![Community for Advancing Discovery Research in Education]

2024 DRK-12 Partnership Development Project Type Awards

The DRK-12 solicitation released in 2023 included the new project type, Partnership Development. The following awards have been funded in response to proposals addressing that project type.

Award #: 2405213
Project Title: Strengthening and Developing Partnerships in East Tennessee for Community Engagement in Artificial Intelligence Education
PI: Rachel Wong, University of Tennessee Knoxville

Although there is a push to integrate artificial intelligence (AI) in K-12 education, the novelty of AI means that little is known about what schools, teachers, students, and parents know, need and expect regarding AI in classrooms. Lack of formal AI education and professional development training poses a significant challenge for educators, parents, and students across the nation. The lack of access to AI knowledge and training is especially significant in rural high-needs communities where schools are under-resourced. This year-long partnership development project has three key goals : (1) strengthen and expand existing research-practice partnerships (RPPs) with East Tennessee teachers and school leaders, (2) develop new RPPs with parents and students enrolled in East Tennessee middle and high schools, and (3) co-construct a shared vision for AI that aligns with the needs and assets of the partner community. The project's work will be guided by an RPP leadership team comprising three educational researchers, two secondary school teachers, two school leaders, four parents, and six middle and high school students. This leadership team is critical for accurately capturing the community's needs and assets and facilitating the co-construction of a shared vision for AI education in East Tennessee.

RPPs seek to cultivate long-term collaborations that are designed to bring together individuals of varying expertise to co-construct knowledge to transform and improve education. This partnership development project will focus on the following: (1) establishing trust and teamwork through community learning activities, (2) developing an agreements document that unites the needs and interests of all partners (teachers, school leaders, parents, students, and researchers), and 3) building a model for change that leads to research and development efforts. Community building will involve a Value Mapping activity with the RPP leadership team to make values, experiences, and perspectives about AI more explicit. Results from the Value Mapping activity, along with the other structured and semi-structured activities such as interviews, focus groups, and surveys, will inform the construction of the shared vision for AI education in East Tennessee. To ensure alignment between project activities and project goals, an external evaluator, using a culturally responsive and comprehensive evaluation plan, will provide formative and summative feedback throughout the project. All involved partners will receive a summary of the deidentified data collected from the project. Final decisions about the shared vision statement will be made jointly by the RPP leadership team based on information gathered from (1) interview transcripts, (2) focus group notes, observations, and transcripts, (3) survey responses, (4) summary documents from community building activities and meetings with the RPP leadership team, and (5) feedback from the external evaluator. At the conclusion of this project, the deliverables encompass a collectively crafted vision of AI in Education in East Tennessee, alongside a model offering a blueprint for STEM education initiatives centered on community collaboration and research-practice partnerships.

Award #: 2405217
Project Title: Milwaukee Mathematics Dual Enrollment Equity Pathways
PI: Ann Edwards, WestEd

High school and first-year college mathematics courses sometimes act as gatekeepers, 'weeding out' students who struggle with the subject matter and narrowing students' opportunities for advanced STEM education and employment. Acknowledging opportunity gaps for students of color and those experiencing poverty, this partnership development project brings together Milwaukee Public Schools (MPS), Milwaukee Area Technical College (MATC), and WestEd to establish dual enrollment math courses that function as a lever for equity. Dual enrollment courses are high school courses that award students both high school and college credit, providing students with experience with rigorous college-level coursework, a sense of purpose and readiness for college, and reduced college tuition costs. Traditionally, dual enrollment courses have functioned as a "program of privilege," providing advanced opportunities for college-track students. Yet, when designed and implemented to meet the needs and interests of all students, dual enrollment courses are a promising approach for making college and career opportunities more available to underrepresented groups. Centering the needs and voices of MPS students and teachers, this partnership will develop a strategy for dual enrollment implementation in mathematics that addresses significant disparities in math course achievement, graduation rates, and college enrollment in Milwaukee, particularly by race and ethnicity.

