC-FEW). NC-FEW is a hub of innovation for education research on FEW-Nexus educational programs at many levels (K-12, postsecondary, adults) and settings (formal and informal). The project will directly impact an estimated 600 educators and education researchers (postsecondary faculty, K-12 teachers, informal educators) from diverse institutions and a variety of learners in various educational settings. This Research Coordination Network (RCN) will enhance

educational programs grounded in the FEW-Nexus. The RCN will benefit society by improving STEM/FANH science literacy through educational innovation and capacity building around an important sustainability challenge.

Developing Spatial Visualization and Understanding of Complex Systems via Interactive Mixed Reality Modules: The Professional Formation of Engineers

Dr. Paul Asunda, CoPI, and Dr. Farid Breidi, PI, will examine the efficacy of integrating state-of-the-art mixed reality (MR) technology into advanced engineering technology courses. In this National Science Foundation-funded project (\$199,996), interactive MR modules will be employed as a pedagogical tool to study and enhance students' visualization skills. The proposed research will have a broader influence that benefits society in different aspects, including (1) developing spatial visualization skills that are needed in everyday life situations, (2) advancing the infrastructure of STEM instruction and research, and (3) progressing discovery and promoting learning through the implementation of interactive visual representations.

Development and Assessment of an Online Fatigue Training Program

Dr. Paul Asunda (Co-PI), in collaboration with a team of professors in Purdue's School of Aviation and Transportation Technology and Embry Riddle Aeronautical University in Florida, is developing curriculum training materials based on findings from research focused on mitigating fatigue in professional flight students. The curriculum consists of three modules, (a) causes and symptoms of fatigue, (b) best practices for sleep and a healthy lifestyle, and (c) decision-making related to what student pilots may face today and what they may face in the future workplace. This fatigue training program is anticipated to change behaviors in over 1000 Purdue students. In addition, it will help student pilots develop healthy lifestyle habits and decision-making skills as they become safer student pilots at Purdue University and across the broader aviation community. This project is funded by a \$12,000 seed grant through the PPI.

Engineering by Design Workshops

CATALYST is in its third year of offering *Engineering by Design* workshops for Purdue University undergraduate elementary education majors and the first year of providing *Engineering by Design* workshops for secondary STEM teachers. *Engineering by Design* (EbD) is a program developed by the International Technology and Engineering Education Association (ITEEA). Led by Dr. Nathan Mentzer, first-grade teacher Tracy Young (Little Falls School District, New York), and Ryan Nixon from ITEEA, workshop participants engage in project-based, inquiry-based integrated STEM instruction while learning how to teach lessons from the EbD curriculum, which is based on the Standards for *Technological and Engineering Literacy*, as well as national standards for science and math and the NAE's Grand Challenges for Engineering. Workshop completers received a Technology, Engineering, Environment, Mathematics, and Science TEEMS certificate, a complimentary subscription to *Technology and Engineering Teacher*, ITEEA's flagship publication, and one-year access to the entire EbD curriculum. To date, 23 Purdue students have completed the workshop and are classroom-ready to implement integrated STEM lessons.

Environmental-STEM (E-STEM)

Environmental-STEM, or E-STEM, is a collaboration between CATALYST (Lynn Bryan, Director), Grand Universe (Greg McCauley, COE), NASA, and Westfield-Washington School District (John Atha, Assistant Superintendent) that was launched in 2022. Dr. Bryan leads a group of graduate students in developing middle school-level integrated STEM units that utilize NASA's Earth Systems Observatory resources. These units align with the most recent Indiana Academic Standards for science and engineering and will be tailored to WWSD middle school teachers' classrooms. The unit will be piloted and learning research conducted beginning in Fall 2023. Dr. Bryan is currently seeking funding for the project.

Expanding Accessibility of Learning through Blended Synchronous Instruction of F2F and Remote Students

Expanding Accessibility of Learning through Blended Synchronous Instruction of F2F and Remote Students is a 3-year, \$599,980 grant funded by the National Science Foundation. The goals of the project are to (1) develop, test, and use teaching practices and curricular innovations that will engage students and improve learning, persistence, and retention in STEM, and (2) implement and sustain highly effective STEM teaching and learning in colleges and universities. The project team, led by Dr. Nathan Mentzer, will examine active learning strategies in blended synchronous instructional environments to further define HyFlex as an educational model, optimize the approach, and study the efficacy of student learning and sense of community. This project will annually impact at least 1,500 and 10 graduate students during the project period but have a growing and lasting impact long after the project has ended.

Feed the Future Innovation Lab for Food Safety

Dr. Hui Hui Wang (Co-PI) is a member of a Purdue University–Cornell University collaboration of scientists developing programs to improve food safety in Bangladesh, Kenya, Ethiopia, Senegal, and Cambodia. This project is funded by a \$ 9,989,774 grant from the U.S. Agency for International Development (USAID) to establish what is said to be the first-ever Feed the Future Innovation Lab for Food Safety.

Foregrounding High School Mathematics in Project-Based Learning

In partnership with Purdue Polytechnic High School, Dr. Elizabeth Suazo-Flores (co-PI), Rachael Kenney (PI), and co-PI Signe Kastberg collaborated with co-PIs Sarah Leach (PPI-SB), Fay Barber-Dansby (PPI-Anderson), and Jeff de Varona (PPHS) to infuse project-based learning in mathematics high school classrooms (2021-2022, \$20,000). Video recordings of mathematics teaching were used to develop the content of an in-person professional development for mathematics teachers in PPHS South Bend.

