Community for Advancing
Discovery Research in Education

Discovery Research K-12 (DR-K12):

Descriptive Summary of Portfolio Analysis

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Introduction

The National Science Foundation (NSF) Division of Research on Learning in Formal and Informal Settings (DRL) maintains a portfolio of complementary programs aimed at improving science, technology, engineering, and mathematics (STEM) learning at all stages. The Discovery Research K-12 (DR-K12) program is DRL's key program to support high-quality research and development on STEM learning and teaching at the elementary through high school levels.[1] Individual research and development projects funded by the DR-K12 program can be placed on a conceptual cycle of innovation and learning that advances the development of the field of STEM learning and teaching. A single project might fit within a single stage or bridge multiple stages in the cycle of innovation and learning:[2]

- **Design**, develop, test, validate, and refine materials, measurement tools, and methods, in specific contexts;
- **Implement** innovations; study why interventions have the impacts they have, with particular groups;
- **Evaluate** effectiveness; study complex phenomena, generalize;
- **Synthesize** lines of work; identify new insights and questions to inform new research and development; set research and development agendas; and
- **Hypothesize**, study and clarify phenomena of interest; frame issues; operationalize goals and constructs; develop and propose theory; conduct basic research on learning.

A key aspect of the cycle of innovation is that advances are made through the synergies of many projects with diverse goals and characteristics.

The Community for Advancing Discovery Research in Education (CADRE) was funded under a cooperative agreement to create a network that supports the diverse DR-K12 community and furthers the goals of the DR-K12 program. One of the goals of CADRE is to clarify where the field and various individual projects are on the cycle and to further STEM education research education along the cycle.

One of the first tasks undertaken by CADRE was an initial portfolio assessment of DR-K12 grants. This assessment has several goals: (1) Describe key characteristics of the projects in the DR-K12 portfolio; (2) Explain how grantees are working towards meeting the goals of the program and identify any gaps in the portfolio; (3) Identify potential technical assistance needs of grantees; and (4) Identify potential topics for syntheses and thematic studies. This report addresses the first goal by providing a descriptive summary of the findings from the initial assessment of the DR-K12 portfolio to help NSF better understand the scope and depth of research and development currently being conducted on STEM resources, models, and technologies. Subsequent CADRE activities will build on this portfolio assessment to address the other goals.

At the time of the assessment, the portfolio included the first two cohorts of funded projects. This report provides an overall portrait of the DR-K12 portfolio that includes a description of the types of projects funded (i.e., contextual or frontier) and the areas of research undertaken (e.g., on resources, models, or technologies). It also presents information on the characteristics of projects such as their distribution, across geographic areas, grade levels, subject areas, project contributors, proposed collaborators, populations targeted, research designs, and dissemination plans.

[1] Other programs in DRL's current portfolio include the Research and Evaluation on Education in Science and Engineering (REESE), Informal Science Education (ISE), and Information Technology Experiences for Students and Teachers (ITEST) programs.
[2] NSF DR-K12 Solicitation, NSF08502.

Approach to portfolio assessment

CADRE operates under a cooperative agreement with the NSF and does not have access to the data and materials maintained at NSF. Sources of data for the portfolio analysis were limited to publicly available documents and information, and materials provided to CADRE by individual awardees. Each project PI was contacted and asked to provide CADRE with a copy of their project's proposal, annual reports, any project publications, and any other information that would provide information about the plans, activities, and achievements of the DR-K12 project. Where project materials were not provided (29 projects), CADRE was limited to project abstracts and award information available on the NSF website. The limited availability of data for some projects, as well as the unsystematic reporting of details in the materials provided created challenges in being able to accurately code all projects and limited the level of detail that could be reported across them. As projects mature and additional materials are available, subsequent iterations of this portfolio analysis will provide a more complete picture of the portfolio.

