



Evaluating the Efficacy of the Data Research and Development Center (DRDC)

Results of a Self-Study for the National Science Foundation*

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EXECUTIVE SUMMARY

The Data Research and Development Center (DRDC) was established in 2002 through a cooperative agreement with the National Science Foundation (NSF) to support, strengthen, and disseminate high quality research funded under the Interagency Education Research Initiative (IERI). Drawing on a template developed by DRDC Principal Investigator Barbara Schneider, senior staff created a framework to guide a self-study designed to provide both summative and formative evaluations of the Center's impacts in supporting the IERI program and pursuing its own research agenda. A major goal of this self-study was to enhance the more traditionally reflective, narrative, and internally-validated character of many self-study processes with more robust indicators providing some opportunities for longitudinal analyses and external validation.

This mixed-methods approach draws on data from a variety of sources, including contemporaneous evaluations of specific Center activities (e.g. annual PI and special topic meetings), a wealth of documents collected over the past six years (e.g., correspondence, website statistics, citation analyses, meeting reports), and the experiences of DRDC investigators and staff. The Center also conducted in-depth interviews with a random sample of 25 of the 77 projects whose funding periods exposed them to the full range of services provided by DRDC. When combined with the database of IERI project characteristics maintained by the Center, these interviews can help inform judgment regarding the scalability of the programmatic support center concept and also provide suggestions for future support centers.

Main findings

Funded under the IERI program, a federal initiative to provide rigorous evidence that educational interventions can be taken to scale, DRDC similarly researched the efficacy of its support functions and the feasibility of replicating such support with other research communities. Specifically, from its inception the mission of DRDC has been to support other IERI-funded projects by

1. **Conducting research on scale-up** to help build capacity in the field for ensuring that educational interventions will be effective when applied to larger and more diverse populations. To date, the Center has supported 56 presentations at professional association meetings and the publication of 15 refereed journal articles, four of which have received an average of 3.4 citations per year. DRDC investigators also contributed 12 chapters to edited volumes, edited the two volumes of *Scale-Up in Education* (Schneider & McDonald, 2007a, 2007b), and produced 14 research reports or technical papers, including two white papers and the *Just the Facts* brochure. The two *Scale-Up* volumes have together sold about 700 copies in less than two years, while the *Just the Facts* brochure has been distributed by NSF and averaged about 100 downloads per month in 2007. By having its own research agenda that was methodologically supportive of the projects yet not competitive in substance, it legitimized the work of the Center and fostered cooperation.
2. **Providing technical assistance** both individually and collectively on research methods and design, networking with other projects, and dissemination of findings to educators

and policy makers. Analysis of project demographics indicates that IERI projects more involved with DRDC-sponsored activities and projects receiving a moderate amount of funding were more likely to have received technical assistance services. TA consultations did not vary by project research methods, when the project was funded, or by project topical focus. These results suggest that Center support is important to projects with limited resources and also highlight the importance of building community to encourage the use of such services (and vice versa). Ratings of TA services were uniformly high and did not vary by project characteristics, indicating that DRDC delivered high-quality technical assistance to any project that requested it.

3. **Building an IERI community** by encouraging interaction among projects both in person and online and by synthesizing results across the IERI portfolio for stakeholder groups. Principal investigator meetings organized and hosted by the DRDC were highly rated at the time and received good but slightly lower ratings by investigators interviewed for the self study. However, PIs who attended at least two meetings gave significantly higher ratings than those who attended only one. PIs whose projects were more involved with DRDC also were significantly more likely to give higher meeting ratings, as were PIs whose projects included experimental designs and those with smaller awards, indicating that the meetings provided valuable resources to projects most in need of them. The DRDC website saw a 350% increase in visits in four years, with an estimated 4.4 visits per month by IERI projects and a "good" or "excellent" rating by most PIs interviewed.

Overall, IERI investigators interviewed for the self study gave near "excellent" ratings for the professionalism of DRDC staff, with slightly lower ratings for the quality of DRDC services and the usefulness of Center support to their projects respectively. More project involvement with the Center is associated with higher ratings for both DRDC staff and the quality of DRDC products and services. However, the overall usefulness of DRDC support is independent of project involvement, project timing, size, topical focus, research design, and receipt of technical assistance. This suggests that a support center can be scaled up to serve a diverse population of research projects with a variety of needs.

Selected recommendations

A second goal of this self-study was to identify insights from the DRDC experience that might inform future programmatic support centers' efforts and programs of activity, especially those lessons relevant to the STEM education research community served by NSF's Directorate for Education and Human Resources (EHR). The following selected recommendations are based on the served community's assessments of the Center and the reflections of DRDC investigators and staff.

- **Monitor project-specific technical assistance requirements.** Conducting an initial needs assessment is critical in identifying, prioritizing, and addressing problems for individual projects and the community as a whole. However, one-time inquiries into project needs are likely to be insufficient not only to determine the full range of technical assistance requirements but also to develop the confidence projects' require in order to entrust the

programmatic support center with the provision of those TA services and to engage in activities on behalf of the community.

- **Build connections with a pool of experts within and outside the community.** The broad range of TA requirements in multidisciplinary communities requires an equally broad pool of technical expertise. Staffing programmatic support centers with individuals whose institutional ties and social networks provide connections to a wide range of experts is one strategy for building this pool. Another option would be to encourage the development of cross-center relationships and collaboration, perhaps providing a password-protected online TA referral resource.
- **Maintain strong ties to and the strong support of agency program staff.** Agency staff are pivotal in helping establish an identity which encourages the community it serves to perceive the support center as a collaborative partner in providing resources to pursue issues of interest not only to the community as a whole but also to subgroups with particular methodological and substantive foci and questions. Such an identity then allows all parties to view the center not as a substitute but as an additional conduit for raising ideas with program officers.
- **Establish the legitimacy and authenticity of the center and its activities.** A support center should regularly solicit investigators' comments on how core activities (e.g., PI meetings, online services) should be organized and might be improved. Such comments help both to shape and iteratively refine services and to improve investigators' assessments of activities as legitimate and authentic – a perception that also positively shapes understanding of the interests which link the community itself.
- **Pursue a research agenda consistent with program goals and project needs.** A support center's research agenda can help guide the development of TA services and, perhaps more importantly, can provide the legitimacy required to leverage the capacity of individual projects to serve the community as a whole. Enriching DRDC services with findings from an active research program – and enriching our research with directions from the field regarding priority topics – helped to ensure the benefits of each were leveraged to achieve the Center's mission in support of the IERI program.

Finally, self-study played an important role in prompting us to consider the limits as well as the implications of the information we were able to document regarding the impacts of Center activities. We found the insights gleaned from this process, combined with summative evaluations of discrete activities, invaluable in tailoring DRDC services and in considering how evidence generation and knowledge accumulation can be promoted in support of programmatic objectives. We would strongly encourage future programmatic support centers to similarly commit to developing and implementing an ongoing program of critical self-analysis.

1. INTRODUCTION

The Data Research and Development Center (DRDC) was established in 2002 through a cooperative agreement with the National Science Foundation (NSF) to support, strengthen, and disseminate high quality research funded under the Interagency Education Research Initiative (IERI). In many ways the DRDC was a new model for the agency; its technical assistance and community building activities were designed not only to assist individual IERI projects, but also to build capacity and leverage the broader impacts of the program as a whole. Similarly, DRDC's research activities complemented yet transcended the IERI program's substantive emphasis on the scalability of interventions. While DRDC was expected from the outset to document investigator, project, and agency staff assessments of individual activities using established indicators, it was also expected that existing metrics would prove insufficient to establish the overall contributions of the Center to individual IERI projects and to the program as a whole. A 2004 proposal for a supplementary award included a request for funds to conduct a self-study to combine an awareness, image, and impact assessment of DRDC with a report that would reflect on critical success factors and shortcomings, and provide recommendations regarding both the establishment and the evaluation of similar centers in the future. This proposal was successful, and drawing on a template developed by DRDC Principal Investigator Barbara Schneider to evaluate the Center for Education at the National Academies, DRDC senior staff created a framework to guide a self-study designed to assess the Center's efforts to support the IERI program, and to inform future efforts to support NSF-funded programs.

This report describes the goals, methodology, and results of the DRDC self-study, and offers recommendations based on the Center's experiences for the establishment and evaluation of future programmatic support initiatives. This section briefly reviews the origins of DRDC, and describes the goal for the self-study and the methodology employed. Section 2 analyzes feedback on the technical assistance services provided by DRDC. Section 3 evaluates DRDC's efforts to build and strengthen ties within the IERI research community. Section 4 describes and assesses the impacts of DRDC's own research initiatives. Section 5 presents a summary of lessons learned from this prototype center, with implications for other programmatic support initiatives.

Origins of the DRDC: Supporting the Interagency Education Research Initiative

In the autumn of 2000, Schneider and Co-Principal Investigators Larry Hedges, Colm O'Muircheartaigh, Robert Zimmer, and David Sallach received a planning grant to develop a proposal to the National Science Foundation to establish a center in support of the Interagency Education Research Initiative (IERI).¹ One goal of this new center would be to provide technical support to IERI principal investigators (PIs) and their projects. IERI "intend[ed] for its projects

¹ Under this planning grant (REC-0089235) the team: (1) designed a curricular outline for a series of seminars and workshops and a sampling course; (2) conducted secondary analyses using four national probability datasets to explore school effects and how they have changed over time; (3) constructed a model for linking datasets; (4) hosted a conference on data linking; (5) conferred with several IERI investigators on their data needs; (6) received additional training on data confidentiality, human subjects protection, and research integrity; (7) attended the Knowledge, Discovery, and Data Mining Conference on new techniques for software data warehousing, data mining, data display, and integration of quantitative and qualitative datasets; and (8) conferred with the directors of NICHD Data Coordinating Centers to obtain advice on the purpose and activities of a center serving IERI projects.

to be as effective as possible,” and recognized that “one way to improve the prospects for success is to provide technical assistance to PIs.” It was proposed the center would “take an active role in helping PIs to identify and understand the conditions that are essential for moving promising educational models, programs, and strategies to scale. Equally important ... [the center would provide] technical assistance relevant to data gathering and analytic methods,” (National Science Foundation, 2002: 3-4).

A second major goal of the proposed center was to “work toward building a community of researchers engaged in the problem of how to apply educational research to larger scales of students, teachers, and schools.” Agency staff realized “the goals of IERI are more likely to be reached if the initiative results in a community of scholars concerned with and dedicated to the problems of scaling up research” – and that such a community “might outlive the IERI program itself and be one enduring product of the initiative.” Thus it was proposed the center would engage in a range of community-building activities with other IERI-funded investigators and their projects (see National Science Foundation, 2002: 4-5).