GEMS: Girls Excelling in Math and Science

GEMS (Girls Excelling in Math and Science) clubs were started in 1994 by Purdue alumni Laura Jones to encourage students, especially girls, to pursue education and careers in STEM fields. GEMS clubs strive to ensure that children see themselves as change agents or problem-solvers, possible technology entrepreneurs, engineers or scientists, and people who make a difference. CATALYST adopted GEMS in 2018. In 2022, the first GEMS club was launched in an Indianapolis Public School. A group of 16 girls from Grades 3 and 4 at Lew Wallace Elementary school worked with the Purdue GEMS team on activities to develop STEM practices. In 2022, the Purdue GEMS team was comprised of graduate students Yi Zhu and

Lisa Nuguid, undergraduates Grace Gochnauer and Meredith Chasse, and led by Drs. Jill Newton, Signe Kastberg, Elizabeth Suazo-Flores, and the GEMS founder, Laura Jones.

Indianapolis STEM Teacher Residency

This \$5.1 million project, funded by the U.S. Department of Education, is a collaborative partnership between Indianapolis Public Schools (IPS) and Purdue University and is led by Drs. Lynn Bryan (PI) and Selcen Guzey (Co-PI). The *Indianapolis STEM Teacher Residency* (ISTR) Program aims to strengthen the educational outcomes of students in the largest urban school district in Indiana, IPS, by preparing culturally competent, highly qualified career STEM teachers who will elevate student achievement in middle and high school science (including computer science), technology, engineering, and mathematics. The ISTR program is designed for prospective science and mathematics teachers with a bachelor's degree in a STEM-related field. ISTR participants will complete an Interdisciplinary Master of Science degree in Secondary STEM Education with Initial Licensure and the K-12 Integrated STEM Graduate Degree Certificate within 18 months. Participants complete a year-long academic residency in an IPS school as part of the Interdisciplinary Master of Science degree in Secondary STEM Education with Initial Licensure. Immediately after completing state licensure requirements and university coursework, ISTR teachers will be employed full-time in IPS. The 2022 cohort consists of one prospective teacher. Partnering schools in IPS include Arsenal Tech High School, Longfellow Middle School, and George Washington High School.

Industry-Driven Integrated STEM and Systems Approach to Innovative Incubation

Industry-Driven Integrated STEM and Systems Approach to Innovative Incubation is a U.S. Department of Agriculture/National Institute of Food and Agriculture grant (2020-2024) in which Purdue scientists from the College of Agriculture co-develop agriculture and iSTEM educational materials that are solidly grounded in agro-ecosystem thinking. This project aims to increase rural high school teachers' agriculture and STEM literacy teaching capacity and equip high school students' system thinking and data-based decision-making skills by solving industry-based, real-world agricultural design challenges from pre-harvest to post-harvest themes. Dr. Hui Hui Wang is the PI, and Drs. Neil Knobloch, Roger Tormoehlen, Betty Feng, and Peter Langenhoven are Co-PIs for this \$300,000 grant project. Partnering high schools include LaPorte High School, Portage High School, Purdue Polytechnic High School Englewood, Purdue Polytechnic High School North Campus, Riley High School, Tri-County High School, and West Washington High School.

Integrating STEM Through Food Systems Incubation Design Challenges

In partnership with Purdue Polytechnic High School, Dr. Hui Hui Wang (PI) and co-PIs Neil Knobloch, Roger Tormoehlen, Betty Feng, and Petrus Langenhoven are leading this project (2019-2022, \$20,000) that combines developing problem-solving skills and entrepreneurial thinking through Incubation Design Challenges (IDCs) in high school classrooms.

Integration of Engineering Design and Life Science: Investigating the Influence of an Intervention on Student Interest and Motivation in STEM Fields

Integration of Engineering Design and Life Science: Investigating the Influence of an Intervention on Student Interest and Motivation in STEM Fields (aka PULSE) is a \$1.8 million project funded by the National Science Foundation that involves research, teaching, and engagement. The PULSE team is investigating middle school students' learning of and interest

in Life STEM due to engaging in instruction that integrates science and engineering design. We are developing content-rich, engineering-design-based curriculum units that focus on core life science ideas and practices identified in NGSS (the NGSS Lead States, 2013); providing sustained-contact professional development to allow middle school science teachers to meaningfully integrate engineering in their life science classes; and supporting teachers as they implement the project constructed teaching materials. Purdue faculty and staff involved include Drs. Selcen Guzey (PI), Lynn Bryan (Co-PI), Muhsin Menekse (Co-PI), and Bill Walker. PULSE reached 35 middle school teachers and more than 5500 students over the project's lifetime. The following schools are project partners: Battle Ground Middle School, East Tippecanoe Middle School, Klondike Middle School, Wainwright Middle School, Wea Ridge Middle School, Southwestern Middle School, Highland Middle School (Anderson Community Schools), Frankfort Middle School, Rossville Junior High School, Carroll Junior High School, Delphi Middle School. In 2022, longitudinal data of teacher learning and middle school students' learning and interest development was analyzed.

