Evolving Impact: A Look at NSF's Discovery Research PreK–12 (DRK–12) Program

(*Includes DRK–12-related data through September 2024 only.)*

Since its inception in 2006, the Discovery Research PreK–12 (DRK–12) program, housed within the National Science Foundation's (NSF) Division of Research on Learning (DRL), has been a cornerstone of federal investment in preK–12 STEM education research. Designed to improve student and teacher learning outcomes in science, technology, engineering, and mathematics, the program evolved in scope, structure, and reach while maintaining its core commitment to rigorous, innovative research.

Between 2006 and 2025, the DRK–12 program was the largest funder of K–12 STEM education research at NSF, making approximately 1,500 research awards for a total of approximately 1.5 billion dollars.[1] DRK–12 funding consistently reached a wide range of institutions in states across the United States. Those in Massachusetts and California received the largest investment of DRK–12 funding, followed by Michigan, New York, and North Carolina. The program was also instrumental in supporting STEM education researchers from across the nation. Many of these researchers became leaders in the field, contributing to national standards, instructional materials, or assessments, as well as shaping the applied research landscape as part of DRK–12's portfolio.

Origins and Early Years

The DRK–12 program was launched with the release of NSF Solicitation 06-593. It unified several prior NSF initiatives under a broader mandate to support research that leads to transformative innovations in teaching and learning. The first DRK–12 solicitation (though it read as "DR K–12" in the early years) represented a consolidation and re-alignment of the Teacher Professional Continuum (TPC), Instructional Materials Development (IMD), and Centers for Learning and Teaching (CLT) programs that were administered in the Division of Elementary, Secondary, and Informal Education. The early solicitations emphasized three project types—exploratory and full-scale applied research, development of resources and tools, and capacity building and development—as well as conferences.

- *Applied Research* supported three categories of projects: Evaluative Studies of NSF-Funded Resources and Tools, Studies of Student Learning Progressions, and Studies of Teachers and Teaching.
- *Development of Resources and Tools* supported two categories of projects: Assessment of Students' and Teachers' Learning and Instruction of K–12 Students and Teachers.
- *Capacity Building* supported two categories of projects: STEM Systems Research and STEM Education Research Scholars.

In 2008, DRK–12 formally introduced a resource network through NSF Solicitation 08-502, resulting in the funding of CADRE (Community for Advancing Discovery Research in Education). Thereafter, CADRE served as the backbone for knowledge exchange across DRK–12 awardees and the broader STEM education community.

CADRE's descriptive review of 321 projects early in the life of the DRK–12 portfolio (2007–12 funding cohorts) found:

- Projects represented 41 states and the District of Columbia.

[1] Based on an award search filtered by DRK–12 program element codes 7645, 764500, and DRL organization.

- The portfolio was nearly equally divided in science and mathematics funding, whereas few projects were funded to study engineering or technology.
- The majority of projects were developing resources, whereas many fewer were developing technologies or models.
- Sixty-five percent (65%) of projects focused on design-development-testing versus other aspects of the research cycle.
- Fewer projects addressed the assessment strand (13%) than teaching (34%) and learning (51%) strands.
- Projects focused across grade levels, though less than 7% of projects worked with pre-kindergarten students or teachers.
- Only a small number of projects highlighted specific subgroups of students or teachers.
- The four states with the most PIs were Massachusetts, California, Michigan, and New York.

Programmatic Shifts (2006–25)

DRK–12 projects have historically focused on core content areas in mathematics and science education, with growing emphasis over time on engineering and computer science. In the early years of the DRK–12 program, it sought proposals that addressed one or more of the following key challenges in preK–12 STEM education:

1. How can improved assessment of student knowledge and skills advance preK–12 STEM teaching and learning?
2. How can all students be assured of the opportunity to learn significant STEM content?
3. How can we enhance the ability of teachers to provide STEM education?
4. How are effective innovations successfully implemented, scaled, and sustained in schools and districts in a cost-effective manner?

Awards primarily investigated student cognition and teacher professional development, particularly in math and science contexts. As the program evolved, there was a noticeable shift toward design-based research along with a rising interest in computational thinking, data use, and disciplinary literacy.

Midway through the program, engineering design and computer science education became more prevalent, often framed within the broader push for STEM integration. During this period, topics such as scientific modeling, argumentation, and culturally responsive pedagogy became more widespread, reflecting the field's attention to disciplinary practices and equity. Research methods increased in complexity.