A third and final major goal for the center was to engage in research and theory building related to core IERI priorities. As described by agency staff:

The mission of IERI is daunting: To find ways to make research findings applicable to large numbers of children in the real world. Beyond that, IERI embraces the study of scaling up per se and envisions the formation of a science of scaling up. This science would entail finding ways to frame the problem theoretically and developing technical tools to build the field empirically and analytically, (National Science Foundation, 2002: 5).

To this end, IERI invited its programmatic support center “to be its collaborator in launching a field of inquiry concerned with understanding scaling up and its vital parameters,” and Schneider and her colleagues proposed to initiate a variety of research projects consistent with this aim.

The proposal was successful, and in 2002 NSF entered into a cooperative agreement with NORC at the University of Chicago to establish the Data Research and Development Center to: (1) provide technical assistance, training, and ongoing needs analysis in service of IERI grantees; (2) engage in community building with members of the IERI research community and the audiences for the evidence derived from their research; and (3) conduct research and theory building related to core IERI priorities.²

Evaluating the Center: Goals for a self-study

The 2004 decision to promote the Center’s evaluation through a self-study was significant, as it acknowledged the importance of tapping DRDC investigator and staff perspectives on what did and did not work well to serve the needs of the IERI community and the partner agencies. In many ways DRDC was a new model for the NSF. At the time the Center was established, there were no existing models for this type of programmatic support organization working in

² REC-0129365; see <http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0129365>.

collaboration with the agency.³ In addition, this NSF-funded support center was designed to assist researchers and projects funded not only by NSF, but also by the two other agencies participating in the Interagency Education Research Initiative – the U.S. Department of Education's Office of Educational Research and Improvement (subsequently the Institute of Education Sciences), and the National Institute of Child Health and Human Development. Self-study provided important opportunities to learn from and adjust to evidence regarding what was and was not successful in supporting projects and building community.⁴ This was **one major goal of the DRDC self-study: to assess summatively the impact of individual Center activities and their contributions towards achieving the Center's mission, while assessing formatively through critical self-reflection how the Center's program of activities might best be adjusted to achieve DRDC's three major objectives:**

1. **Providing technical assistance** both individually and collectively on research methods and design, networking with other projects, and dissemination of findings to educators and policy makers.
2. **Building an IERI community** by encouraging interaction among projects both in person and online and by synthesizing results across the IERI portfolio for stakeholder groups.
3. **Conducting research on scale-up** to help build capacity in the field for ensuring that educational interventions will be effective when applied to larger and more diverse populations.

A self-study would also provide an important opportunity to address the prospects for replicating and sustaining successful (while avoiding any unanticipated negative) consequences of similarly-organized centers with comparable missions. This opportunity is particularly important when one considers the Center, from the program's scale-up perspective, as a potentially scalable intervention.

The use of self-study to inform judgment regarding the scalability of the programmatic support center concept may seem counterintuitive, and particularly at odds with the approach to warranting the scale-up of interventions characteristic of the IERI program. The innovation-to-implementation scale-up process exemplified by IERI research begins by providing proof-of-concept in idealized conditions, next establishing the efficacy of an intervention before determining its effectiveness in "typical," "real-world" conditions, and only then, considering scale-up to enact the intervention with larger numbers of individuals across a wide range of educational contexts (see McDonald, forthcoming; Schneider & McDonald, 2007). In contrast, the DRDC "experiment" embodies both stage 1 proof-of-concept elements with stage 3 effectiveness elements in an effort to comment on the potential relevance of similar (not identical) interventions in support of larger numbers of programs operating in different contexts (stage 4 scaling-up).

³ DRDC functions under a cooperative agreement, which means that its activities are designed in consultation with NSF, and it is accountable to the interests and needs of the agency.

⁴ Sablan (1997: 17) defines self-study as an internal evaluation process typically designed to "comprehensively assess critical aspects and components" of an institution, process, or system, and to generate [plans for] self-corrective action or efforts to improve outcomes in line with stated objectives.

In addition, DRDC today is neither the intervention originally established to support IERI investigators, their projects, and their program, nor is it the intervention we began to assess at the start of the self-study. Instead, in keeping with the goals of the cooperative agreement and the emphasis placed on responding to the served community (and the agency's) evolving ideals for the Center, DRDC's program of activities, functional emphases, structure, and staff were, by design, dynamic. In addition, Center investigators and staff intentionally took advantage of the potential of a self-study conducted over a prolonged period of time (in this case, approximately four years) to serve as an important catalyst to continuous process improvement and a critical element of a total quality management program. Thus the 'intervention' changed over time, precluding the possibility of drawing meaningful conclusions typical of more controlled longitudinal studies.

These considerations notwithstanding, self-study is an ideal approach to take in reflecting on the larger role DRDC may have played in enhancing not only the outcomes of individual-funded projects, but also the IERI program as whole. Such critical reflections have much to contribute to prospective assessments of the value of other programmatic support initiatives. An open question at the time this self-study was initiated was what lessons from DRDC's experience might be relevant to future programmatic support ventures. NSF has since decided to fund four similar centers within the Education and Human Resource Directorate's Division of Research on Learning in Formal and Informal Settings (DRL).⁵ Thus a **second major goal of this evaluation** – informing future efforts to support NSF-funded programs – has been reformulated: **to identify insights from the DRDC experience that may inform other programmatic support centers' efforts and programs of activity.**

Evidence of the Center's impacts: Self-study methodology

Most commonly associated in education research with teacher education and efforts to promote continual improvement and ongoing professional development for members of the instructional workforce, self-study is also a characteristic element of numerous institutional accreditation processes. In both cases, a hallmark of self-study is the reflective, thoughtful, and honest analysis of the meanings and implications of evidence for improvement. Such reflections are consistent with context-specific (thus highly contextualized) knowledge production – the type of knowledge which from a scientific research perspective is least generalizable and particularly difficult to validate. Thus the evidence generated by self-study is often used “to provoke, challenge, and illuminate rather than confirm and settle” (Bullough & Pinnegar, 2001: 20; see also LaBoskey, 2004b).

⁵ For example, a research and evaluation network in support of the **Research and Evaluation on Education in Science and Engineering** (REESE) program will “provide technical assistance for projects on research methods and analysis procedures, synthesize findings across the REESE portfolio of projects, perform special evaluative studies, and disseminate findings” (Program Solicitation, available online from <http://www.nsf.gov/pubs/2007/nsf07595/nsf07595.htm>). Similarly, a resource network for the **Discovery Research K-12** (DR K-12) program “will provide assistance for projects in such areas as research and development methods, implementation, and analysis procedures; synthesize findings cross the DR-K12 portfolio of projects; and promote national dissemination of the research and development contributions of the DR-K12 program,” (Program Solicitation, available online from <http://www.nsf.gov/pubs/2008/nsf08502/nsf08502.pdf>).

An important question for the DRDC self-study was what mix of methods would best address the combined summative and formative objectives for the first goal of the evaluation. At the same time, it was important to identify a mix of methods that would simultaneously facilitate informed judgments about the merits of particular activities and approaches, and encourage the critical yet creative consideration essential to the second goal of the evaluation of how these might be improved for different investigator communities. As conceptualized by LaBoskey, self-study “is self-initiated and focused; it is improvement-aimed; it is interactive; it includes multiple, mainly qualitative methods; and, it defines validity as a validation process based in trustworthiness (Mishler, 1990),” (LaBoskey, 2004b: 817). A major goal of this particular self-study was to enhance the more traditionally reflective, narrative, and internally-validated character of many self-study processes with more robust indicators providing some opportunities for longitudinal analyses and external validation.⁶

Critically important here was to select and, where necessary, develop quantitative indicators amenable not only to reduction for summary analyses, but able to suggest external conceptual frames – ‘public theory’ – through which self-study reflections are most helpfully viewed; (see e.g., Bullough and Pinnegar, 2004; Loughran, 2007). As Feldman argues, “when self-study is seen as a research genre that generates knowledge and understanding that is to be shared and used by others,” validity considerations are critical, and it is incumbent to “provide reasons why others should trust our findings,” (2003: 26-27). As part of our concern to establish – for ourselves and for others – the validity of our findings, each of the following sections not only reports the results of our self-examination, but also describes what data were collected, how, and for what analyses.

Briefly, this self-study draws on data from eight types of sources: contemporaneous evaluations of specific Center activities (e.g., surveys distributed at PI meetings); web statistics; content analyses of contacts with the 101 projects eligible to receive services from the Center (e.g., e-mail correspondence, phone logs); trip reports on which interactions with the served community at professional association and other meetings were recorded; citation analysis and other bibliometric sources; in-depth interviews with principal investigators of a sample of IERI projects; an online survey of other IERI-funded investigators; and the reflections and experiences of DRDC investigators and staff. In general, these data were utilized as follows.

To assess summatively the impact of individual Center activities and their contributions towards achieving the Center’s mission we conducted in-depth interviews with a random sample of 25 of the 77 projects whose funding periods exposed them to the full range of services provided by DRDC. These interviews were designed to obtain summative (feedback on DRDC’s performance, using a scale of 1=poor to 5=excellent) and formative (suggestions for future support agencies) data. Projects that did not participate in the in-depth interviews were given the opportunity to provide feedback via a brief online survey which also requested assessments of Center-supported activities on the same 5-point scale. Appendix A provides a more detailed

⁶ Of course quantitative measures of performance are not incompatible with the aims of self-study; indeed, as Bullough and Pinnegar argue, “Like any good research self-study must represent rigorous data gathering and analysis. Data sources should be stable and empirical. Methods must be transparent. Quantitative methods have a place,” (2004: 340).

description of the self-study design and copies of instrumentation used to collect data. In addition:

- **Provision of technical assistance** was judged using data on the number and nature of technical assistance requests received; contemporaneous evaluations of the relevance, timeliness, and value of technical assistance offered (in one-on-one consultations and in group settings; see Section 2 of this report); content analyses of contacts with projects; and DRDC investigator and staff experiences and reflections.
- **Efforts to build an IERI community** were judged using data on participation in activities DRDC organized on behalf of the community; web statistics; content analyses of contacts with projects; DRDC investigator and staff experiences and reflections; and contemporaneous evaluations of Center-sponsored meetings. For example, evaluation forms were routinely included in materials prepared for principal investigator and other meetings that DRDC organized in support of the IERI research community. In addition to the opportunity to submit comments in writing at the conclusion of such meetings, participants were regularly provided with opportunities to submit assessments via online and/or e-mail distributed self-completion surveys. At the conclusion of nonresponse follow-up, reports of such contemporaneous evaluations were provided to agency staff. Appendix B provides an example of an instrument developed to document IERI investigators' evaluations of these meetings.
- **Results of Center research on IERI priority issues** were judged using data on the number and nature of scientific publications and other reports and presentations on Center-sponsored research; bibliometric data; and placements of Center-supported graduate research assistants and post-doctoral fellows.