CADRE staff systematically coded information about individual projects using a standard protocol that was developed based on a review of the DR-K12 program solicitations, proposals, and annual reports. The protocol captured information about project attributes, project characteristics, and the DR-K12 program goals being addressed. Project attributes were defined as general features of all of the projects, including cohort and funding categories. Codes for these attributes are mutually exclusive and derived from descriptions and definitions in the solicitations.

Project characteristics were defined as specific features of projects, including discipline (e.g., science, math, engineering, technology), subject area within discipline (as appropriate), grade level (e.g., elementary, middle, or high school), and population (e.g., in-service or pre-service teachers, administrators, professional developers). Project characteristics also included specifics about the research and development activities of projects. A project could be coded as including multiple characteristics. In other words, classifications were not mutually exclusive. The DR-K12 program goals that were coded included the primary area of each project's focus (e.g., resources, models, or technologies), and the challenges within the contextual and frontier strands addressed.

Data from individual projects were aggregated to provide the portfolio perspective that is presented in this report. The data were analyzed to provide a comprehensive picture of the portfolio, guided by research questions that describe the types of projects and investigators funded:

- What types of projects is DR-K12 funding?
- Who is being funded?

and questions that characterize the research and development activities of the projects:

- Where is the program focusing its investment?
- What research is being conducted?
- Are projects evaluating their work?
- What dissemination are projects planning?

The following sections of this report summarize the findings from the analysis of each research question.

What types of projects is DR-K12 funding?

CADRE received from NSF lists of awards that fell within the DR-K12 program. These were awards that had been funded under the DR-K12 program in its first and second years of funding, treated in this report as cohort 1 and cohort 2, respectively. After combining multiple awards that were funding the same project,[3] the portfolio of DR-K12 projects included 137 unique projects; 84 of these projects are in cohort 1, 53 in cohort 2, and 19 of these were co-funded, receiving funding from both DR-K12 and some other NSF program.

Size of awards

The DR-K12 portfolio that was reviewed includes 137 projects that have been funded for an average of 3.17 years.[4] To date, these projects have current funding of $618,819 on average from the DR-K12 program; cohort 2 projects have received on average almost $150,000 more in DR-K12 funds compared with cohort 1 projects (Exhibit 1).[5] Of the 137 projects in the DR-K12 portfolio, 19 (14 percent) are co-funded by other NSF programs. When we include the co-funded projects' non-DR-K12 funding, the average level of funding that DR-K12 projects have received is $646,204. The 19 co-funded projects have been awarded an average of $415,887 total NSF funds, with an average of $218,422 coming from the DR-K12 program. Note, these budget numbers include only amounts funded to date.[6] The total intended funding amounts will be presented when we have received and analyzed the data for the total intended funding for projects that are fully funded by DR-K12 and those that are co-funded with other projects.

Exhibit 1: Duration and Current Funding Levels of DR-K12 Projects

Projects	Mean duration (years)		Mean award ($)	Median award ($)	Minimum award ($)	Maximum award ($)
All (N=137)	3.17	DR-K12 funding	618,819	409,924	6,000	3,190,230
		Total NSF funding	646,204	439,747	12,000	3,190,230
Cohort 1 (N=84)	3.27	DR-K12 funding	561,825	349,812	25,000	2,964,284
		Total NSF funding	584,681	404,889	43,283	2,964,284
Cohort 2 (N=53)	3.00	DR-K12 funding	709,149	439,747	6,000	3,190,230
		Total NSF funding	743,713	460,562	12,000	3190,230
Co-funded (N=19)	3.05	DR-K12 Funding	218,422	91,744	6,000	1,690,125
		Total Funding	415,887	320,205	12,000	2,120,125

Category of funding

Each DR-K12 program solicitation specified the types of activities to be funded by the program. The first solicitation, under which cohort 1 was funded, identified three areas: **applied research**, which included evaluative studies of NSF-funded resources and tools, studies of student learning progressions, and studies of teachers and teaching; **development of resources and tools**, which included assessment of student and teacher learning, and K-12 student and teacher instruction; and **capacity building** projects, which included STEM systems research, and STEM education research scholars.[7] Nearly two-thirds of

[3] Projects that were funded under multiple awards are treated as a single project in this analysis, and the PI identified in the proposal or the PI of the largest award was recorded as the project PI and others as co-PIs.