Learning by Evaluating: Engaging Students in Evaluation as a Pedagogical Strategy to Improve Design Thinking

Learning by Evaluating: Engaging Students in Evaluation as a Pedagogical Strategy to Improve Design Thinking is a 3-year, \$1.26 million grant funded by the National Science Foundation. The project aims to develop, refine, and test an educational innovation in which 9th-grade students evaluate sample work as a starting point in engineering design cycles. The project will work directly with DeKalb County School District in Atlanta, Georgia, and connect to an internationally implemented 9th-grade course offered through the International Technology and Engineering Educators Association STEM Center. The pedagogical strategies emerging from this project could be embedded in other STEM Center courses offered in K-12 classrooms internationally or incorporated by individual teachers in various disciplines through the dissemination of freely available instructional resources. The project team, led by Dr. Nathan Mentzer (PI), combines design education researchers from Purdue, Brigham Young, and the University of Georgia, the director of the International Technology and Engineering Education Association's STEM Center, and the Career Technical and Agricultural Education Instructional Coordinator for the DeKalb County School District. The project engages ten teachers in Georgia. Project outcomes include the development of a research-based curriculum and approximately 500 students this year, which will increase to about 1000 in the next few years.

Math Recovery Project

Dr. Bill Walker (co-PI), Assistant Director of Programs and Partnerships at CATALYST, and Dr. David Feikes (PI), Professor at Purdue University Northwest, were awarded two grants from the Indiana Department of Education (\$140,000, \$173,000) for the *Math Recovery Project*. The *Math Recovery Project* provides teachers with one week of professional development with activities and materials promoting math recovery for high-needs students. The project includes approaches focusing on significant mathematical tasks, social and emotional learning, small-group work and whole-class discussion, and students becoming autonomous learners. The Math Recovery Project started in summer 2021 with seven workshops for 58 teachers who worked with over 1,100 students. In summer 2022, 8 workshops for 76 teachers who worked with over 1,500 students were completed. A final set of workshops are scheduled for summer 2023.

National Institute of Education, Nanyang Technological University, Singapore Exchange

From May 30 to June 3, 2022, CATALYST hosted 11 faculty and preservice teachers from the Department of Natural Science and Science Education in the National Institute of Education at Nanyang Technological University in Singapore (<https://nie.edu.sg/our-people/academic-groups/natural-sciences-and-science-education>). This visit is part of an exchange between Purdue's CATALYST and NIE's MeriSTEM Center to share their common interest in K-12 integrated STEM education research and practices. Activities included a campus tour, seminars on integrated STEM education research, make-it-better engineering activities, and integrated STEM activities at Prophetstown State Park and Wolf Park. Preservice teachers earned a certificate of completion for K-12 Integrated STEM professional development.

James Ackerman Center for Democratic Citizenship

- Purdue University's Constitution Day Celebration, 2005 – present. Professor VanFossen was invited to coordinate the event by the President's Office. Event involves 100s of Purdue students and faculty annually. The Celebrity Quiz-Off returned to in-person and had as participants state representatives, mayors, judges, Purdue student-athletes, as well as key Purdue administrators (Provost, Dean of Students, etc.). The center developed additional Constitution Day curriculum and Kahoot! Quizzes that teachers and students could access to conduct their own Constitution Day celebrations. In addition to the array of booths, the Center also highlighted the Center [YouTube video](#) we created in 2021 (introduced by Pres. Mitch Daniels) of local celebrities reading the Preamble and the Bill of Rights (3rd most popular video on COE YouTube channel over the last 2 years with more than 2,100 views).
- Co-founder and co-coordinator of the [Purdue Series on Corporate Citizenship and Ethics](#). The Series, co-sponsored with Krannert School of Management, has hosted 32 speakers—including author Michael Lewis, Nobel Prize winner Lech Walesa, film-maker Ken Burns, Wikipedia cofounder Jimmy Wales, former Attorney General Richard Thornburgh, Sears CEO Arthur Martinez, and Jerry Greenfield of Ben and Jerry's—with combined attendance of over 21,000. Annual support from PFCU. John Whyte, chief medical officer of WebMD spoke before nearly 300 attendees on April 21, 2022.
- Purdue University's Holocaust Remembrance Educator Workshop. Sessions for students have included Holocaust survivors, presentations by notable children's authors such as and Lois Lowry (Number the Stars), plays and art displays. The 2022 workshop was entitled “Expressing the Inexpressible”: Reckoning with the Holocaust through Visual Art, Music, and Drama” and was part of the 2022 Greater Lafayette Holocaust Remembrance Conference. More than 30 teachers attended.
- Project Citizen. Civic education outreach project. Students address local public policy problem, research solutions, and make presentation before a panel of judges. High profile members of the local community have served as judges (e.g., state reps., mayors, local judges, etc.). Ackerman Center has sponsored two local showcases annually since 2009. The Project Citizen Showcase is a graduation requirement for Oakland High

School in LSC. In April 2022, more than 100 students from Lafayette Jeff High and Benton Central High presented showcases. In December 2022, 30 students from Lafayette Jeff High presented.

GK-12: Graduate Engagement in K-12

Anatoli Rapoport, Faculty in Social Studies Education. The GK-12: Graduate Engagement in K-12 program started in 2006. The program gives masters, doctoral, and post-doctoral students a mentored, in-depth opportunity to share their research with K-12 students and teachers in local schools. It provides participants with enhanced skills and experience in outreach, teaching, and communication of their research with diverse audiences. Regular annual surveys demonstrate that program alumni believe they are more competitive for academic and professional jobs due to the knowledge and skills obtained during the program.