To identify insights from the DRDC experience that may inform other programmatic support centers' efforts and programs of activity, we asked investigators randomly sampled for the in-depth interviews described above to discuss what was most useful about having DRDC as a support agency to the IERI community, whether from their perspectives there was anything else the Center could have done to better support their IERI projects, and what advice they would give should NSF decide to provide support services for future educational research initiatives. Other investigators invited to participate in the online survey described above were asked to provide (1) open-ended comments on DRDC's support services, community building activities, and efficacy in supporting the IERI program; and (2) any suggestions they might have for future initiatives to support other research programs. These data were supplemented with relevant comments culled from content analyses of contacts with projects and evaluations of specific Center activities, and the reflections and experiences of DRDC investigators and staff.

2. PROVIDING TECHNICAL ASSISTANCE

IERI projects used a variety of research designs to measure the effects of the interventions under study, including randomized controlled trials, quasi-experimental research, and observational methods. The broad range of expertise needed to implement these designs placed significant demands on individual projects and the research community as a whole. As a result, providing technical assistance tailored to meet the particular needs of IERI projects and to build capacity within the field was an integral component of DRDC operations. An early priority was to conduct a needs assessment to identify the technical assistance requirements of the IERI community and to guide outreach efforts. These insights also shaped DRDC's efforts to facilitate communication within the IERI community, and to research and develop tools to assist the education research community more generally. Technical assistance itself was delivered both through consultations with individual IERI projects and through professional development activities at annual PI and special topic meetings.

The quality of DRDC's technical assistance services was evaluated both on an ongoing basis to be more responsive to project needs and through interviews with a random sample of projects as part of this self-study. Ongoing evaluations of TA services included direct feedback from projects that received individual consultations and ratings of professional development activities on conference evaluation forms. Additionally, a random sample of 25 out of the 72 projects exposed to the full range of DRDC services was selected in early 2007, and PIs were asked to participate in in-depth telephone interviews designed to assess the quality and usefulness of DRDC support and to obtain suggestions for future support agencies.⁷ Projects that did not participate in the in-depth interviews were given the opportunity to provide feedback via a brief online survey which also requested assessments of Center-supported activities. Appendix A provides a more detailed description of the self-study design and copies of instrumentation used to collect data. Analyses of project responses are presented in this section and the sections that follow.

Technical assistance to individual projects

The needs assessment interview protocol was developed over the course of the first three months of the DRDC project with input from agency staff, and was pilot tested with six projects at the 2002 annual IERI PI meeting. A final version of the protocol was constructed after further revision. Between December 2002 and December 2006, 73 principal investigators were contacted to participate in the needs assessment. A total of 52 interviews were conducted.⁸ The needs assessment interview often was the first contact between an IERI project and the DRDC. Projects were given the opportunity during the interview to identify areas where assistance might be valuable. Particular consideration was given to investigators': (1) research objectives; (2) conceptions of scale-up; (3) current or projected technical assistance requirements; and (4)

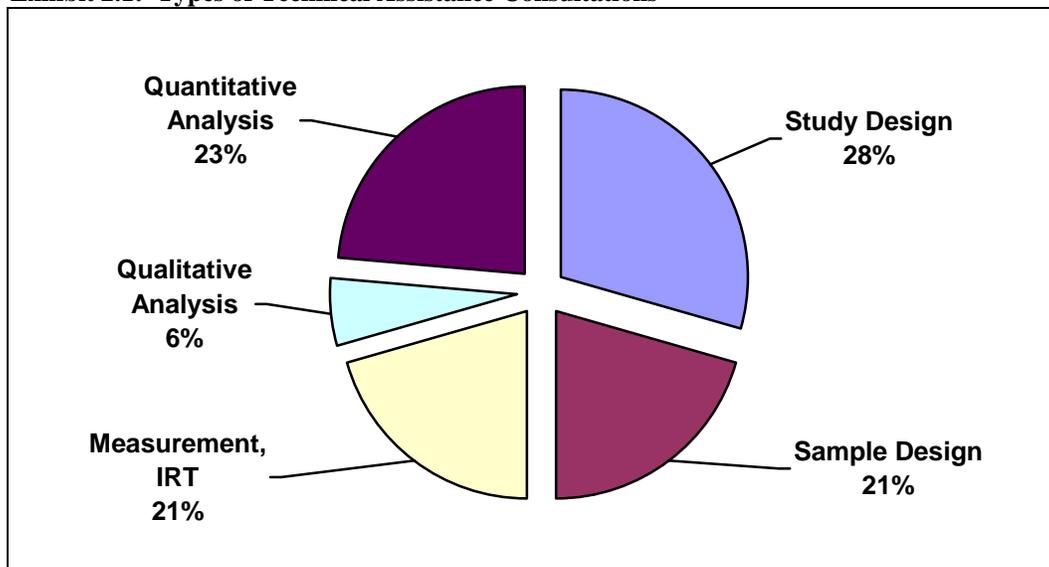
⁷ The DRDC assembled and maintained a complete database of IERI projects that included numerous demographic variables. Appendix C provides a demographic analysis of key characteristics of the 72 projects included in this self study, which were correlated with quantitative measures to DRDC performance to see if ratings varied by type of project.

⁸ Several PIs receiving second awards under IERI declined to be interviewed again, observing that they already were familiar with the technical assistance services provided by DRDC.

interests in data sharing and data archiving. Interviews were analyzed in a number of ways, including content analysis of transcripts, in order to extract information on conceptions of scale-up and specific types of assistance required. An initial report of baseline needs assessment findings was submitted to NSF in Year 2. In subsequent years, DRDC contacted newly-funded projects, inviting them to participate in in-depth interviews regarding their projects' current and anticipated TA requirements.

The technical assistance needs portion of the interview focused primarily on issues that relate to research (**study and sample**) **design, measurement** and instrumentation, **qualitative analysis** and the collection of qualitative (e.g., behavioral observation) data, and **quantitative analysis** (e.g., statistical analysis of small samples, multilevel statistical methods, statistical methods for longitudinal studies, data mining and exploratory data analysis, and geographical information systems models).⁹ In response to the issues projects raised in these needs assessments, immediate and periodic follow-up contacts were made, and assistance was delivered by phone, e-mail, or in person. As a result of the first round of needs assessment interviews, follow-up contacts were initiated with 16 PIs. These follow-ups led to DRDC's first technical assistance activities—a series of consultations with 14 projects that had requested immediate technical assistance. DRDC subsequently conducted two rounds of telephone calls to projects which had not utilized TA in the past, e-mailed all active projects informing them of the availability of TA consultations at annual PI meetings, and began another round of interviews with new IERI projects. As a result, DRDC conducted 10 more technical assistance consultations. Exhibit 2.1 shows the proportion of these 24 TA consultations provided in each the five main areas assessed.

Exhibit 2.1: Types of Technical Assistance Consultations



⁹ Descriptions of the TA consultancy services DRDC provided and information on how to request TA were made available to IERI projects through a password-protected section of the DRDC website, designed specifically for IERI investigators and their projects.

Who used the TA consultancy services?

The Center database of IERI project demographics provides some insight into the types of projects that received technical assistance services. Analysis by project characteristics indicates that IERI projects more involved with DRDC-sponsored activities and projects receiving a moderate amount of funding were more likely to have received technical assistance services. TA consultations did not vary by project research methods, when the project was funded, or by project topical focus (see Appendix D). These results suggest that smaller projects have yet to reach a point in the research cycle where methodological assistance is needed, while very large projects may already have sufficient technical expertise on their teams. Nevertheless, some of the most prominent researchers indicated they were open to seeking and receiving assistance. One PI who was involved in a comprehensive scale-up project reported that although “*we have great competence [on our team] we can always use another brain and resources at the table . . . and we’ll take all the help we can get to the extent that you can provide it.*” Two of the most intensive TA support efforts by the DRDC were in fact in support of larger IERI projects.

However, a few researchers indicated that they might be reluctant to ask for technical assistance since, as one investigator observed, it could be assumed that “*asking for help means you are ignorant.*” As another investigator commented, “*people are typically reluctant to talk about their problems for fear that it will militate against them, particularly towards the end of the project.*” DRDC’s community-building efforts (see Section 3) may have been of critical importance for encouraging the use of TA services. The needs assessment provided both a private forum for projects to ask for support and a foundation for building informal relationships between the DRDC and projects that could make it less daunting to request assistance in the future. Such TA services were also made available at professional and PI meetings, both individually and collectively through workshops (see below), helping to reinforce the availability and legitimacy of technical support consultations. As noted above, our analysis does in fact show that requests for TA varied by a project’s familiarity with the DRDC. However, one PI felt that his project underutilized the services offered by DRDC, which was “*probably more our fault than anything else*”:

[B]ut if you and NSF are looking forward to doing things like this again, I have to say I felt reticent to call. Sometimes I think things fell apart because I was always trying to collect more information so I’d have very specific short questions, and I never got enough information to feel I was at that point. So [DRDC] said sure we can call, when do you want to set it up, oh, wait [I’d say], pretty soon and then pretty soon never came. And I think just encouraging people to really say, “listen that’s what we’re here for and we’re perfectly willing at any point to spend X amount of time helping you even conceptualize the questions” would’ve been a good thing for me.

How satisfied were projects with TA consultancy services?

One might expect that the amount of technical assistance requested would vary directly with the quality of the services delivered. Interviews with the random sample of IERI projects yielded an overall average rating of 4.6 out of 5 for DRDC’s technical assistance. Note that TA here also included meeting workshops and added “dissemination of findings” as a type of assistance

offered (rated 5.0 out of 5). Given the uniformly high scores, ratings of TA services did not vary by project demographics. In other words, DRDC delivered high-quality technical assistance to any project that requested it. This is reflected in the interview comments, with one PI noting that assistance with quantitative analysis “*was very useful*” but that DRDC’s assistance with his project’s study design “*was a huge help*” and was “*absolutely over the top*” in terms of value to his project. “*I believe [that] would be a hard resource to get if it weren’t for DRDC being organized for this purpose.*” Another PI who received multiple types of assistance said that her team also received “*invaluable*” networking help on their scaling proposal and that the quality of services provided by DRDC was simply “*the best I’ve ever worked with.*” Said another,

There’s been a bit of a paradigmatic shift with how that work takes place and so the methodology, the data work, the level of analysis, the construction of instruments, all of that [assistance] was very appropriate and it was provided in a way that was supportive and encouraging.