The partnership development process will draw upon principles and practices of inclusive research-practice partnership approaches to ensure power sharing, the balancing of practitioner and researcher priorities, and giving voice to all participants and partners. Project activities include needs-sensing and stakeholder engagement, co-construction of the research and development agenda, development of roles and processes across partners, and planning for future collaborations in developing, implementing, and examining dual enrollment math pathways in MPS high schools. While WestEd facilitates these activities, the MPS and MATC partners drive agenda setting, decision-making, sense-making of data, and strategy development. The primary outputs of this project are the establishment of an equity-focused, inclusive research-practice partnership grounded in the needs of Milwaukee's students and in the Milwaukee educational context, and the development of concrete and actionable plans for designing and implementing mathematics dual enrollment in Milwaukee.

Award #: 2405464
Project Title: Centering Indigenous Science in K-12 Science Instructional Materials
PI: Jedda Foreman, University of California-Berkeley

To successfully understand and address complex and important questions in the field of environmental science, many kinds of communities' knowledge about their local environment need to be engaged. This one-year Partnership Development project involves a collaboration to design an approach that would yield opportunities for K-12 students to learn about environmental science in ways that honor both traditional STEM knowledge and Native ways of knowing among the Pomo community in California. The goals of the project are to advance knowledge of place-based science by considering how Indigenous knowledge and traditional Western science can be productively partnered. The project is led by a

partnership of researchers and educators from the Lawrence Hall of Science, Redbud Resource Group, and California Indian Museum and Cultural Center.

Partners will develop a common vision and framework that responds to key questions and guides future research and instructional materials development. To reach this vision, partners will engage in a range of activities including: 1) a series of partnership development meetings; 2) asset-based review of the research and development landscape, including literature review and identification of exemplar sites; 3) a pilot design workshop with school and Tribal partners in Pomo territory; 4) Native listening sessions; and 5) convening an advisory board to inform and evaluate the partners' approaches and progress. Through its work, the project aims to be a model for future partnerships and collaborations among Native communities, STEM curriculum designers, and preK-12 schools.

Award #: 2405487
Project Title: Cultivating Math Resilience: Fostering a Durable School-University Partnership Working to Promote Math Confidence in Post-Pandemic Education
PI: Mathew Uretsky, Portland State University

Math is a school subject that causes some people anxiety. Anxiety about math has increased for some students due to disruptions in their learning during the COVID-19 pandemic. This partnership development project involving Portland State University and the Tigard-Tualatin School District addresses pandemic-related learning challenges in middle school mathematics, with a focus on math anxiety. Across the yearlong project, the partners play equal roles in co-developing research, practice and policy proposals aimed at enhancing math outcomes and reducing math anxiety among the district's middle school students. Given that the district serves students with differing needs and talents, the project will also focus on how math instruction might reduce anxiety by adapting to students' cultural and community experiences. Addressing math anxiety in middle school is important because this is the time when students build math skills, and attitudes towards math, that can shape their future STEM learning and career opportunities. The project also aligns with the state of Oregon's current initiatives promoting math engagement and adapting high school math learning pathways to meet students' diverse needs.

Using a Community-Based Participatory (CBPR) approach, the project partners will engage local community members and organizations to evaluate existing theoretical models of math anxiety and develop tailored interventions. This participatory approach involves forming a core team of educators, administrators, and researchers, supported by a rotating listening group including math educators, mental health professionals, and community leaders. Together, they will co-construct solutions aligned with local resources to integrate emotional and mental health support into math education. Additionally, the project tackles racial and gender biases in STEM education that contribute to math anxiety, leveraging expertise in mathematics education, mental health, and educational research. A central aim is to create a sustainable school-university partnership, fostering ongoing collaboration and capacity-building for the community's diverse educational and mental health needs. The CBPR approach will be operationalized through regular meetings of the core team, the listening group, and subject-specific workshops, ensuring continuous feedback and adaptation to meet community needs. The partnership will use evidence-supported frameworks for both partnership design and evaluation. These frameworks

will provide the structure for partnership development and the criteria under which the partnership will be assessed. While the project's evaluation will include interviews, focus groups, and observations, evaluation criteria will be collaboratively designed and agreed upon by participants in consultation with the evaluator.