GK-12 is one of the most sustainable graduate programs on campus. For 14 years since its inception in 2006, almost 300 graduate and post-doctoral students participated in the program. After a slight decline in 2009-2010, the enrollment steadily goes up. 23 masters and doctoral students participate in 2018-19 GK-12 program and 18 – in 2019-2020. The program partnered with 4 local schools: Wea Ridge Elementary, Tecumseh Middle, Harrison High, and McCutcheon High. Tecumseh Middle School is the principal partner of the program. More than 40 Tecumseh teachers have mentored GK-12 participants since 2006, supervising their work in classrooms. The estimated number of elementary, middle and high school students impacted by the program is about 6,000. All program participants apply and receive service learning grants that range from \$500 to \$1,500 each.

A primary purpose of the program is to translate participants' pedagogical experiences into research and to facilitate the development of a research agenda in education related to program participants' expertise. Since 2011, participants have presented individual and group research at Annual Graduate Student Education Research Symposium (AGSERS). Program participants made presentations at regional and national conferences. 7 articles in peer-reviewed journals were published based on research conducted during GK-12.

The program has recently started to establish and develop international relations. Program international partners are:

- Doktorander I Lärandet/ DiL (Doctoral Students and Learning) in Angelholm commune +Lunt University (Sweden)
- Preparation Program in ITMO University (St. Petersburg, Russia)
- Katolische Universität Leuven (Belgium)

University & Community Engagement

- **Downtown Boxing Gym (DBG)** (2013-Present): Professor Amanda Case partnered with DBG. Since 2013 Dr. Case has been collaborating with DBG, serving as a program evaluator and consultant to support their youth development programming. The work

conducted in 2020 included creating and implementing a year-round evaluation schedule, conducting a pilot project of their embedded STEAM lab, consulting on the development of their college success programming, and sitting in on meetings with potential funders to assist in describing DBG's evaluation plans.

- **Disability Awareness Program for Young Children (2022, 2023)** Special education PhD Candidate Jingyuan Zhang (COE Holmes Scholar), sponsored by her advisor Professor Yan Ping Xin, received Purdue Community Service/Service-Learning Project grants from the Office of Associate Provost for Engagement (2022 and 2023, \$2,360). During 2022, this program reached 73 young children between the age of two to six at Klondike Elementary School (Mrs. Rebecca Alperin). PhD students from the SpEd program including John Augustine, Amanda Austin Borosh, Hannah Crosley, Sungwoo Kang, David Ray Miranda, Charissa Voorhis volunteered in the 2022 program. Zhang and Xin will continue this program in 2023 engaging more students in local elementary schools.
- **Dr. Yan Ping Xin's Conceptual model-based problem solving** was adopted and used by an online tutoring company to help students around the world learn mathematics. Since 2022, Dr. Xin has been providing consultation to the company Made for Math on strategies of teaching math problem solving to students with diverse needs. On average, the tutoring company serves about 72 students per school year; to date, it has provided over 18,000 hours of math intervention for students.
<https://www.education.purdue.edu/2022/11/xins-math-problem-solving-program-featured-by-madeformath/>
- **PoRTAL** is the current centerpiece for Purdue's Innovative Learning initiative, which aims to leverage Purdue's teaching, learning and educational resources across campuses to offer creative and innovate solutions to meet the current and future needs of the university. Professor Jennifer Richardson leads the cross-campus collaboration PoRTAL project. See: <https://www.purdue.edu/innovativelearning/supporting-instruction/portal/>
- **Purdue University Faculty Athletic Representative (FAR)**. Professor Philip VanFossen was Appointed by President Daniels to a 2nd three-year term (2020-2023) As one of two FARs for Purdue, VanFossen serves in an oversight and advisory capacity between the faculty and the department of athletics. FARs ensure that athletics operates within the overall mission of Purdue University, and we represent the university in dealings with the NCAA and the Big Ten. Phillip regularly interact with President Daniels—meeting a minimum of 3 times per year.
- **Purdue Series on Corporate Citizenship and Ethics**. Professor VanFossen is the co-founder and co-coordinator of the series, co-sponsored with Krannert School of Management, which has hosted 32 speakers—including author Michael Lewis, Nobel Prize winner Lech Walesa, film-maker Ken Burns, Wikipedia cofounder Jimmy Wales, former Attorney General Richard Thornburgh, Sears CEO Arthur Martinez, and Jerry Greenfield of Ben and Jerry's—with combined attendance of over 20,000. Annual

support from PFCU.

See: <https://www.education.purdue.edu/ackermancenter/programs/lecture-series/>.

- **YMCA Camp Tecumseh, Brookston, IN. 2018-present.** Dr. Case began collaborating with leaders at YMCA Camp Tecumseh in Fall 2018 based on their desire to identify or develop supportive services for camp counselors. The initial collaboration resulted in the creation of a mental health consultation model that was implemented in summer 2019, 2021, and 2022. The model involves three components: training, consultation, and research.
 - **Training:** Each summer, training is provided to full- and seasonal staff on a variety of topics including listening skills, well-being, stress management, and conflict management.
 - **Consultation:** On-site and on-call services are provided by Dr. Case and Ph.D. students from Purdue's Counseling Psychology program. Dr. Case provides weekly supervision to the students throughout the summer.
 - **Research:** pre-/post- assessments of training are conducted, as well as surveys and focus groups at mid-summer and end-of-summer to assess staff reactions to consultation services for the sake of model refinement and dissemination.
- **YMCA Camp Copneconic, Fenton, MI. 2022-present.** After a presentation at the 2022 Mid-America Camping Conference, the Director of YMCA Camp Copneconic contacted Dr. Case to investigate replicating the mental health consultation model from Camp Tecumseh. After several meetings, a revised version of the model was successfully replicated in Summer 2022 following a similar model as outlined above.