Several PIs interviewed expressed appreciation for the availability of TA services but noted that timing prevented them from taking advantage of the offered help. In most cases the projects were already too far along to need assistance, but in others the offer of assistance was made too soon. DRDC staff did check in with projects periodically if they indicated a need for technical assistance in the future, but more systematic contacts might be warranted. Even a second, abbreviated (perhaps online) needs assessment could serve as a reminder or as encouragement to projects hesitant to “bother” Center staff. Perhaps more important, however, is the need to have services readily available at the beginning of a research program or a new funding cycle. This would serve both to provide assistance when projects are making crucial early decisions and to encourage project participation in community-building activities later on.

Technical assistance through meetings

One finding of the DRDC needs assessment was that IERI investigators wanted to participate actively in professional development activities – and many, not surprising in a program with such strong substantive emphases – had similar interests. Investigators were particularly interested in thematic meetings to address: conducting scientific research on scale-up with appropriate fidelity of implementation; designing research to detect and explain intervention effects; protecting and archiving data; disseminating education research findings effectively to policymakers, practitioners, and other stakeholder groups; documenting impacts within the academy; using video research in education; and the challenges of assessing reading comprehension in young children. Additional synergetic topics for capacity-building initiatives relative to substantial sub-sets of projects, and program-wide, were identified through additional consultations with representative IERI projects and discussions with NSF staff. Examples included: identifying opportunities and overcoming challenges of bringing exemplary interventions to scale; characteristics of good research that can drive good practice; bringing development work to market; data mining and analysis; and accumulating and synthesizing research findings for replication and extension.

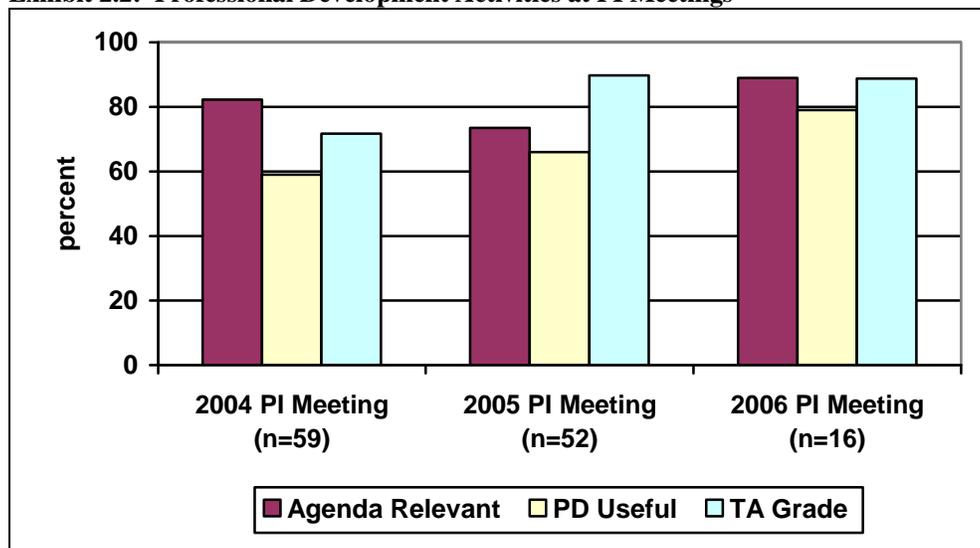
In response to these findings, DRDC provided technical assistance to projects via break-out sessions and workshops at annual IERI principal investigator meetings and by organizing

meetings on topics of special interest to the IERI community. Each of the topics noted above – and others – were addressed in plenary or concurrent sessions in PI meetings open to the full IERI research community. Three special topical meetings also were organized by DRDC, including a meeting on using video in education research that brought IERI investigators together with over 40 leading videography experts from a wide range of disciplines. An explicit goal of this and subsequent smaller meetings was to move the field towards identifying best practices for using video to develop or study educational interventions, the result of which was the white paper, *Guidelines for Video Research in Education: Recommendations from an Expert Panel* (available online at <http://drdc.uchicago.edu/what/video-research.html>). Another special topic meeting resulted in the seminal two-volume edited book *Scale-Up in Education* (Schneider & McDonald, 2007a, 2007b) discussed in Section 4.

How satisfied were projects with TA provided in group settings?

The assistance provided collectively through these topical meetings and workshops was recognized as such and, like the individual consultations, received high marks. Based on responses to evaluations provided at IERI PI meetings, Exhibit 2.2 presents both the overall “usefulness” of professional development (PD) activities and the rating weighted by those who found such activities relevant to their projects, thus providing a measure of usefulness conditioned on project need. The chart shows that this “grade” for TA grew from about 70% at the first PI meeting to nearly 90% at subsequent meetings. DRDC also better identified project TA needs, with the usefulness of breakout sessions and workshops growing steadily from 60% at the first PI meeting to nearly 80% at the last.

Exhibit 2.2: Professional Development Activities at PI Meetings



For instance, a participant at the 2004 annual IERI PI meeting said that “*the [session] that I thought was really useful was on fidelity of implementation, how to measure whether the treatment occurred both in the control and the experimental group.*” Two other PIs found the sessions on the dissemination of findings to broader audiences at the 2005 and 2006 annual meetings to be “*excellent,*” prompting one to invite a presenter “*to speak with us about those kinds of issues, and of course we networked with her on her IERI project then.*” Another found a

presentation on quantitative research methods to be “*emergent issues for me in the context of the DRDC meetings. So I appreciated that those things were brought up, [and] you at least understand that the issues are there and they better be thought about the next time you plan a design.*”

Less successful, however, was an online system for submitting and sharing instruments used to research educational interventions developed and deployed via the DRDC website in 2005. A live demonstration at a PI meeting and periodic email requests resulted in only a handful of submissions. Similarly, even though the sessions and workshops on dissemination of findings were generally well-received, several PIs were more skeptical in their evaluations and did not consider dissemination to be a useful or even appropriate topic. This highlights not only the challenge of identifying technical assistance needs across a diverse population of projects, but also indicates that support centers should be prepared to explain why certain kinds of assistance are needed at all. The legitimacy of such efforts depends, in turn, on the research credentials of the center team and approval from the funding agency. In the end, DRDC was able with NSF support to obtain structured abstracts from 52 projects for use in a publication to disseminate IERI results (see Section 3).

3. BUILDING AN IERI COMMUNITY

Communities of researchers are able to share expertise, which improves ongoing research programs, and to express common concerns or needs, which makes it possible to spend scarce resources more wisely. Perhaps the most important, and possibly most challenging, mission of DRDC then was to build a sense of community among the projects funded under the IERI program and to make this IERI community visible to educators and policy makers. The former was meant to help build research capacity in the field, while the latter was crucial for ensuring the impact of the program itself. Principal investigator meetings provided the main forum for developing a sense of shared purpose around common interests and concerns. The DRDC website also provided both a virtual community for IERI investigators and a public face to individual projects and the program as a whole. Other strategies for building community both within and without the IERI program included organizing special sessions at professional meetings and editing and promoting publications based on IERI research. In all cases the idea of scale-up provided a unifying theme.

Evaluating the results of these efforts is inherently difficult given the lack of any direct measure of cohesiveness within a community. DRDC did undertake a project to measure the change in network ties among projects over its funding period, although the results were incomplete as is discussed below. Since PI meetings were the primary community-building tool, contemporaneous evaluations of the meetings sponsored by DRDC provide one indirect source of data. Another more abundant source of data is usage statistics for the DRDC website, the other primary tool for building community. However, such statistics must be interpreted carefully since it is difficult to determine what counts as a significant “use”. The raw number of “hits,” for example, may be insufficient without information about the duration of a hit (e.g., random access vs. meaningful use), where the hit came from (e.g., target audience vs. web crawler), or even how many hits count as “good” (e.g., longitudinal growth vs. similar websites). In any case it is impossible to know from mining website statistics alone whether the users found what they needed. Thus this section also employs the random sample interviews to gauge project satisfaction with the various resources available on the DRDC website and to give PIs an opportunity to reevaluate annual IERI PI meetings. Finally, a supplementary analysis of email correspondence with projects is explored in Appendix F.

Principal Investigator meetings

DRDC organized and hosted three annual Principal Investigator meetings for the IERI community. About 61% of eligible projects attended these PI meetings, providing the Center with an important opportunity each year to build relationships with and among IERI projects. To establish trust and ensure that projects were engaged, DRDC used the needs assessment interviews, advice from NSF, consultations with representative projects, conference evaluation forms, and its own research agenda to develop ideas for meeting structure and content. To encourage interaction among IERI projects, meetings were designed to include sessions that clustered projects around common topical interests or methodological concerns. Presenters and workshop leaders usually were selected from the projects themselves, in the process creating intermediaries for both conveying the value of DRDC activities to projects within their networks and relaying to DRDC input about what types of activities would be perceived as most useful.

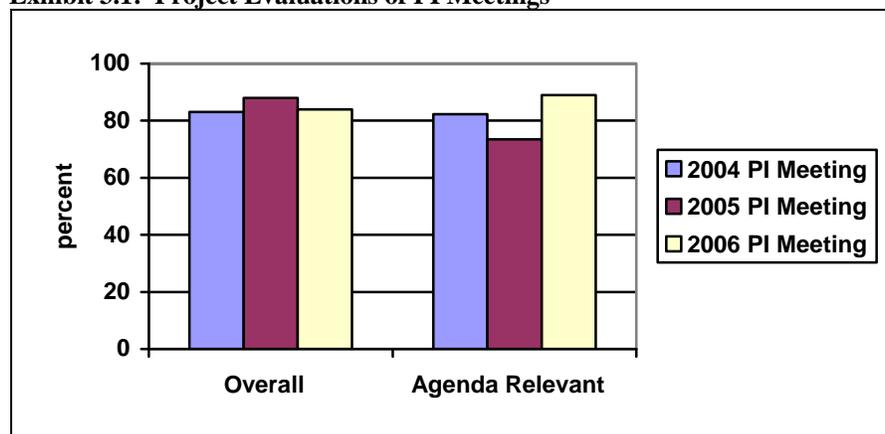
Substantial unstructured time also was built into the meeting agendas to give PIs an informal opportunity to network with like-minded colleagues.

Participants were provided with multiple opportunities to provide feedback on and assessments of these meetings. Self-completion surveys distributed at DRDC-organized meetings were routinely supplemented with opportunities to provide comments online and/or through truncated evaluations distributed by e-mail, with e-mail and/or telephone non-response follow-up for critical item retrieval. Specifically, participants were asked to assess the usefulness and relevance of individual sessions; to evaluate the organization and logistics of the overall program and meeting support facilities (e.g., meeting websites); to assess opportunities for participation; and to provide comments and suggestions for future meetings.

How satisfied were projects with PI meetings?