In more recent years, the portfolio has expanded to include more research on implementation, system-level partnerships, and the scalability of innovations. Projects increasingly combined rigorous methodological designs with attention to real-world uptake, systemic change, and the sustainability of effective practices. There was a shift toward impact-focused, context-sensitive STEM education research.

In the early years, projects used both qualitative and quantitative methods (primarily correlational and one-group approaches); rigorous research methods were emphasized more in the later years. The methods employed were primarily design-based research, mixed-methods approaches, quasi-experimental designs, random controlled trials (in fewer but growing numbers), learning analytics (especially in the 2020s), and video-based analysis of classroom practice.

In 2013, the program rebranded as Discovery Research **Pre**K–12, acknowledging the importance of funding research on early learning. Over time, solicitations reflected additional shifts such as:

- Streamlining challenge areas (changed to "project strands") to teaching and learning, with clearer expectations for impact and dissemination
- Tiered funding levels (Levels I, II, III) reflecting the scale of research
- Increased emphasis on implementation and design-based research and research-practice partnerships
- Expansion of project types to include Partnership Development

Awarded projects most commonly addressed populations including K–12 teachers, elementary and middle school students, administrators and professional development providers (to a lesser extent), rural and underrepresented student groups, and emerging audiences such as computer science educators, computational-thinking facilitators, and multilingual educators.

The Role of DRK–12 Resource Centers

CADRE has been a connective tissue of the DRK–12 program since 2008, supporting over 1,300 grantees and elevating the visibility and utility of DRK–12-funded work through:

- Biennial PI meetings
- Cross-sector research-and-practice convenings
- Capacity-building webinars and videos
- Topical working groups and communities of practice
- Information and resource curation, product development, and dissemination
- Broad dissemination of DRK–12 project's products and research to a variety of stakeholder groups
- Early- and mid-career mentoring (including via the CADRE Fellows program)

In 2021, the Evidence Quality and Reach Hub (EQR Hub) was funded as another DRK–12 resource center. The EQR Hub supported DRK–12 researchers to strengthen the quality, relevance, and reach of their work through activities such as:

- Consultations and technical assistance
- Tools for equitable and rigorous research
- Capacity-building webinars and learning groups

Conclusion

The DRK–12 program was a pivotal mechanism for improving STEM learning and teaching in U.S. schools. With its deep investment in innovation and research on teaching, learning, and assessment, it not only seeded new ideas but also built a lasting infrastructure for STEM education improvement nationwide.

More specifically, the DRK–12 legacy includes:

- **A stronger evidence base for what works in preK–12 STEM education**: DRK–12-funded research and development advanced knowledge about how students and teachers learn STEM and how to design, implement, and assess effective innovations.
- **Widely used instructional tools and assessments:** DRK–12 grants underwrote the design and field tests of curricula, learning progressions, and measurement tools that moved from pilots to classroom use.
- **A field that's more connected and capable:** Through the DRK–12 resource centers (CADRE and EQR), the program built a national network that disseminated findings (e.g., STEM Smart), offered synthesis and professional development, and supported project teams and early-career scholars—helping translate research to practice.

- **Attention to equity and broadening participation:** DRK–12 repeatedly prioritized proposals that expanded participation and opportunity in STEM learning—shaping project design norms around inclusion and impact for diverse learners.
- **Research standards that raised the bar for the field:** The program built a portfolio spanning exploratory work through impact studies and conferences and/or syntheses—encouraging clear theories of action, rigorous study designs, and cumulative knowledge-building.
- **Enduring infrastructure for education improvement:** NSF's continued investment in DRK–12 not only accelerated education research and translation but also created an infrastructure for partnerships and professional development.
- **A bridge to the next era:** Although DRK–12 has been archived for new submissions, its aims roll into NSF's new STEM K–12 program, so the learning agenda DRK–12 established remains in motion.

Through the DRK–12 program, NSF made a near two-decade investment that knit together thousands of researchers and partners, produced usable knowledge and tools for classrooms, and raised expectations for equity and evidence in preK–12 STEM education. Its awards built a pipeline—from exploratory ideas to classroom-tested innovations—while CADRE and the EQR Hub built capacity for advancing and circulating this research. The result is a stronger national infrastructure for teaching, learning, and assessment that persists beyond any single grant cycle. As the portfolio transitions into NSF's STEM K–12 program, the DRK–12 legacy endures not just in publications or products but also in a field that is more connected, methodologically stronger, and oriented toward impact, ready to carry forward the work of improving STEM education for all learners.