2022 Faculty /Staff Engagement Awards and Recognition

These awards were presented for the 2022-2023 academic year.

University Awards

Service-Learning Fellow – Wanju Huang

College Awards

Outstanding Faculty Engagement College Award – Jennifer Smith

Outstanding Leadership in Global Engagement Award – Jill Newton

Outstanding Service Award – Wanju Huang

Department Awards

Outstanding Achievement in Engagement – Lisa Lambert Snodgrass, Department of Educational Studies

Engagement Funding Sources

Addressing Disparities in Autism Spectrum Disorder (ASD) among Burmese Refugee families in central Indiana. (2022-2024); \$75,000 Collaboration in Translational Research, Clinical and Translational Sciences Institute, National Institute of Health.

Characterizing How Teachers Design Engaging Learning Environments in STEM Education: Examining Teachers' and Students' Conceptualizations of Integrated STEM (7/2021-6/2023); \$325,009 National Science Foundation: Building Capacity in STEM Education Research (BCSER) (PI: Paul Asunda)

Department of Education, Indy STEM Teacher Residency and Indiana Commission for Higher Education, Strengthening Indiana's Future through the 21st Century STEM Teachers Scholarship Program. \$5,177,290 and \$255,000 (PI: Lynn Bryan)

Expanding accessibility of learning through blended synchronous instruction of F2F and remote students. National Science Foundation, IUSE: EHR. (07/01/2021- 6/30/2024); \$600,000 / \$25,662 (PI: Nathan Mentzer)

GEERs (09/01/2020-8/31/2022) \$1,548,823/ \$387,205.75: Becoming an Online Teacher Even when I Didn't Sign up for It. (PI: Dr. Tim Newby, LDT) (Co-PI Koehler, Adrie)

Indiana Department of Education (09/01/22–6/30/24). (\$916,453) *1-2-1 Grow-Your-Own Teacher Pipeline Program (121 GYO).* (PI: Kathryn Obenchain, Co-PI: Jennifer Barce)

Innovation in Quantum Pedagogy, Application and its Relation to Culture (IQ-PARC) (9/2021-8/2024); \$2,815,000 U.S. Department of Defense (PI: Muhsin Menekse)

Interprofessional Education Supporting the High Intensity Needs of Exceptional Students (IPE-SHINES) (11/2021-10/2026); \$1,135,870 U.S. Department of Education: Office of Special Education Programs (PI: Rose Mason)

Lilly Endowment Inc. (2022-2023); \$161,019: Scaling Up the Reflection-Informed Learning and Instruction by Integrating Mobile Learning Technologies with Artificial Intelligence (PI Muhsin Menekse)

NSF (01/01/2023- 12/31/2025) \$ 847,844.00/ 125,523.36: /Cyber Training for Open Science in Climate, Water and Environmental Sustainability. (PI: Venkatesh Merwade, Civil Engineering) (Co-PI: Wanju Huang)

NSF (01/01/2020-12/31/2023) \$1,989,709.00 / 25% FTE: Development, Deployment, and Evaluation of Instructional Modules for Current and Future Practitioners of Model-Based Systems Engineering. (PI: Audeen Fentiman, Engineering Education) (Senior Personnel: Wanju Huang) (Program Evaluator: Koehler, Adrie)

NSF (2020-2023) \$773,000: Discovery Research K-12/Multi-University Collaborative Research: Building Community-based Expertise with Elementary Engineering (Co-PI Brenda Capobianco)

NFS (07/01/2021-6/30/2024) \$600,000 / \$25,662: NSF/Expanding accessibility of learning through blended synchronous instruction of F2F and remote students.

National Science Foundation, IUSE: EHR. (PI: Nathan Mentzer, Engineering/Technology Education) (Co-PI Koehler, Adrie)

NFS (2022) \$2,018,951: Improving Undergraduate STEM Education (IUSE) / Using Principles of Design to Advance Teacher Education (UPDATE) (PI Brenda Capobianco

Parental Inclusion in Language and Research (Project PILAR) (7/2021-6/2026); \$2,903,764 U.S. Department of Education: National Professional Development (PI: Trish Morita-Mullaney)

Spencer Foundation (2021-2023) \$500,000: Building Community among Kenyan Teachers and Street Youth through Participatory Action Research. (Co-PI Brenda Capobianco)

U.S. Department of Education's Office of English Language Acquisition (2017-2022); \$1,892,481. Project PUEDE, Responsibility: 80% (details under PI Morita-Mullaney in P-12 Schools section)

U.S. Department of Education's Office of English Language Acquisition (2017-2022); \$1,840,319. Leveraging the Lectura y Lenguaje. Responsibility: 80% (details under PI Morita-Mullaney in P-12 Schools section)