Reviewing the results of these contemporaneous evaluations, we find the three PI meetings received an average survey rating of 4.3 out of 5, with more than 80% of respondents finding the PI meetings to be at least somewhat useful for their IERI projects all three years, as shown in Exhibit 3.1.

Exhibit 3.1: Project Evaluations of PI Meetings



The projects randomly selected to participate in an in-depth self-study interview were also asked to rate and reflect on the PI meetings they attended. The PIs who had attended at least one meeting gave an average rating of 3.9 out of 5.0. PIs who attended at least two meetings were significantly more likely to give higher ratings ($p < .05$), averaging a 4.25 out of 5.0. PIs whose projects were more involved with DRDC also were significantly more likely to give higher meeting ratings ($p < .01$), as were PIs whose projects included experimental designs ($p < .05$) and those with smaller awards ($p < .05$). These latter two results indicate that DRDC PI meetings provided valuable resources to projects most in need of them, i.e. those with less money and those employing the most demanding research designs. As one PI interviewed for this report put it, “they really listened pretty carefully to the researchers to see what the problems were that they were confronting and then tried to plan sessions around that.”

The value of meetings as a vehicle for delivering technical assistance or professional development was addressed in the previous section. However, other PIs found the primary value

of annual meetings to be the opportunities for networking. One PI interviewed for the self-study said that while “*the meetings were well run and while the topics varied,*” the primary benefit to his project was that “*overall they provided a nice avenue for networking with other major projects.*” Another PI concurred, observing that “*the main use was putting us into contact with some other projects and that was very useful....I think what was valuable and what will be valuable in the future is to put researchers working on related ideas into contact so that they get to meet each other and find out about their projects.*” A PI responding to the online survey wrote that “*I have found the PI meetings to be incredibly helpful. The networking with other IERI PIs has contributed greatly to the overall success of this project.*”

Although DRDC staff worked to develop agendas sufficiently broad to appeal to a diverse set of projects, and was generally successful as shown in Exhibit 3.1, the first PI quoted above thought that “*maybe a little more tailoring could have been helpful.*” His advice was to survey projects prior to meetings and to conduct sessions concurrently, as was done at the 2004 PI meeting, though he recognized “*that doesn’t give you a lot of group cohesiveness if everybody’s off doing their own thing all the time.*” Trying to balance individual project needs against community-building activities was in fact a moving target, varying with the diversity of the community and existing levels of cohesiveness. The meeting poster session seemed the most difficult to manage, perhaps initially forgoing an opportunity for projects to engage individually in favor of more group-focused activities. Perhaps a more effective strategy for achieving balance would be to identify clusters of projects with similar needs and interests early on and to select individuals within these clusters who are able to act as intermediaries or team leaders. Overall, however, the PI “*thought [DRDC meetings] were very professional, and I know that they were there to be of service and I was glad that they were part of the whole initiative.*” Or as another PI put it:

I think the meetings were very well organized and I think it is important to bring people together. I thought the topics and speakers were interesting even though they weren’t always the thing that hit the nail on the head with respect to what our project needed, I learned a lot of things. I learned about running large-scale studies, so I have an IES proposal in under consideration now that a great deal of what went into that proposal--which is scaling up, which is the next step--we learned at those meetings....So we learned a lot that is going to be showing up more in the next steps than it will show up in the reports of what we’ve already done.

The DRDC website

The Internet has made it possible to link dispersed and diverse people online, although such connections may be as tenuous as they are broad. DRDC launched a website for the IERI community in April of 2003. The site (<http://drdc.uchicago.edu/>) was designed to be used by current and prospective members of the community as a clearinghouse of project information, as well as by practitioners, policymakers, and others who could benefit from descriptions of IERI research findings. It was also intended to provide a platform for password-protected access by IERI researchers interested in participating in a variety of collaborative activities. As such, the website served both as a community-building activity for the IERI program and as a vehicle for disseminating IERI project activities and findings to stakeholder audiences. DiPerna (2005:2) classifies this as a “connector website,” which is a “demand responsive online service that allows

a user to effectively find and contact people who share common needs and interests, or those who may have valuable information, experience, or insight.” Connector websites are very efficient in terms of time management, but the intended community must be encouraged to use the website by, for example, developing infrastructure quickly, creating simple web pages, mixing content, and establishing a brand. DRDC regularly solicited recommendations from IERI investigators and agency staff regarding enhancements to the Center’s online resources that would be most valuable in communicating information about the IERI program, projects, and findings, and facilitating knowledge accumulation within and across the IERI community.

Statistics on use of the DRDC website were collected using a commercial Web server analysis software package. Using this package, DRDC staff was able to see monthly executive reports of overall use of the website and could also access use by week and day through an interactive “calendar of reports” that provided data on specific pages used and common trails followed. Various information about users (e.g., country of origin, computer domain type, duration of visit) and referrers (e.g., referring search engine, search keywords used) could also be collected. As is standard practice, website use itself was measured by:

- *Accesses*: a single, successful request made by a web browser. Every successful request for any resource on the web server, whether for an image or a document or for another type of information, is regarded as an access.
- *Visits*: one or more accesses made by the same visitor, with no more than a certain time interval between accesses, using a combination of cookies, IP addresses, and other information to establish user identity.
- *Unique Visitors*: a single, distinct person, visiting the site one or more times. Since web browsers do not always report any user-identifying information, this figure must be estimated by the best means available.

Generally speaking, total “accesses” provide a rough measure for how *much* a website is used (i.e., depth of use), while total “visits” roughly indicate how *many* people are using a website (i.e., breadth of use). Since the DRDC website was designed to be used repeatedly, there was no need to employ the “unique visitor” method when evaluating use by the IERI community. Given the methodological difficulties detailed above, such analyses were conducted by computer domain type (i.e., those at educational institutions) to provide a more valid measure of use by IERI researchers and by website usage in previous months in order to provide a baseline to make reliable comparisons.

Services provided through the DRDC public-access website

DRDC’s public-access website was initially designed both to provide information about the Center, and about the IERI research program and community of investigators that the Center supports. The *IERI Research Community* portion of the public-access website provides information about: funded projects and their investigators; select meetings DRDC organizes on behalf of the community; IERI projects’ participation in major professional association meetings

(including schedules of updates on and presentations of project findings¹⁰), and directories of external links relevant to IERI research initiatives.

The information on funded projects was originally built around a database of abstracts drawn from NSF FastLane and provided by projects as part of the needs assessment process. In the second and third years of Center operations, major enhancements were made to the DRDC website, including the addition of new research resources requested by IERI investigators (e.g., a bibliography on socioeconomic status as it relates to education, a list of resources selected to help investigators disseminate their findings more effectively), a major revision of the database of investigators and projects, and multiple ways of accessing information about the IERI program (including an interactive map enabling users to search for IERI projects geographically by state, and topical pages enabling users to search for projects by substantive focus). In the fifth year of Center operations, major enhancements to the public-access web pages included the addition of structured abstracts to provide detailed information on each IERI project. These abstracts include information on the background, purpose, intervention, setting, research design, and findings of each project. The development of a dynamic database also allowed PIs themselves to ‘upload’ revisions, updates, and supplementary material to their project and investigator pages. These and other refinements to website functionality and database organization resulted in the current (at the time of writing) “homepage” for the IERI Research Community shown in Exhibit 3.2.

¹⁰ Examples include schedules of IERI-related presentations at the Annual Meetings of the American Educational Research Association and the National Association for Research in Science Teaching.

Exhibit 3.2: The IERI Research Community

DRDC DATA RESEARCH AND DEVELOPMENT CENTER

The IERI Research Community

To date, the Interagency Education Research Initiative (IERI) has supported over 252 researchers on 101 [math](#), [science](#), and [reading](#) research projects across the United States.

For IERI Investigators:
With your password, you may access the [enhanced version of the IERI community zone](#).

Please follow these links to learn more about the [investigators](#) who make up the IERI research community and their [research projects](#), or click a state in the map below (or select a state abbreviation) to view IERI projects headquartered in that state.

[CA](#) [CO](#) [CT](#) [DC](#) [FL](#) [GA](#) [HI](#) [IA](#) [IL](#) [KY](#) [MA](#) [MD](#) [MI](#) [MO](#)
[NC](#) [NJ](#) [NY](#) [PA](#) [TN](#) [TX](#) [WI](#)

Legend:

- States with institutions that have received an IERI grant.
- States with IERI funded interventions.
- States with institutions that have received an IERI grant and have IERI funded interventions.

From this page users can find investigator information, browse projects by topic and location, access lists of presentations by IERI projects, and download a brochure of program findings. Investigators themselves can log into the private section of the website to obtain various research resources, view meeting presentations, and request technical assistance from DRDC.

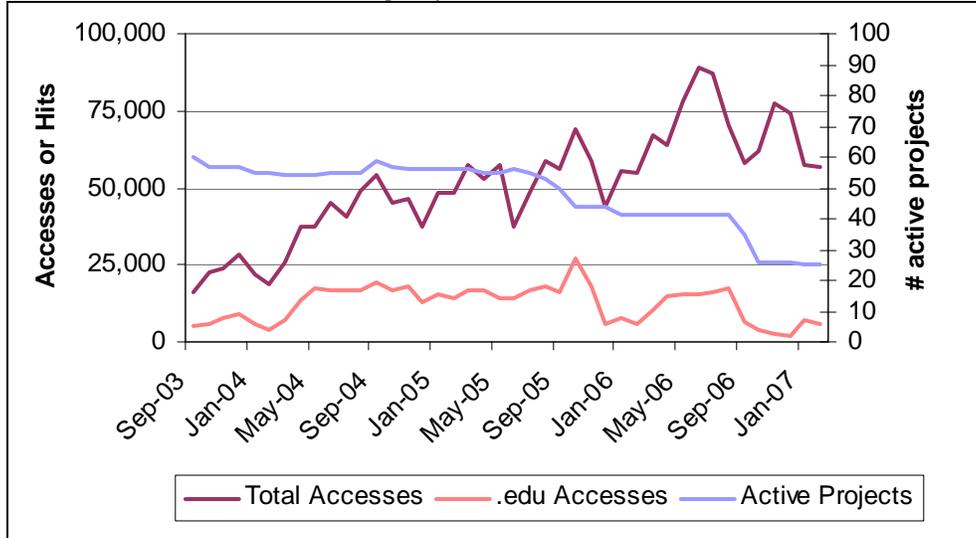
Who used the DRDC website?