[4] Additional DR-K12 funds have been distributed to projects that are primarily funded in other NSF programs and not included in this portfolio analysis.

[5] Projects that were funded under multiple awards are recorded as a single project, and the funding amounts of the individual awards were combined into a collective project funding amount.

[6] These are funds that were distributed during '07-'09.

[7] NSF DR-K12 Solicitation, NSF06593.

projects (61.9 percent) in the first cohort involve the development of resources and tools. In 38.1 percent of the projects, the resources and tools are related to the instruction of students and teachers and in 14.3 percent of the projects, they are related to the assessment of students and teachers. Fewer projects focus on applied research (23.8 percent) or capacity building efforts (8.4 percent).

The second solicitation, under which cohort 2 was funded, set out to fund: **full research and development**, which included research, design, development, and testing of resources, models, and technologies; **exploratory**, which studied and clarified constructs and developed theoretical foundations; **synthesis** projects, which synthesized existing knowledge; as well as **conferences and workshops**; and a DR-K12 Network, which resulted in CADRE.[8,9] Just over half of these projects involve research and development (54.7 percent) and fewer are classified as exploratory projects (18.9 percent), workshops and conferences (13.2 percent), or syntheses projects (3.8 percent). The limited data we have on some projects provided insufficient information to classify several projects in each cohort into an appropriate category; 6.0 of the cohort 1 and 9.5 percent of the cohort 2 projects could not be reliably classified.

Exhibit 2: Targeted Activities Funded under Each Solicitation

Cohort 1	Percent (N=84)	
Applied Research	23.8	
Studies of teachers and teaching		10.7
Evaluate NSF-funded resources and tools		7.1
Studies of student learning progressions		6.0
Development of Resources and Tools	61.9	
Instruction of students and teachers		38.1
Assessments of students and teachers		14.3
Development of Resources and Tools (general)		9.5
Capacity Building	8.4	
Unable to classify	6.0	
Cohort 2	**Percent (N=53)**	
Research and Development	54.7	
Exploratory	18.9	
Synthesis	3.8	
Conference or Workshop	13.2	
Unable to classify	9.5	

Challenge focus

The DR-K12 program was built on the foundation of three precursor programs—the Teacher Professional Continuum (TPC), Instructional Materials Development (IMD), and Centers for Learning and Teaching (CLT) programs. The DR-K12 program subsumed the goals of each of these predecessors into three Grand Challenge areas: (1) K-12 mathematics and science assessments; (2) Elementary grades science; and (3) Cutting-edge STEM content in K-12 classroom. Grand Challenge 1 focused on improved assessments of student learning in science and mathematics. Grand Challenge 2 promoted developing the knowledge base on early science learning. Grand Challenge 3 promoted the infusion of STEM discoveries into K-12 STEM classrooms. The majority of projects (50.0 percent) focus on infusing the curriculum with current STEM knowledge, while fewer target improving assessments (20.2 percent) or elementary grade science (14.3 percent).

[8] NSF DR-K12 Solicitation, NSF08502.
[9] The cooperative agreement that funds CADRE is not included in the portfolio assessment.

In the second solicitation, the components of the program were reorganized into two strands—contextual challenges and frontier challenges. Just under 36 percent of the projects address contextual challenges designed to respond to immediate challenges in K-12 STEM education. Another 52.8 percent of the projects address frontier challenges designed to anticipate and improve the education of learners in the near future, including broadening access for all students, and incorporating cyber-enabled learning. Finally, 11.3 percent of the projects could not be classified.