US Department of Education (2018–2022); \$1,389,872. Institute of Education Sciences. Enhancing Undergraduate STEM Education by Integrating Mobile Learning Technologies with Natural Language Processing. (PI Muhsin Menekse)

Us Department of Defense (2021-2024); \$2,815,000. The National Defense Education Program (NDEP) for Science, Technology, Engineering, and Mathematics (STEM) Education Innovation in Quantum Pedagogy, Application and its Relation to Culture (IQ-PARC). (PI Muhsin Menekse)

U.S. Department of Health and Human Sciences, Substance Abuse and Mental Health Services Administration (SAMHSA) Grant (09/30/20-09/29/22) \$200,000.00/ \$23,594.00: Expansion of Practitioner Education (Prac-Ed): Delivering Nurses' Substance Use Education Through a Massive Open Online Course (NSUE-MOOC) (PI: Karen Foli, Nursing) (Co-PI: Wanju Huang)

US Dept. of State (2022-2024); \$750,000 (Rapport) Benjamin Franklin Transatlantic Fellowship, An annual international program for 55 students from all European countries and the United States.

Scholarship of Engagement

Publications

Anwar, S., Butt, A. A., & Menekse, M. (2022). Relationship between Course Engagement and Educational Application Engagement in the Context of First-year Engineering Students. Proceedings of the American Society for Engineering Education (ASEE) Annual Conference, Minneapolis, MN.

- Anwar, S., Butt, A. A., & Menekse, M. (2022). Exploring Relationships Between Academic Engagement, Application Engagement, and Academic Performance in a First-Year Engineering Course. Proceedings of the 2022 Frontiers in Education (FIE) conference, Uppsala, Sweden.
- Anwar, S., Menekse, M., Guzey, S., & Bryan, L. A. (2022). The effectiveness of an integrated STEM curriculum unit on middle school students' life science learning. *Journal of Research in Science Teaching*, (Early View). <https://doi.org/10.1002/tea.21756>
- Berry, F., Huang W., & Exter, M. (2022). Interventions for improving accuracy of self-and-peer reviews in an Engineering Technology capstone course. *IEEE Transactions on Education*. doi: 10.1109/TE.2022.3208219.
- Butt, A. A., Anwar, S., Ezzat, A. & Menekse, M. (2022). Comparative analysis of the rule-based and machine learning approach for assessing student reflections. Proceedings of the 2022 International Conference of the Learning Sciences (ICLS), Hiroshima, Japan.
- Purzer, Ş., Quintana-Cifuentes, J., & Menekse, M. (2022). The honeycomb of engineering framework: Philosophy of engineering guiding precollege engineering education. *Journal of Engineering Education*, 111(1), 19-39. <https://doi.org/10.1002/jee.20441>
- Butt, A. A., Anwar, S., & Menekse, M. (2022). Work in Progress: Role of digital nudging strategies on STEM students' application engagement. Proceedings of the American Society for Engineering Education (ASEE) Annual Conference, Minneapolis, MN.
- Debs, L., Gray, C.M. & Asunda, P.A. (2022) Students' perceptions and reasoning patterns about the ethics of emerging technology. *International Journal of Technology Design and Education*. <https://doi.org/10.1007/s10798-021-09719-w>
- Dolby, N. (2022). Reimagining the Faculty Role in Community Engagement. *Journal of Community Engagement and Higher Education* 14(3), 53-57.
- Dolby, N. (2022). Animals, Community and Justice Matters in Critical Times. *International Review of Qualitative Research* 14(4), 614-630.
- Dolby, N. (2022). Multispecies Families: Pets, Community, and Social Action. *Families in Society: The Journal of Social Services*. DOI: 10.1177/10443894221094495
- Fentiman, A., Sutherland, J., DeLaurentis, D., Douglas, K., Camba, J. D., Kenley, C. R., Raz, A. K., Koehler, A., Huang, W. J., Hurt, A., & Richardson, J. C. (2022, June). Work in progress: Aligning a professional development program with industry needs. Proceedings of the American Society of Engineering Education Annual Conference & Exposition, Minneapolis, MN.

- Huang, W. J., Wynkoop, R., Exter, M., & Berry, F., (2022, June). Feedback matters: Self-and-peer assessment made better with instructional interventions. Proceedings of the American Society of Engineering Education Annual Conference & Exposition, Minneapolis, MN.
- Jannini, A., & Akdemir, Z., & Menekse, M. (2022). Tackling Differing Motivations: A Preemptive Look at Key Findings from a Systematic Literature Review of Achievement Goal Theory in Undergraduate STEM Motivations. Proceedings of the American Society for Engineering Education (ASEE) Annual Conference, Minneapolis, MN.
- Kim, S. J., Kastberg, S. E., Xin, Y. P., Lei, Q., Liu, B., Wei, S., & Chen, Y. (2022). Counting strategies of students struggling in mathematics in a computer-based learning environment. *The Journal of Mathematical Behavior*, 68, 101007.
- Marcos, L.P., Li, T., Huang, W., Douglas, K.A., Fentiman, A., DeLaurentis, D.A., & Kenley, C.R. (2022), Plug-and-play adaptive approach to integrating Model-Based Systems Engineering concepts into academic curriculum. INCOSE International Symposium, 32, 872-887. <https://doi.org/10.1002/iis2.12969>
- Morita-Mullaney, T. (2022). How Teachers Can Break Down Stereotypes of Asian American Students. *Education Weekly*. <https://www.edweek.org/leadership/how-teachers-can-break-down-stereotypes-of-asian-american-students/2022/10> Scholarly review of the ways in which stereotypes are reinforced, reproduced, and resisted for AAPI and NNHI students and educators.
- Samarapungavan, A., Bryan, L., Staudt, C., Sapokta, B., Will, H., Broadhead, J., & Kimball, N. (2022). Using technology-mediated inquiry to help young learners reimagine the visible world through simple particle models. *Journal of Research in Science Teaching*. <https://doi.org/10.1002/tea.21802>
- Wessel-Powell, C., & *Bentley, H. (2022). Newcomers, novices, censors, and seasoned advocates: Informed approaches to critical literacy from teachers navigating risky texts. *The New Educator*, 18(1-2), 61-86.
- Zhang, J., Miranda, D. M., & Xin, Y. P. (2022). Disability Awareness Program for Young Children: A Community Service-Learning Program at Preschool and Elementary School. *Purdue Journal of Service-Learning and International Engagement*. 9, 33-38. (E.) <https://docs.lib.purdue.edu/pjsl/vol9/iss1/7>