Overall “visits” to the website grew substantially, from 1,117 in September 2003 to a near peak of 4,087 in January 2007 before leveling off to about 3,700 thereafter.¹¹ The largest increases occurred prior to 2006, perhaps reflecting the decline in total active IERI projects from 58 in 2005 to 41 in 2006 (a 29% decline). Website usage also exhibited “seasonal” trends, with visits increasing just prior to the annual PI meeting and peaking just before the academic break in December. These statistics suggest that IERI projects themselves accounted for a significant

¹¹ Note that website statistics provided to DRDC did not filter out use by DRDC staff, programmers, or web crawlers. This may result in biased trend data when the numbers reported are low and when modifications to the website required significant internal use.

portion of total visits to the website. Exhibit 3.3 provides more direct evidence by charting overall “accesses” or hits to the website against both the number of active IERI projects and the number of accesses from educational institutions.

Exhibit 3.3: DRDC Website Usage, by Month and Domain

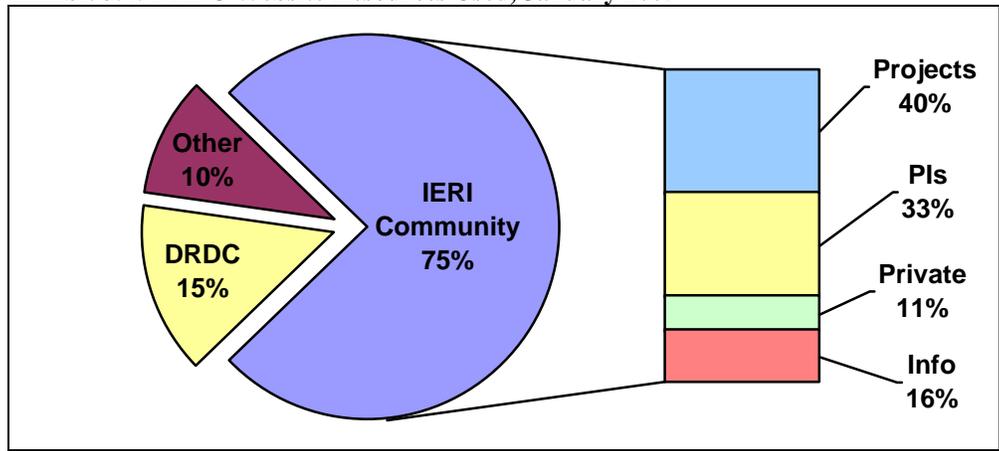


Accesses to the website more than tripled between 2003 and 2007, peaking at approximately 90,000 in June 2006. A strong correlation ($P < .001$) between the declining number of active projects and website use from computers using “.edu” domain names (versus “.com”, “.net”, “.gov”, etc.) indicates that IERI projects made substantial use of the DRDC website.¹² According to this analysis, each active IERI project accounted for about 4.4 visits and 485 accesses to the DRDC website every month. The website also seems to have given individual projects and the IERI program itself substantial public visibility, averaging well over 3,000 *unique* visitors each month during the first half of 2007. However, “.edu” visitors accounted for as much as half of all accesses even though they represented less than 15% of total visits. Together these results indicate that the DRDC website generated broad interest but that visitors from educational institutions were more likely to use the website in depth than were other visitors.

Website usage statistics also provide a window into relative use of each section of the DRDC website. Although use of different parts of the website varied considerably from month to month, Exhibit 3.4 below represents a fairly typical month (i.e., January 2005).

¹² It should be noted that about one third of all visits have “unknown” computer domains.

Exhibit 3.4: DRDC Website Resources Used, January 2005



This chart shows that the majority of accesses (75%) were to the *IERI Research Community* section of the website, with the remaining 25% of accesses being divided between users seeking information about *DRDC* itself and *Other* information such as “News” or “Related Links”. Visitors to the *IERI Research Community* section of the website most frequently accessed descriptions of individual *IERI Projects* (40%) and *IERI PIs* (33%). About 16% of accesses were to other *IERI-related Information* such as the list of project publications and scheduled presentations at AERA. Finally, 11% of accesses to the *IERI Research Community* section were to the password-protected *Private* section of the website designed for exclusive use by PIs to share information, find research resources, and access meeting materials (see below).

How satisfied were projects with the DRDC website?

One indication of the value *IERI* investigators ascribe to these resources as a mechanism for communicating with colleagues are the requests *DRDC* received to highlight announcements of project activities on its web pages.¹³ Our random sample interviews provide another source of information about use (and the usefulness) of the *DRDC* website by projects themselves, with the 72% of PIs who personally used the website rating it an average of 4.3 out of 5.0. A PI who gave the highest rating said his team “used the *DRDC* website on numerous occasions for synopsis, working on other people’s projects, what was going on, people to contact, to get email addresses, for communication with other PIs.” Another PI similarly observed that “the website that has been built has been really helpful.” This was true both as a mechanism to keep projects connected between PI meetings, saying that “the website kind of helped glue the whole thing together,” and as a resource for gathering information before contacting other projects for assistance:

The information provided was excellent...You could start out with the website and get some of the basics so that you weren’t calling and making a foolish call, you could

¹³ For example, *DRDC* was asked to highlight on its home page a workshop on educational data mining at the 2006 National Conference on Artificial Intelligence (AAAI-06), and a workshop on “Designing and Validating Assessments for Research: A Practical Roadmap from Conceptual Framework to Work Plan” scheduled to take place at an Annual Meeting of the American Educational Research Association.

understand what was going on and then you could do that kind of follow-up. So I think that was invaluable.

One PI found it “*very interesting to read the variety of projects that were funded,*” while another “*took a look at what other projects in particular in the IERI community were doing as a sense of trying to see if anything was relevant to us and also to compare to see if we were keeping up or lagging behind or looking very different.*” Another PI said, “*I did check the website to find out what projects might be related to the ones that I was engaged in, namely math-oriented projects,*” and thought “*the information that I went to look for was readily accessible.*” However, two PIs thought that there needed to be more ways of searching for projects with common interests such as those using similar research designs or instruments for assessing fidelity of implementation.¹⁴ Another said he “*would like to see more online interaction ... and a common repository where people could share papers in a more informal state at times before things were far along and finished.*”

Overall, it seems that most IERI projects found the DRDC website to be useful and well designed. Given the central importance of the website to encouraging participation and building a sense of community, however, greater visibility might have been warranted. This might mean sending regular emails, perhaps highlighting different website features, in addition to those sent whenever significant upgrades or additions were made. A regularly updated or monthly “News” or “Featured Project” section could be used both to drive PIs to the website and to keep them updated on IERI and related research. An online forum was suggested, though the PI also observed that the diversity among projects might discourage participation. Another PI said that password protection discouraged use of the private Community Zone, so a balance must be struck between the need for privacy and the complexity of the password system used.

The most significant barrier encountered by DRDC in building its website was obtaining participation from IERI projects themselves. By necessity, the first iteration of the website relied heavily on publicly available information. Getting more detailed and current information about projects was a gradual process, partly by making the submission process easier via new website features and partly through solicitations at PI meetings and through the assistance of NSF staff. In the end, 52 projects submitted detailed summaries, representing about 63% of potential respondents. Another 67% submitted schedules of AERA presentations on their IERI research for posting online. Obtaining significantly higher response rates might require making cooperation with a support agency part of the project award itself.

How effective were restricted-access web services?

The password-protected *IERI Community Zone* initially provided information on forthcoming events of interest to the community, a place for posting information about and links to IERI investigators’ favorite research resources, and a place for projects to distribute working papers to other members of the community. In 2004-05, DRDC completed a series of improvements to this private area for IERI researchers. A meeting section was added to the website prior to the

¹⁴ DRDC did create an online form for submitting instruments and demonstrated this new resource at the 2005 IERI PI meeting. However, response from projects was insufficient to create the planned IERI Assessment Instrument Library.

2004 annual PI meeting. This section included an agenda along with resources for the breakout sessions. It also allowed participants to register online, read biographies of the scheduled speakers, and contribute to or browse a virtual poster room. Video of meeting presentations and related materials were later posted on a special section of the meeting website with a separate password. Based on results of the breakout sessions and follow-up interviews, DRDC collected resources for satisfying legal requirements, developing assessment instruments, and sharing project materials and made them available to investigators under a new *Research Resources* section of the *IERI Community Zone*. Major enhancements in 2005-06 included two new sections of the *Research Resources* page. The first was a bibliography on socioeconomic status as it relates to education. This was requested by several participants at the 2005 PI meeting and was compiled by DRDC staff. The second was a list of resources selected to help investigators disseminate their findings more effectively, which also was a focus of the second day of the 2005 PI meeting.

As is shown in Exhibit 3.4 above, about 11% of total accesses to the DRDC website were to the private *IERI Community Zone*. Since 31% of total accesses to the website also were from educational institutions in this month, it appears that IERI projects were making significant use of this private area (about 1/3 of total project accesses). However, only three of the PIs interviewed for this self study (12%) ever remembered using this section of the website. These three PIs all gave the resources provided in the *IERI Community Zone* the highest rating, suggesting that a handful of projects were using this resource intensively while the majority used it sporadically or not at all. A clear barrier to use was the need for multiple passwords to access the main site and each meeting site. One of the major upgrades was to implement a single-password system, although this too seemed problematic for many PIs. The lesson here is that a community website must balance the need for privacy with ease of access, protecting only the most sensitive of resources. One such suggested resource was an online forum, though the PI also observed that the diversity among projects might discourage participation. Such forums might also need to be moderated, which could overwhelm Center staff. Here too team leaders recruited from the community served might prove invaluable.

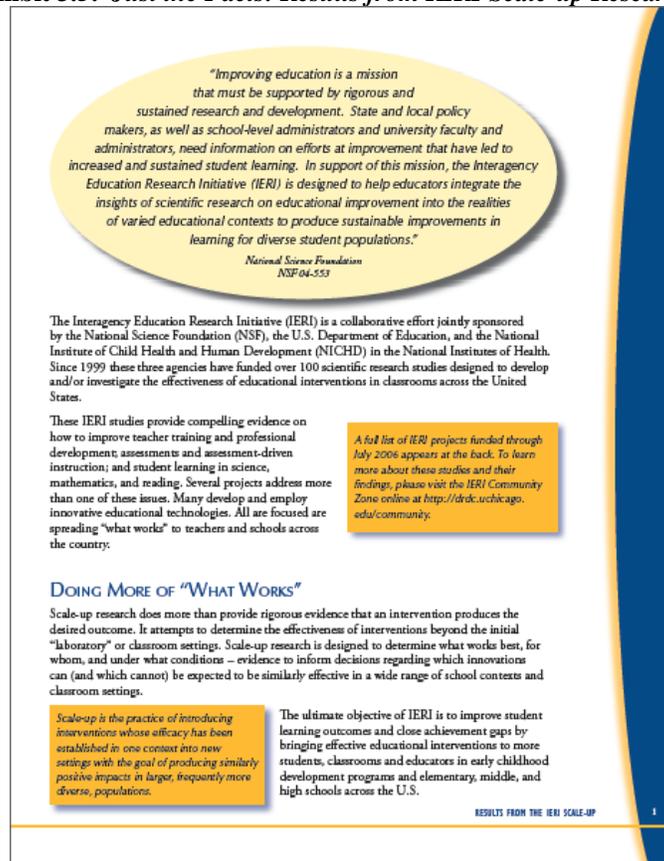
DRDC support for dissemination of project findings

A major Center goal was to disseminate IERI program results to relevant stakeholder audiences, which also served to engage projects in community activities and to help build bridges to educators, policy makers, and other researchers. Although the website was the most visible tool for achieving this goal, DRDC also organized meeting sessions on behalf of the IERI community, made conference presentations itself, and published syntheses of project findings. Between 2003 and 2007, DRDC teamed with IERI projects or presented Center research at twelve sessions at the annual meetings of the American Educational Research Association (AERA) and at two sessions at the annual meetings of the American Association for the Advancement of Science (AAAS). DRDC also issued a press release and held a news conference in early 2007 at the National Press Club in Washington, DC to promote the publication of an edited volume on scale-up research (see below). This press conference included several PIs from large IERI projects and resulted in a front page story in *Education Week*. A meeting for agency staff at NSF headquarters in Arlington, VA in the spring of 2007 similarly included presentations by IERI PIs and a briefing on the activities and accomplishments of the DRDC.