Exhibit 3: Challenge Focus Area for Each Solicitation

Cohort 1	**Percent (N=84)**	
Grand Challenge 1: Assessments	20.2	
Grand Challenge 2: Elementary Grades Science	14.3	
Grand Challenge 3: Cutting Edge STEM content in K-12 classrooms	50.0	
Unable to classify	15.5	
Cohort 2	**Percent (N=53)**	
Contextual Challenge	35.9	
Role of assessment in teaching & learning		18.9
Enhancing STEM learning to prepare the technological workforce		11.3
Frontier Challenge	52.8	
Broaden access to STEM learning to all students		17.0
Supporting teachers' practice and learning in digital age		24.5
Unable to classify	11.3	

Disciplines addressed by projects

DRK-12 projects address a variety of STEM disciplines. Both science and mathematics are well represented across the projects, though a larger proportion of projects involve science (65.0 percent) than mathematics (50.4 percent). Technology and engineering are targeted by fewer of the projects (13.1 and 11.0 percent respectively).

Exhibit 4: STEM Disciplines Addressed by Projects

Discipline[10]	**Percent (N=137)**
Science	65.0
Mathematics	50.4
Technology	13.1
Engineering	11.0
Statistics	2.2

[10] No projects fell into the categories of computer science, social science and economics, and behavioral and cognitive sciences, so these are not included in the table.

There are 45 projects that have a focus on science at the middle school level, making it the most popular discipline-grade level combination. Other popular combinations were middle school math (40), high school science (39) and math (30), and elementary school science (32) and math (28). Technology focused projects in middle school (11) and high school (11) were the only other discipline-grade level combinations that had more than 10 projects.

Exhibit 5: Disciplines Addressed of DR-K12 Projects by Grade level

Grade Level	Number of Projects						
	Math	Science	Engineering	Technology	Computer Science	Statistical Methods	Other
Pre-K	3	2	1	1	0	0	0
Elementary	28	32	5	4	1	0	2
Middle School	40	45	6	11	1	2	3
High School	30	39	8	11	1	1	3
Other	4	4	1	2	0	0	0
Unable to classify	5	6	1	1	0	0	0

Grade levels and populations included

The target populations for projects vary along several dimensions including grade, characteristics of subgroups, and whether or not they focused on students or teachers (or both))[11]. Most projects include teachers in the target population (86.9 percent). The focus is on pre-service teachers in 13.1 percent of the projects, teachers of special education students in 4.4 percent, and teachers of English Language Learner (ELL) students in 3.7 percent of the projects.

Exhibit 6: Populations Targeted by Projects

Target Population	Percent (N=137)
Teachers	86.9
Special education	*4.4*
ELL	*3.7*
Pre-service	*13.1*
Students	70.8
Special education	*5.8*
ELL	*6.6*
School administrators	8.0
Higher education faculty (undergraduate)	5.8
Higher education faculty (graduate)	5.1
Individuals in informal learning settings	2.2

Most projects also include students in the target population (70.8 percent). Special education students were the focus of 5.8 percent and ELL students were the focus in 6.6 percent of the projects. Less than 10 percent of the projects focused on administrators, and higher education faculty of either undergraduate or graduate students. Projects spanned the pre-kindergarten-12 continuum, with some projects involving

[11] Projects that specified age ranges rather than particular grade levels were classified as follows: Pre-K (ages 3-4); Kindergarten to 5th grade (ages 5-10); 6th to 8th grade (ages 11-13); 9th to 12th grade (ages 14-18)

students and/or teachers from multiple school levels. Middle school grades were the most commonly included grades across both projects involving both teachers and students, followed closely by high school.

Exhibit 7: Grade Levels Included in Projects

Target Population		Percent (N=137)
Teachers		
	Pre-K	1.5
	Elementary school	32.9
	Middle school	51.1
	High School	38.0
Students		
	Pre-K	2.2
	Elementary school	22.6
	Middle school	39.4
	High school	32.1

Who is being funded?

Substantive background of researchers

DR-K12 projects are housed at colleges and universities (68.6 percent), and within non-academic institutions (31.4 percent). Over fifty percent of PIs (54.7 percent) were in education departments or organizations, just under one-fifth (19.7 percent) were in STEM departments or units, and 8.8 percent were in other disciplines. One PI held a joint appointment in education and science departments, and there was not enough information to classify the disciplinary background of 15.3 percent of the PIs.