Award #: 2405609
Project Title: Establishing a Partnership Between a Rural School and an Urban University to Support Algebra 1 Learning for Students with Learning Disabilities
PI: Casey Hord, University of Cincinnati Main Campus

Tutoring programs that are jointly supported by schools and universities can offer benefits to both parties. Schools benefit by receiving additional instructional support for their students. Universities benefit by providing meaningful, one-on-one teaching experiences for their students who are studying to become teachers. Tutoring programs, however, are only helpful to the extent they respond to the needs and interests of the students and schools they serve. This project will establish a partnership between a large, urban university and a small, rural high school to collaboratively create a tutoring program to support the mathematics learning of students with learning disabilities. Mathematics tutoring can be especially helpful for students with learning disabilities, who likely need support for strategically organizing mathematical information and who may also experience math anxiety. Building on promising work in urban school settings, the project will co-create a model of mathematics support that is informed by the rural community intended to receive the support.

Using a framework adapted from collaborative, participatory research, the university team will work with teachers, students, and other school personnel in a rural high school—along with leaders from local businesses and community organizations—to examine the most productive models of tutoring for students with learning disabilities. The design of this project draws on research from special education and, respectively, mathematics education documenting the cognitive and affective needs of students with learning disabilities in math. Across the yearlong project, meetings will be held to assess the needs and strengths of the project partners, plan and evaluate pilot tutoring programs, and establish a long-term partnership to support both high school students in math and college students preparing for future careers as teachers. Transcripts and field notes collected throughout the work will be analyzed and synthesized in an ongoing project report. An advisory board, comprising school and community members, will provide ongoing evaluation of the work and its outcomes through review of the project report and independent review of transcripts and field notes. The final product will be an established tutoring program as well as a set of recommendations for mathematics tutoring for students with learning disabilities in remote, rural settings.

Community for Advancing Discovery Research in Education

Award #: 2405717
Project Title: Establishing a Partnership Among a State Department of Education, Educators, School District Leaders and Researchers to Enhance Early Childhood Educators' Mathematics Teaching
PI: Lynsey Gibbons, University of Delaware   Annastasia Purinton

High-quality early educational experiences, particularly in mathematics, are crucial for students' success in K-12 schooling. To create these foundational experiences for young children, early childhood educators need opportunities to enhance their mathematics teaching through job-embedded, sustained professional learning. This partnership development project establishes the Research Practice Partnership for Professional Learning in Early Mathematics (RPP-PLEM), a collaboration among early childhood mathematics educators, school and district leaders, the state department of education, and university faculty in Delaware. These partners aim to enhance children's early mathematics learning by Partnership development activities include having the university researcher collaborate with early childhood mathematics educators and leaders to learn more about their professional learning needs and to collect local evidence that reflects the voices of those most impacted by this work. To establish the RPP-PLEM, the team will engage in development activities. These activities aim to build trust, conduct rigorous research, support partner organizations, produce knowledge for educational improvement, and build the capacity of researchers and practitioners to engage in partnership work. The project will collect evidence using a research-practice partnership framework and use related tools to assess the formation of the partnership and to guide its work. As an outcome of this work the partnership will be positioned to begin responding to their collaboratively developed set of research and policy questions. These questions will be related to providing early childhood educators with support that deepens their knowledge of and ability to engage young children in learning mathematics. Evaluation findings will guide improvements, aid other researchers in developing similar partnerships, and will mobilize knowledge related to understanding the lived experiences of early childhood educators in relation to their ongoing professional identities as teachers of mathematics.