A year earlier DRDC had suggested the benefits of compiling a user’s guide to results of IERI scale-up research. Unlike the dynamic project-specific summaries available from the IERI Research Community page (see above), the purpose of this guide would be to document the accomplishments of the program as a whole at a point in time. Key objectives of the brochure were to increase awareness and understanding of the IERI program and results from the IERI project portfolio. The guide was conceived as a vehicle for reaching out to local educators, state officials, and federal policymakers. It was suggested the guide might also prove useful as a resource in classrooms for training education researchers, and in workshops for demonstrating the kinds of education research funded by NSF and other federal agencies.

DRDC contacted all IERI projects multiple times describing our plans for the brochure and asking for updated project summaries to include. NSF also sent a request to projects asking them to submit updated summaries in structured abstract form to DRDC. DRDC received 52 such summaries, condensed them to paragraph length, and received approval to use these paragraphs from each PI. A prototype of the brochure was circulated at the 2006 PI meeting for comments, and revisions were made to the text before designing a final layout, as exemplified in Exhibit 3.4.

Exhibit 3.5: *Just the Facts: Results from IERI Scale-up Research*



Print versions of *Just the Facts* (Brown, McDonald, & Schneider, 2006) have been distributed to the intended audiences through several mechanisms. Copies were first mailed to all IERI PIs and to NSF. NSF subsequently distributed the brochure at the 2007 and 2008 annual meetings of

AERA and AAAS. Copies also were distributed to members of the media at the National Press Club book launch and were provided thereafter to select committee and legislative staff at the U.S. Congress. An online version of *Just the Facts* was made available mid-January 2007 (at <http://drdc.uchicago.edu/extra/just-the-facts.pdf>), hyperlinked to allow visitors to the DRDC website quick access to more detailed information about the IERI program and individual projects, their findings and products. Approximately 100 people visited *Just the Facts* online every four weeks between February 2007 and September 2007, meaning a “distribution” rate for the brochure of about 1,200 copies annually.

Investigators are naturally interested in how their work is portrayed and in opportunities to present their research to others. Joint conference sessions and synthetic publications are therefore effective mechanisms for engaging PIs and bringing them together for a common purpose. The result, if sufficiently inclusive and visible, is a stronger sense of community among investigators and a public “brand” for the program as a whole. In this case the concept of scale-up served as a brand for the IERI community, a brand that DRDC made visible through the use of related images and symbols on its website, in PI meeting materials, and as the cover of the *Just the Facts* brochure. Having a brand to associate with the supported community allows for broader recognition and richer awareness, providing a concreteness to the enterprise that makes it easier to “market” but which also gives people an opportunity to question its utility and value.

4. CONDUCTING RESEARCH

From its inception, DRDC was designed as both a technical support and a research center. Importantly, the research DRDC conducted was designed not only to fulfill the objectives of the Interagency Education Research Initiative program, but also to assist DRDC investigators in establishing the legitimacy and authenticity of the Center and its activities among the community DRDC was established to serve. Substantively, DRDC's research program addressed two major issues at the heart of the IERI mission: advancing the theory and practice of scaling up educational interventions, and advancing the science of knowledge accumulation, particularly how education research itself is taken to scale. Additionally, DRDC helped advance the research agenda of the IERI program by providing training and professional development opportunities to graduate students and postdoctoral research fellows. In evaluating the impacts of the Center's research activities, we consider not only the most widely employed indicators (e.g., numbers of peer-reviewed publications and presentations, peer citations calculated using bibliometric databases such as the *ISI Web of Science* and *Scopus*, student placements), but also the potential of the results of Center research to support the generation, accumulation, and use of evidence on the scalability of exemplary interventions.

Establishing the legitimacy and authenticity of Center activities

An important aspect of establishing a Center as legitimate and authentic in the eyes of the supported community is ensuring each activity it conducts (and the institution as a whole) is perceived as having a reasonable rationale that explains why it is important in light of the Center's mission. A second key element in establishing legitimacy and authenticity is communication – to explain not only the rationale behind an activity but also what benefits investigators and their projects can expect to derive from it, emphasizing how it supports their own work and that of the program and the funding agency more generally. A third, related, element is follow-through, e.g., reporting back on assessments of individual activities. As described above, DRDC devoted considerable effort to these legitimizing activities, soliciting IERI investigators' comments on how core activities (e.g., PI meetings, online materials) might be tailored and improved to best serve the community's needs, investing resources in communication networks and activities, and regularly requesting and summarizing investigators' assessments of individual Center activities.

A fourth critical aspect of establishing *relational trust* with the served community (see Bryk and Schneider 2001 on this concept) was to underscore the Center's primary commitment to improving the overall quality of research in the IERI and educational research communities more generally. DRDC's research agenda thus assumed an important role in the IERI community's perceptions of the value and authenticity of their support Center. This consideration influenced not only the nature of our efforts to communicate the results of our research to the IERI community (emphasizing that the Center was an active participant in the research community it served), but also the topics that became the focus of DRDC's research initiatives.

DRDC's research agenda

As a result of the Center's needs assessments with IERI projects (see Section 2) and our own literature reviews, we found that many lessons learned by researchers in fields outside of education (who have been tackling issues of scale-up for quite some time) had not yet been systematically addressed or incorporated in education research. Center investigators expected the conceptualizations of scale-up and methods used in these other disciplines would provide models likely to broaden education researchers' thinking and stimulate us to conceive of the challenges of scale-up and their solutions in new ways. In addition to influencing the program of activities planned to provide technical assistance, capacity building, and other support services to the IERI research community (see Sections 2 and 3), these findings influenced DRDC's research agenda.

Advancing the theory, practice, and evaluation of taking exemplary interventions to scale

A significant proportion of DRDC's research agenda was directed to advancing the theory, practice, and evaluation of efforts to take exemplary interventions to scale. Six interrelated topics were addressed by DRDC investigators, post-doctoral fellows, and graduate research assistants: (1) refining conceptualizations of scale-up in education; (2) furthering understanding of the impacts of context on scaling up interventions; (3) designing experiments to measure scale-up; (4) understanding the variance structure of academic achievement in America; (5) causal inference in scale-up research; and (6) applying multilevel statistical modeling techniques to the analysis of educational phenomena.

Conceptualizing scale-up. One of the goals of the DRDC was to undertake a research agenda directed at building a science of scale-up. A priority Year 1 activity for Center staff and research associates was an examination of the scientific literature on scale-up, focusing specifically on: (1) published and unpublished materials from current IERI projects; (2) reports on interventions, including ones that center on education as well as those that deal with social issues but have educational implications; and (3) scholarly work on scale-up in disciplinary fields outside of education (e.g., chemistry, engineering, health, and manufacturing). The latter was particularly important; researchers in many fields outside of education tackle issues of scale-up, but the literatures from these fields had not been reviewed, compared, and contrasted. In reviewing this literature we found that while some have already developed informal and formal theories of scale-up that apply to their particular fields, different disciplines frequently address issues of scale-up in different ways. As our reviews progressed, it became increasingly clear that researchers working with promising educational interventions would benefit from interactions with individuals outside of education who are also using principles of scale-up in their work.

In 2003, DRDC convened a meeting to address these issues. "Conceptualizing Scale-Up: Multidisciplinary Perspectives" brought together 45 researchers who considered, from multiple perspectives: (1) conceptual, theoretical, and analytic perspectives for scale-up; (2) measuring for scale-up; (3) challenges of scaling-up promising interventions; and (4) the results of scale-up initiatives. Importantly, the program was designed to balance exploration of scale-up in disciplines outside education with reports on lessons learned from extant IERI research regarding the methodological, practical, and analytical challenges of conducting scientific research to

develop and scale-up exemplary educational interventions in varied school settings with diverse student populations. Two volumes were produced as a result of that conference, *Scale-Up in Education: Volume 1, Ideas in Principle* (Schneider & McDonald, 2007a) and *Volume 2, Issues in Practice* (Schneider & McDonald, 2007b) as were several other Center publications (including an article in *Educational Researcher* and a chapter in the *AERA Handbook of Education Policy Research*) and numerous professional association presentations.

The impacts of context on scaling up interventions. Consistent with the emphasis IERI places on “the context in which educators do their work, pushing past controlled laboratory studies to ensure adaptability to classroom settings” (National Science Foundation, 2004: 5), the conceptualization of scale-up the Center’s research suggests is one which distinguishes the *objective* of scaling (extending the reach of an exemplary intervention to have similarly positive effects on larger numbers of students in different settings) from the *strategies* employed to achieve this objective and the methods employed to evaluate them.

Accordingly, one strand of DRDC’s research was devoted to furthering understanding of the significant impacts context has on student learning outcomes, the implications for the strategies that are developed to scale-up interventions, and the research designed to assess their impacts. This research reinforced the notion that it is the attention to context that enables the results of scale-up research to be used to leverage scientifically-based research evidence about what ‘works’ to improve student achievement and literacy in science and mathematics, enabling practitioners and policymakers to select when and how to implement proven interventions with different student and teacher populations with the defensible expectation of realizing similarly positive effects. Such an approach combines a commitment to establishing and accumulating an evidence base on the effectiveness of promising interventions, with the recognition that powerful contextual influences mean they must be implemented with a combination of fidelity and appropriate flexibility in a zone of adaptability around the core precepts which define “the intervention.” It also reinforced the necessity of providing additional analytic tools to help investigators determine whether an intervention has significant effects on learning and instruction.