Experience and collaboration

The DR-K12 community contains both experienced and new investigators. Fifty-two percent of projects are lead by PIs who have received prior NSF funding. This is the first NSF research grant for 48.2 percent of PIs.

Almost three-fourths of projects (73.7 percent) involve collaborations between investigators as reflected by the involvement of a co-PI on the grant. Across projects for which demographic information of investigators was available (N=116), 67.2 percent included at least one female senior investigator (PI or co-PI) and 18.1 percent included at least one senior investigator from a minority racial/ethnic group.

In the materials available to CADRE, we identified 34 projects that involved collaborations between senior investigators with STEM and education backgrounds. Among the 75 projects with PIs in education fields, 19 involved co-PIs from STEM fields; and among the 27 projects with PIs from STEM fields, 15 involved co-PIs from education.

Many DR-K12 projects are using their funds to support higher education students. Among projects for which information about the funding of student was available (N=116), 8.6 percent of projects fund post doctoral students, 57.8 percent fund graduate students, and 11.2 percent fund undergraduate students.

Geographical distribution

The institutional location of the PIs of DR-K12 projects are distributed across the country in 31 states and the District of Columbia. Exhibit 7 presents the number of projects located in each state. The states hosting the largest number of projects are Massachusetts (23), California (22), and New York (13). Fourteen of DR-K12 projects (10.2 percent) are located in Experimental Program to Stimulate Competitive Research (EPSCoR) states.[12]

Exhibit 8: Geographical Distribution of Projects

Number of Projects in State	State (s)
23	Massachusetts
22	California
13	New York
5	Indiana, North Carolina, Michigan, Pennsylvania, Virginia
4	Colorado, District of Columbia, Maryland, Missouri, Tennessee, Washington
3	Arizona, Illinois, New Jersey, Ohio, Texas
2	Connecticut, Georgia, Maine, Wisconsin
1	Alabama, Alaska, Delaware, Iowa, Kentucky, Mississippi, Nebraska, New Mexico, West Virginia

[12] Twenty-five states, Puerto Rico, and the Virgin Islands are designated as Experimental Program to Stimulate Competitive Research (EPSCoR) states.

Where is the program focusing its investment?

Placement in cycle

The cycle of innovation and learning was introduced in the DR-K12 program in the FY2008 program solicitation.[13] As previously mentioned, the cycle encompasses five stages in the process of innovation and learning that together advance the development of the field of STEM learning and teaching.

- **Design**, develop, test, validate, and refine materials, measurement tools, and methods, in specific contexts;
- **Implement** innovations; study why interventions have the impacts they have, with particular groups;
- **Evaluate** effectiveness; study complex phenomena, generalize;
- **Synthesize** lines of work; identify new insights and questions to inform new research and development; set research and development agendas; and
- **Hypothesize**, study and clarify phenomena of interest; frame issues; operationalize goals and constructs; develop and propose theory; conduct basic research on learning.

Projects were classified according to which of the five stages on the cycle of innovation they primarily addressed. In 10.2 percent of the projects, the stage could not be determined from the information available.

The first two cohorts of the DR-K12 portfolio address all five stages of the cycle of continuum, though the bulk of the work is being done in the design stage. Over half of the projects (51.1 percent) are developing, testing, and refining materials, measurement tools, and methods. The second most common stage is the evaluation of effectiveness. Over 15 percent of the projects (15.3%) are evaluating the effectiveness of a resource, model, or technology, or studying complex phenomena. Fewer than 10 percent of the projects are addressing the other three stages: implementation, syntheses, or hypothesis and study of theory or basic research.