Award #: 2405747
Project Title: Co-Constructing a Research Program Through Community Dialogues about Mathematical Storylines
PI: Carlos Gómez Marchant, University of Texas at Austin

This partnership development project deepens an existing partnership between the researcher and leadership of an elementary school in central Texas that serves predominantly Black and Latine students. The project focuses on engaging community members, teachers, and learners at the school in conversation about how mathematics teaching and learning might be improved. This partnering is important because the relationship between schools and communities is often marked by one-way communication and decision-making without dialogue. By promoting dialogue, all members of this partnership can learn more about the mathematical storylines embedded into the community—that is, the stories that community members, teachers, and learners share about their personal relationship to

mathematics teaching and learning. Approaching mathematics education in this way also provides a space for addressing myths about mathematics such as math is free of culture, history, or specific points of view. In the context of this school and the students it serves, the storylines that are uncovered can be a strong cornerstone for developing mathematical practices that support learning by connecting to students' culture, history and community experiences. Finally, by understanding more deeply the mathematical storylines of community members, teachers, and learners, the researcher and leadership team can co-design a research program about mathematics teaching and learning that is anchored in the school communities' concerns, interests and talents.   The question guiding this partnership development project is: In what ways can the research and school leadership teams be in dialogue with the community to enhance the professional development of teachers and experiences of learners in elementary mathematics? To answer this question, the research team will engage in the following activities: 1) Listen to and document the stories of resistance, perseverance, and inequities shared by community members, learners, and teachers regarding mathematics teaching and learning; 2) Analyze and compare mathematical storylines within community dialogues. 3) Develop a collaborative plan of action leading to the development of a research project responsive to the DRK-12 solicitation. The project's findings will add to our understanding of how to (re)create educational spaces that serve, rather than marginalize, communities. Developing a partnership means a deep commitment to the community; consequently, feedback and continued dialogue must be a key component to evaluating the project's success. As such, newsletters, video-updates, member checking, community presentations, and other forms of sharing in the decision-making processes will be used. Across the project, an advisory board of experts in bilingual education, students' learning of mathematics, and community-school partnerships will foster accountability by offering meaningful feedback regarding the extent to which the partnership's processes and objectives are being fulfilled. Lessons learned and reflections can provide a conceptual framework for developing powerful community partnerships through dialogue with school communities and provide district policymakers and school leadership with tools and strategies for creating more bidirectional relationships with community members.

Award #: 2405849
Project Title: Partnership Development for Career-long Teacher Learning in Elementary Mathematics and Science
PI: Marisol Kevelson, Educational Testing Service

Providing mathematics and science teachers with professional development to enhance their teaching is a key focus across U.S. schools and districts. However, several factors make it difficult for school districts to meet the growing and varied learning needs of their teachers. These factors include offering only in-person PD at restricted times and limiting teachers' opportunities to rehearse or practice specific and important teaching skills. Such limitations in teachers' learning opportunities tend to especially impact elementary teachers who are expected to be teaching experts in multiple subject areas. While more accessible online learning opportunities that reflect everyday teaching challenges are becoming more available, most of these more flexible PD experiences are being offered by colleges and universities to teachers who are not yet in the classroom. This situation provides an opportunity to explore how innovations in teacher professional development can be woven into school districts' regular professional

development work with its teachers. This partnership development project will create a shared vision and plan for making digitally-based teaching tasks available to elementary math and science teachers so they can learn at any time and from anywhere.

This project draws upon the joint expertise of a team of teachers, teacher leaders, and educational researchers to collaboratively reimagine how teacher learning opportunities could be designed to support personalized, on-demand professional development learning for elementary mathematics and science teachers. During this yearlong partnership, the team will collaborate via monthly strategic planning meetings to co-design a shared vision by identifying the key components of a current personalized, online platform and determine how they will work together to support the learning needs of elementary mathematics and science teachers in the diverse partner school districts. Feedback on the plan will be gathered through a focus group with external stakeholder groups and from the project Advisory Board. The lessons learned from this partnership development project may be valuable to the larger teacher education community given the broad range of backgrounds and experiences in the partnership team, including teachers in states with different student demographics, learning standards, and other district characteristics.