Presentations

- Case, A. S., & Hauser, J. (2022, September). Establishing and sustaining mutually-beneficial Organization Partnerships Work. Spark session presented at the 2021 National Partnership of Educational Access Conference, Virtual.

- Case, A. S., Murphy, P., Allan, B.A., & Nikalje, A. Development and validation of the Privileged Social Class Attitudes Scale (PSCAS). Poster presented at 2022 American Psychological Association Annual Convention, Minneapolis, MN.
- Case, A. S., & Hauser, J.2 (2022, February). Working across contexts: Mutually beneficial research-practitioner partnerships as a liberatory practice. Roundtable presented at the 2022 Winter Roundtable Conference, Virtual.
- Case, A. S., Bhojwani, J.1, Murphy, P.1, Aggarwal, A.1, Khalil, A.1, Piechocki, M.2, & Elliott, T.2 (2022, January). Leveraging university partnerships to support camp staff mental health: Updates & review of a second implementation of the Purdue University/Camp Tecumseh collaboration. Presented at the 2022 YMCA Mid America Camping Conference. Brookston, IN.
- Case, A. S., & Hauser, J.2 (2022, October). Establishing and sustaining mutually-beneficial researcher-practitioner partnerships to increase impact. Workshop presented at the 2022 Engagement Scholarship Consortium Conference, Athens, GA.
- Huang, W. (2022, December). Fostering deep learning with intentional learning design and technology. Presentation on learning design and technology in the context of EMI (English as a Medium of Instruction) National Taiwan Normal University.
- Huang, W. (2022, November). Keynote Speaker at the Virtual Learning Blitz Conference for the Indiana Department of Education. Indianapolis, IN.
- Huang, W. J., Wynkoop, R., Exter, M., & Berry, F. (2022, April). What did students focus on in their self- and peer-written feedback when using the comprehensive assessment of team member effectiveness?. American Educational Research Association Conference (virtual).
- Pollettini Marcos, L., Kenley, R., Li, T., Huang, W. J., Douglas, K., & Hurt, A. (2022, April). Integrating model-based systems engineering curriculum into engineering courses. ASEE IL-IN Section Conference, Anderson, IN.
- Huang, W. J., Wynkoop, R., Exter, M., & Berry, F. (2022, June). Feedback matters: Self-and-peer assessment made better with instructional interventions. American Society of Engineering Education Annual Conference & Exposition, Minneapolis, MN.
- Kenny, R., Kastberg, S., & Suazo-Flores, E. (2022, May). Problem Posing and Representation. Purdue Polytechnic High School, South Bend, IN.
- Lambert Snodgrass, L. & Kiracofe, C. (2022, June 19, 2022) A hybrid Ph.D.: *Preparing globally responsive higher education leaders*. IAFOR Paris Conference on Education: Paris, France.
- Luo, X., Sapkota, M., Sapkota, B., Phillion, J., & Newton, J. (2022, March). Educators' perceptions. West Lafayette, IN

Max, B., & Newton, J. (2022, February). Teaching Mathematics Panel. Mathematics Department Seminar. West Lafayette, IN.

about the impact of social justice movements in global contexts. Poster presented at the 2022 Annual Graduate Student Education Research Symposium (AGSERS). West Lafayette, IN.

Newton, J. (2022, March). Returned Peace Corps Volunteer Panel. Purdue Peace Corps Prep Recruitment Session. West Lafayette, IN

Newton, J. (2022, September). Elementary teachers' use of mathematics curriculum. Paper presented at Purdue College of Education Research Seminar. West Lafayette, IN.

Pirrello, J., & Newton, J. (2022, April). Exploring Purdue teacher education program: Focus on diversity, equity, and social justice. Presentation in EDPS 53400. West Lafayette, IN.

Sapkota, M., Luo, X., Sapkota, B., Phillion, J., & Newton, J. (2022, September). Educators' perceptions about the impact of social justice movements in educational contexts. Paper presented at Purdue College of Education Research Seminar. West Lafayette, IN.

Stanley Jr., D. C. & Atari-Khan, R. (2022). Resistance against systemic oppression in counseling psychology: A literature review. Poster presentation at 130th annual American Psychological Association conference, Minneapolis, MN.