Exhibit 9: Placement on the Cycle of Innovation and Learning by Cohort

Cycle Stage	Cohort 1 N = 84	Cohort 2 N= 53	Total % (N=137)
Design, develop and test	52.4	49.1	51.1
Implement and study efficacy	6.0	9.4	7.3
Evaluate effectiveness and generalize	14.3	17.0	15.3
Synthesize and theorize	8.3	9.4	8.8
Hypothesize and clarify	7.1	7.6	7.3
Unable to classify	11.9	7.6	10.2

[13] NSF DR-K12 Solicitation, NSF08502

There are some differences between experienced and inexperienced PIs with respect to where projects fall along the cycle; PIs with previous NSF funding are more likely to be engaged in the design phase, compared with PIs with no previous funding.

Exhibit 10: Placement on the Cycle of Innovation and Learning by PI Previous Funding

Cycle Stage	Previous funding (N=80)	No previous funding (N=55)	Previous funding unclear (N=2)
Design, develop and test	51.3	50.9	0.0
Implement and study efficacy	6.3	7.3	50.0
Evaluate effectiveness and generalize	15.0	16.4	0.0
Synthesize and theorize	12.5	3.6	0.0
Hypothesize and clarify	6.3	9.1	50.0
Unable to classify	8.75	12.7	0.0

Projects studying the various STEM disciplines fell along the spectrum of stages. The design phase was the most common across disciplines, although projects involving mathematics are less likely to be in the design phase, compared with projects involving other disciplines, and more likely to be in the evaluation phase.

Exhibit 11: Placement on the Cycle of Innovation and Learning by Discipline

Cycle Stage	Math (N=69)	Science (N=89)	Engineering (N=15)	Technology (N=18)
Design, develop and test	37.7	57.3	53.3	66.7
Implement and study efficacy	5.8	9.0	0.0	0.0
Evaluate effectiveness and generalize	20.3	10.1	13.3	11.1
Synthesize and theorize	13.1	6.7	20.0	11.1
Hypothesize and clarify	11.6	5.6	13.3	11.1
Unable to classify	11.6	11.2	0.0	0.0

Project focus

Across the portfolio, DR-K12 funds projects to develop, adapt, or study new or existing resources models, or technology. Some projects combine resources, models, and/or technologies. While both resources and models influence instruction and learning, they can be distinguished by their proximity to actual use in the classroom. Resources are instructional or instructionally-related materials that are used directly in instruction and learning, whereas models have a more indirect or distal influence in learning and instruction—for example curricular frameworks, learning progressions, teacher education or professional development frameworks, standards. Technology, in turn, can be a delivery mechanism (e.g. learning opportunities provided by software, calculators, web-experiences, portable digital media), and therefore not mutually exclusive of the other two categories.

Over half of projects are developing or studying resources (60.6 percent), 38.7 percent are developing or studying models and 38.7 percent are employing or studying technology. Almost half of the projects focusing on resources also incorporate technology (48.2 percent), and 26.4 percent of the projects focusing on models include a technological component.

Exhibit 12: Proportion of Projects with Focus on Resource, Model, and Technology

Project Focus	Total (N=137)	Percent Involving Technology
Resource	60.6	(N=83) 48.2
Model	38.7	(N=53) 26.4
Technology	38.7	

Form of resource

Among the 83 projects working with a resource, the most common forms of resource being developed, studied, or modified are curriculum units or short courses (41.0 percent), assessment instruments (36.1 percent), and handbooks or manuals (24.1 percent).

Exhibit 13: Specific Form of Resource among Projects Working with Resources

Form of Resource	Percent of Projects (N=83)
Curriculum unit or short course	41.0
Assessment instrument	36.1
Handbook/manual	24.1
Video	13.3
Curriculum (full)	13.3
Workshop	12.1
Software	8.4
Course	4.8
Database	3.6
Book	3.6

Type of model

Among the 53 projects working with a model the most common forms of models involve teachers' learning, including professional development (37.7 percent) and teacher education (26.4 percent). Projects working with learning progressions (13.2 percent), curriculum frameworks (11.3 percent), and standards (5.7 percent) are less common.