Award #: 2405894
Project Title: Building Capacity in a Rural School District to Support Teacher Development in STEM Areas through Cycles of Continuous Improvement
PI: Rodolfo Rincones, University of Texas at El Paso

Partnership development between universities and school districts requires an understanding that each organization has a distinct institutional point of view that must be considered in defining and shaping collaborative work. The goals and objectives of each organization may not always align, and at times may compete or conflict with each other. For example, school district staff may have concerns about working with researchers who are unfamiliar with their community and the goals and needs of the districts. With the understanding that successful partnerships are those where practitioners and researchers achieve high levels of trust, commitment, transparency, interdependence, and mutual benefit, this project centers on building a partnership between a University that serves a largely Hispanic student population and a rural school district that also serves a community that has long been underrepresented in STEM education and career opportunities. The partners will jointly focus on how to respond to three negative impacts of the COVID-19 pandemic: (1) limited access to quality learning opportunities, (2) increased student learning gaps in STEM subjects, and (3) a local teacher shortage.

This project's contributions focus primarily on the development and sustainability of a research-practice partnership between a university and rural school districts serving underserved student populations. The project partners will engage in a collaborative inquiry process to identify a problem of practice in STEM teaching and learning at the high school level, research best practices to address the identified problem and develop a targeted improvement plan to strengthen STEM education. To develop an effective, authentic, and equitable research-practice partnership that will be sustainable beyond the initial planning year, the project will use inquiry and team-building strategies, developmental evaluation, and a continuous improvement process. This project's approach in a rural context and with underrepresented

communities can inform current understanding about nuances of creating research-practice partnerships, including adaptation of emerging goals and related work, changes in school leadership, and the flexibility required for sustainability. Findings can also inform researchers and practitioners about how the continuous improvement process can help identify areas of need and co-designing solutions in teaching and learning STEM related areas.

Award #: 2406920
Project Title: Frameworks for Phenomenal Science Success: Enhancing Partnerships for Aina-Based NGSS Experiences
PI: Pascale Pinner, Hawaii Science and Technology Museum

One of the best ways to help K-12 students learn science is by having them engage in the scientific inquiry and engineering design processes used by STEM professionals. These approaches, which are are spelled out in the Next Generation Science Standards (NGSS), help students develop problem-solving, critical thinking, and collaboration skills by engaging them in science-related aspects of their local communities. Unfortunately, support for the development of high-quality, place-based, and NGSS-aligned learning experiences that actively engage students has not been forthcoming in all school districts. This gap is particularly true for rural schools and communities. Further, continuing education for teachers, which is essential to assure successful implementation of high-quality science lessons that are grounded in students' local community experiences, is lacking as well. This partnership development project addresses these gaps in science teaching and learning by deepening an existing partnership among local non-profit community education organizations, K-12 publics schools, and local university partners. In consultation with new education technology industry partners, the project team will work collaboratively to develop high-quality NGSS-aligned science learning opportunities that actively engage students in lessons relevant to their local environment. This partnership development work can also lead to a future research proposal that examines how teachers engage with the developed lessons in high-quality professional development.

Over the yearlong project, the project partners will engage in monthly meetings within a Leadership Cadre composed of teachers, curriculum coordinators, administrators, university faculty members, and community partners. After establishing meeting protocols and sharing their current work in the educational arena, participants will explore their diverse perspectives on the need for culturally-appropriate and place-based STEM learning experiences for students. Major themes that arise from these meetings, including barriers, challenges, and constraints that must be addressed in the development of place-based learning experiences for students, will be identified. After conducting "listening tours" and gathering deeper perspectives related to student learning, the assessment of learning, learning data collection, and data interpretation and use in the educational setting, a framework or model will be advanced for curriculum development. Evaluation measures to document the quality of the project will include analyses of agendas, meeting minutes, mid-year and end-year surveys, interviews, and focus groups, as appropriate.