Engagement Partnerships

Diversity, Equity, Inclusion, and Social Justice Development: Intercultural learning collaboration between Purdue and Universidad Zamorano.

In 2022 Dr. Stephanie Scherer collaborated with CILMAR and their mission of innovative scholarship towards the development of intercultural competencies and fostering awareness and knowledge of diversity, equity, and social justice issues in faculty, staff, and students of Purdue University and Universidad Zamorano. Through conceptualizing, designing, and implementing this course in alignment with the Collaborative Online International Learning grant aims, Purdue faculty and graduate students will reflect on intercultural practices and incorporate the findings and learnings of the global context into their teaching and research practices. The project will impact two schools and 24 undergraduate students and was funded by Collaborative Online International Learning (COIL)

Faculty Development Workshop: Reimagine Teaching and Learning – Journey to an Engaging and Effective Learning Design

Dr. Wanju Huang designed and delivered a two-day faculty development workshop on learning design and online teaching for the School of Engineering faculty at the University of Antioquia, Colombia. Approximately 15 faculty members attended the two-day workshop on May 3-4, 2022. Dr. Huang covered learning objectives, motivation theories (e.g., ARCS), multimedia educational applications, emerging technologies (e.g., Augmented Reality, Virtual Reality), Community of Inquiry, etc. She empowered the participants with evidence-based teaching and course design strategies they could implement immediately in their courses. One faculty member shared that he learned about writing learning objectives before this workshop. Still, Dr. Huang's teaching approach made the idea of learning objectives more relevant and less intimidating for him. Another faculty indicated that he always wanted to try new things in his classes but didn't know how. This workshop helped increase his knowledge of learning design and teaching strategies and gave him specific and valuable examples that he could incorporate into his courses. When sharing his reflection with the participants at the end of the workshop, he said in an exciting and determined tone – "I am going to do all of these in my classes."

Graduate School Mentor Fellows.

(2022) Dr. Marisa Exter (Associate Professor of Learning Design and Technology) and graduate students Zeynep Akdemir (Department of Curriculum & Instruction) and Kris Robbins (Department of Educational Studies) were Graduate School Mentor Fellows as part of a university-wide initiative. They collected comprehensive data from both graduate students and faculty members, formulated recommendations for the college, and hosted a working lunch in which teams of graduate students and faculty worked together to brainstorm materials, events, and potential policy/organizational improvements to inform the recommendations. The report with final recommendations was shared with all faculty and students at the College of Education, as well as with the Purdue Graduate School.

New Zealand Study Abroad Program with University of Waikato, Hamilton, NZ

In Fall 2022, Dr. Broome was awarded an International Programs SAIL Grant to explore study abroad opportunities in Portugal with Dr. Ofelia Schepers entitled, Portugal Immersion: Navigating Re/Shaping Cultural Mis/Understandings. Since that award, he has been approached by the Education New Zealand, the New Zealand government agency responsible for creating relationships and connecting North American universities with New Zealand Universities to establish partnerships. In November, Dr. Kathryn Obenchain and he met with the Pro Vice Chancellor of the Education Division of the University of Waikato to explore a may-mester experience in Hamilton, NZ. Dr. Broome will be using his SAIL grant to visit the country late spring 2023 to explore opportunities for undergraduate student collaboration as well as ways to connect faculty research and centers with Kiwi and Māori populations.

Virtual Exchange Program with Japan - Intercultural Learning Through A Design Challenge

Dr. Wanju Huang and Dr. Yukiko Maeda co-developed a virtual exchange program in Fall 2022. This program was implemented on October 12. Student participants include: six students from Purdue University, four students from Nagasaki University, and two students from Kyoai Gakuen University. This program is still in progress. However, we have received

positive feedback from the participants in all three universities. For example, the students and faculty in Japan shared that they were excited to see Purdue's campus through our check-in videos, they appreciated the learning design expertise shared by their Purdue team members. The students and faculty at Purdue were amazed by the Nagasaki University's faculty and student's video of their campus and the foods they the university provides.

Virtual Exchange Program with Taiwan - Intercultural Learning Through A Course Transformation

Dr. Wanju Huang developed a virtual exchange program focusing on course transformation in the context of EMI (English as a Medium of Instruction) in Fall 2022. Student participants include: two students from Purdue University and three students from National Sun Yat-sen University, Taiwan. The program provided the students at the NSYSU the opportunities to conduct classroom observations at a 100-level physics class at NSYSU. Additionally, they interviewed Dr. Kao (the instructor of the class) to understand his teaching needs and concerns. Furthermore, they shared what they learned from the observations and interviews with Purdue students and Dr. Huang to seek learning design suggestions and identify strategies that could assist the instructor in transforming the course. Although the course transformation period only lasted for four weeks, Dr. Kao indicated through this collaboration he was able to identify and create new learning materials to enhance student learning and engagement.

Ongoing Projects

- Guzey, Selcen S., Advisory board member: NSF, DRK-12, Computational Thinking in High School Biology (2021- 2025). Project PI is Dr. Ido Davidesco from University of Connecticut.
- Xin, Y. P., Advisory board member: IES, Science, Technology, Engineering, and Mathematics. *The Role of Algebraic Reasoning Within Additive and Multiplicative Multi-Step Problem Solving for Students With Mathematics Difficulty* (2022- present), PI: Sarah Powell, University of Texas, Austin, awarded amount: \$3,289,913.