Exhibit 14: Specific Form of Model among Projects Working with Models

Type of model	Percent of Projects (N=53)
Professional development intervention	37.7
Teacher education	26.4
Learning progression	13.2
Curriculum frameworks	11.3
Standards	5.7
Other	30.2

Type of technology

Among the 53 projects that involve technology, the most commonly classified forms of technology used in projects are web-based resources (39.6 percent), cyberlearning (30.2 percent), and the use of software (26.4 percent). It is important to also note, however, that 18.9 percent of the projects using technology used forms that fell outside of these main categories and are classified as "other."

Exhibit 15: Forms of Technology among Projects Working with Technology

Type of technology	Percent of Projects (N-53)
Web-based resource	39.6
Cyberlearning	30.2
Software	26.4
Networking, collaboration tool	15.1
Virtual environment	9.4
Portable digital media	3.8
Other	18.9

What research is being conducted?

Research design specified

The DR-K12 projects include a wide range of field-test and piloting strategies, and the use of research methods include, but are not limited to, randomized double-blind experiments, in-depth qualitative case-study designs, and syntheses including literature reviews and meta-analyses. Projects are still in their early stages, and only 8.8 percent of projects report that they have findings available from their research. However, the types of research designs and analytic components planned for or being used in projects were classified whenever possible given the available information at the time of data coding.

Almost all projects (98.5 percent) posed explicit research questions in the materials provided to CADRE, and just under two-thirds of projects (64.2 percent) detailed research designs to answer their specific research questions. Of the 88 projects that provided details on their research designs, two-thirds include descriptive studies (65.9 percent), four-tenths of the projects are investigating correlations (40.9 percent), and 40.9 percent intend to investigate causal relationships by including experimental or quasi-experimental designs. Over one-third of the projects plan to use a mixed methods approach (37.5 percent) that includes both qualitative and quantitative components.

Exhibit 16: Research Designs among Projects Specifying Research

Type of Research Design	Percent (N=88)
Descriptive	65.9
Correlational	40.9
Causal	40.9
Mixed method	37.5
Action Research	6.8
Synthesis	4.6
Other	2.3

Among those projects that specify a research design, 48.9 percent are conducting pilot testing, 13.6 percent include a longitudinal design, and 5.7 percent are conducting secondary data analyses.

Data collection approaches

Of the 88 projects that had specific research designs, 83 involve data collection efforts.
The most common form of data collection is the use of assessments to gauge student or teacher learning or achievement (79.5 percent). Other common forms of data collection are observations (62.7 percent), semi-structured or informal interviews (59.0 percent), and self-administered surveys (47.0 percent).

Exhibit 17: Data Collection Approaches Among Projects with Data Collection in Their Research Designs

Type of data collected	Percent of projects (N=83)
Assessments	79.5
Observation	62.7
Semi-structured interviews	59.0
Self-administered surveys	47.0
Diaries/journals/records kept by study participants	15.7
School records/transcripts	8.4
Focus groups	9.6
Researcher administered surveys	7.2

Outcome domains

Three-quarters of projects are examining outcomes of student performance and achievement (74.7 percent), one-third are investigating student attitudes or beliefs (33.7 percent), and just under one-fourth are looking at student behavior (22.9 percent). Among teacher outcomes, projects are investigating classroom practices (55.4 percent), teacher attitudes and beliefs (44.6 percent), pedagogical content knowledge (36.1 percent), and content knowledge (27.7 percent). Fewer projects are investigating fidelity of implementation and administrator attitudes or beliefs (19.3 and 7.2 percent, respectively).

Exhibit 18: Outcome Domains among Projects with with Data Collection in Their Research Designs

Outcome	Percent of projects (N =83)
Student:	
Achievement/performance	74.7
Attitudes/beliefs	33.7
Behavior	22.9
Teacher:	
Classroom practices	55.4
Attitudes/beliefs	44.6
Pedagogical content knowledge	36.1
Content knowledge	27.7
Administrator:	
Attitudes/beliefs	7.2
Fidelity of implementation	19.3

Are projects evaluating their work?

Specific evaluation plans

DR-K12 solicitations require that projects include an evaluation plan as part of their project description. However, only fifty-nine projects (43.1 percent) detailed an evaluation plan separate from research being conducted in the materials provided to CADRE. Of these, 40 projects (67.8 percent) involved an external evaluator. Sixty-one percent of the evaluation plans included a formative component and 72.9 percent a summative evaluation component.

Evaluation design

Of the 59 projects that provided details of their evaluation plan designs, over one-half planned descriptive studies (57.6 percent), and 18.6 percent involved mixed methods research. Fewer planned evaluations that explored causal or correlational relationships (11.9 and 6.8 percent, respectively).

Exhibit 19: Evaluation Designs among Projects Including Detailed Plans

Type of Evaluation Design	Percent (N=59)
Descriptive	57.6
Mixed method	18.6
Causal	11.9
Correlational	6.8

What dissemination are projects planning?

Specific dissemination plans

DR-K12 solicitations also require that projects include a dissemination plan as part of their project description. There are 118 projects (86.1 percent) that contain a dissemination plan in their materials. Most of these plans detailed the specific information or materials that would be disseminated (86.4 percent), and just over one-quarter identify potential partners in dissemination (25.4 percent). Close to two-thirds identify potential adopters of materials or users of information (61.0 percent), although less than one-fifth (19.5 percent) involve these potential stakeholders in early stages of research, design, and development. Few projects addressed issues of sustainability as part of their dissemination strategies (7.6 percent), or identified challenges to dissemination (1.7 percent).

Exhibit 20: Details Included in Dissemination Plan among Projects with a Dissemination Plan

Characteristics of dissemination plan	Percent of projects (N=118)
Identifies what will be disseminated	86.4
Identifies potential adopter/end user	61.0
Identifies dissemination partners	25.4
Includes end user input in design/development/research	19.5
Addresses strategies for sustainability	7.6
Intends to develop a formal dissemination plan	2.5
Identifies dissemination challenges	1.7

Vehicle for dissemination

The most common planned mechanism for dissemination is presentations or poster sessions at conferences (72.9 percent), followed closely by publications in academic journals (72.0 percent). Almost

two-thirds of projects intend to use websites to disseminate their work (61.9 percent), almost half planned to publish in practitioner publications (42.4 percent), and over one-quarter plan to use workshops (28.8 percent) as a vehicle for dissemination. Less common forms of dissemination include writing books or book chapters, developing commercial products or publications, white papers, CDs or DVDs, newsletters, blogs, webinars, and the use of popular media.

Exhibit 21: Planned Dissemination Mechanisms among Projects with a Dissemination Plan

Vehicle for dissemination	Percent of projects (N=118)
Presentations/poster sessions	72.9
Academic journal articles	72.0
Websites	61.9
Practitioner publications	42.4
Workshops	28.8
Books/book chapters	11.9
Commercial product or publication	9.3
White papers	6.8
CDs/DVDs	6.8
Newsletter	6.8
Blogs	5.9
Webinars	3.4
Popular media	3.4

Future work with the portfolio

The current portfolio analysis was conducted on the first two cohorts of projects. In the next year, we will gather project materials from the third cohort of projects and augment the portfolio analysis from these projects. In addition, we intend to solicit current materials from projects in cohorts 1 and 2 in order to update the portfolio analysis. These updates will be conducted each year to include additional grantees awarded in successive cohorts, and to update the analysis annually for earlier cohorts as new information becomes available from project reports and products.

Over time, as the projects begin to make progress with their research, we will conduct more in-depth analyses to assess the extent to which the projects are meeting intended program goals and whether the research is proceeding with rigor. As appropriate we will also identify challenges and successes, and products developed. The CADRE team will also discuss with the NSF the need for additional information from the portfolio assessment.

In addition, we will conduct targeted studies or syntheses that focus on specific areas and delve into the particulars of the projects. An initial summary of this kind was prepared of DR-K12 projects that focus on Assessment. Topics for further exploration will be indentified by NSF, CADRE—related to identified special interest groups—and the field.