DRDC-supported research in this area included investigations of the social forces that shape the contexts in which classroom-based instructional and other interventions are enacted (Kim & Schneider, 2005; Petrin, 2005); explorations of the importance and challenges of designing research that examines and controls key contextual variables appropriately (McDonald, Keesler, Kauffman, & Schneider, 2006); a discussion of social capital and education; the social and institutional contexts of teacher education; and “ethno-racial identity formation and aspirations toward higher education.” DRDC also organized symposia to address these issues at major professional association meetings (e.g., a symposium on “The Teaching and Learning of Science: A Contextual Approach” at the 2005 Annual Meetings of the American Association for the Advancement of Science).

Design, analysis, and interpretation of findings from experiments to measure scale-up. Given the nested contexts within which student learning occurs, efforts to develop and explain the success or failure of interventions solely with reference to individual-level characteristics may be misdirected. Advanced statistical techniques allow us to develop empirical models that, like the

conceptual models the rich literature on the sociology of education suggests, simultaneously capture both individual- and school-level influences on student achievement. Such techniques make it possible to quantify the influence of a particular combination of resource and structural factors on student learning, controlling for student background characteristics, thereby isolating school effects. A key component of scale-up research becomes developing designs which could realistically be executed in field settings. Major concerns include: internal validity and the tension that exists between internal and external validity; statistical power and the value of increasing sample size in conjunction with population and setting controls; and the appropriate use of methodologies that may mitigate the challenges of conducting scientifically-based education research given the practicalities of obtaining access to and conducting longitudinal research in school settings.

DRDC research in this area focused on: (1) the design of experiments (or quasi-experiments) to study scale-up; (2) procedures to obtain sample sizes required to obtain minimal power for studies of scaling-up with different designs; (3) how design choices (e.g., assignment within schools versus between schools) affect sample choices; and (4) computing statistical power for multi-level designs of educational interventions (Konstantopoulos, in press). DRDC was asked to address factors to consider in conducting clinical trials in scale-up research in a symposium IERI PI William Cobern organized for the 2006 Annual Meeting of the American Association for the Advancement of Science on the “Implementation of Clinical Trials and Experimental Research in Science Education.” Citing examples from the IERI project portfolio, DRDC’s presentation considered the implications of technology-enabled changes in information flows and social relations for scaling and scale-up research, the impact of virtual student and teacher communities for scale-up research design, and the continued adequacy of theoretical models that have been developed to describe the context in which learning takes place. These issues are also discussed in “Challenges, incentives, and obligations of conducting scale-up research,” in *Scale-Up in Education Research* (see above). Related DRDC-supported research included Hedges’ (2007a; in press) work on the role of fixed effects for clusters in inference from social experiments, O’Muircheartaigh’s work on computer-assisted advances in sample design and sample design for educational research, and Hedges’ and O’Muircheartaigh’s work on design and generalization. The object of field experiments in education is to support generalizations that are useful for informing policy, yet experiments rarely have samples formally designed to support such generalizations (i.e., probability samples). These ideas have also been extended to the problem of synthesis from several studies and have been developed into a theory for improving the estimation of treatment effects in policy relevant populations based on experimental data. The methods have been presented at public addresses at Duke University and the Society for Research Synthesis Methods. The first theoretical paper describing these methods is currently under review at the *Journal of the American Statistical Association*.

Understanding the variance structure of academic achievement in America. A major, multi-year initiative directed by Co-PI Hedges was designed to help investigators determine whether an intervention has significant effects on learning and instruction. In Year 5, this work culminated in the publication of “Intraclass Correlation Values for Planning Group-Randomized Trials in Education” in *Educational Evaluation and Policy Analysis* (Hedges & Hedberg, 2007a). Early findings from this work were presented by Hedges in a keynote address to the 2006 Annual IERI PI meeting, “Variance structure of academic achievement in America: Reference values for

planning evaluation studies.” Other publications resulting from this work include Hedges and Hedberg’s discussion of “Intraclass correlation values for planning group-randomized experiments in rural education,” (Hedges & Hedberg, 2007b), and Hedges’ articles for the *Journal of Educational and Behavioral Statistics*, “Correcting a significance test for clustering” (2007b) and “Effect sizes in three level designs” (2008). In Year 6, Hedges initiated a program of work to extend to additional datasets the project’s efforts to compile “intraclass correlation [ICC] values of academic achievement and related covariate effects that could be used for planning group-randomized experiments in education” and “variance components information useful in planning experiments involving covariates” (Hedges & Hedberg, 2007a: 60). A related aspect of this work is an initiative that has begun to develop an online resource for accessing results of this project (compiled in a variance almanac) for research design purposes.

Causal inference in scale-up research. The acknowledged benefits of randomized controlled trials (RCTs) notwithstanding, there are situations in which, for a variety of reasons, RCTs may not be warranted or possible. The former include instances in which the existing research base does not justify the commitment of resources required to successfully field an RCT; the latter includes instances in which RCTs are not feasible for ethical reasons and/or resource considerations (see Schneider, Carnoy, Kilpatrick, et al, 2007). DRDC supported Schneider in a project sponsored by The Governing Board of the American Educational Research Association (AERA) Grants Program to “prepare a report that would provide researchers and funding agencies with guidelines for evaluating various methods and analytic approaches for drawing causal inferences,” (*ibid*). This project was critical to DRDC and broader IERI efforts to enhance educational researchers’ capacity to conduct scientific research on scale-up.

A related program of DRDC-supported research is concerned with the secondary analyses of large-scale datasets to estimate causal effects in education. Secondary analyses of educational datasets, particularly those that obtain information from students, parents, and teachers within an institution over time, continue to serve as one of the richest sources for evidence-based policy evaluation. Such analyses may greatly enhance or provide “alternative methods for making valid causal inferences with observational data” (*ibid*). However limited use is made of methods to adjust for observed and unobserved characteristics when making comparisons across groups using such observational data. DRDC supports a program of research directed by Schneider in connection with work she is carrying out at Michigan State University as a subcontractor to the Regional Educational Laboratory (REL)-Midwest. Key activities include conducting an inventory and documenting national and select regional educational datasets; and providing guidelines and training for linking and analyzing these data in order to generate hypotheses, replicate findings, inform the development of RCTs, and estimate causal effects in educational settings.

Multi-level statistical modeling techniques. DRDC supported Petrin in exploring means of adapting existing multiple imputation software for use with multilevel statistical models, and applying multilevel statistical modeling techniques to the analysis of educational phenomena related to student learning and postsecondary educational institution choices.

Advancing the science of knowledge accumulation

Issues of knowledge accumulation and utilization are increasingly important both in educational research generally and to the IERI program specifically as its project portfolio matured. DRDC PI Schneider (2004) directed the Center's program of research activities in this area. Of particular relevance was a major evaluation of the Center for Education at the National Academies which Schneider directed, with support from several members of the DRDC team (Schneider et al, 2005). As part of this evaluation, Schneider and her colleagues developed protocols and instruments to assess the impact of knowledge-producing organizations applicable to DRDC and other programmatic support centers. DRDC also supported Schneider in her work as a member of the National Research Council's (NRC) Committee on Research in Education (CORE). There, Schneider joined other Committee members in addressing issues critical to the ability of the education research field to further strengthen the quality of its evidentiary base and support knowledge accumulation for utilization by researchers, practitioners, and policymakers, including: peer review in federal education research programs; tools and strategies for understanding and promoting knowledge accumulation in education; the implementation and implications of random assignment experimentation in education; journal practices in publishing education research; and education doctoral programs for future leaders in education research. Schneider was a speaker at the two workshops the Committee sponsored on understanding and promoting knowledge accumulation in education and journal practices in publishing education research, and joined the other members of the Committee in contributing to the three NRC publications resulting from the Committee's work: *Advancing Scientific Research in Education* (NRC, 2005), *Implementing Randomized Field Trials in Education: Report of a Workshop* (NRC, 2004a), and *Strengthening Peer Review in Federal Agencies that Support Education Research* (NRC, 2004b). Other related initiatives included research on "Knowledge Production and the Public Interest" (Schneider, Schalliol, Makela, & McDonald 2006); graduate research assistants Makela and Schalliol's presentation on "knowledge accumulation in a multidisciplinary environment" at the 2006 meeting of the American Educational Research Association; Schneider and Kertcher's organization of two Centennial session Symposia for the 2005 Annual Meeting of the American Sociological Association; and Schneider's (2006) work with Offer and Kertcher examining how social scientists define the intellectual boundaries of their disciplines, the constructs used to define disciplinary fields, how researchers define what constitutes evidence and develop their work processes accordingly, and the implications for causal inference.

Impacts of DRDC research activities

The most obvious measure for evaluating the impact of DRDC's research program is the Center's raw output. To date, the Center has supported the publication of 15 refereed journal articles, including pieces in *Educational Researcher*, the *Journal of Educational and Behavioral Statistics*, *Educational Evaluation and Policy Analysis*, *Teachers College Record*, *Social Forces*, and the *Annual Review of Sociology*. DRDC investigators contributed 12 chapters to edited volumes and, with the assistance of the IERI community, edited the two volumes of *Scale-Up in Education* (Schneider & McDonald, 2007a, 2007b). Center investigators and staff have produced 14 research reports or technical papers, including two white papers and the *Just the Facts* brochure. In addition, DRDC investigators, staff, and supported students have made 56

presentations (at the time of writing) at the annual conferences for the American Educational Research Association (AERA), the American Sociological Association (ASA), the American Association for the Advancement of Science (AAAS), and other places.

Of course output does not always, or even usually, equate to impact, so DRDC investigators also worked to acquire expertise (and provide training to PIs) on other measures of influence. Common indicators of effectiveness for academic publications include peer citations calculated using bibliometric databases such as the *ISI Web of Science* and *Scopus*. Although citation analysis requires many years of data to make reliable estimates of impact within the academy, early results from four of the most significant DRDC journal publications are suggestive. An article on knowledge accumulation (Schneider, 2004) has received 3 citations in peer-reviewed journals. Though *Educational Researcher* is not indexed by either *ISI* or *Scopus*, a synthetic piece on scale-up research (McDonald et al, 2006) received 4 citations from peer-reviewed journals according to *Google Scholar*. Two methodological articles (Nye, Konstantopoulos, & Hedges, 2004; Hedges & Hedberg, 2007a) have received a total of 30 citations to date. Metrics for impact outside the academy are less standardized, although it seems clear that Center publications did reach other stakeholder groups. For example, the *Just the Facts* brochure was distributed to Congressional staff and at professional meetings, while a press conference for the *Scale-Up in Education* books resulted in a front-page story in *Education Week*. Additionally, the two volumes have together sold about 700 copies in less than two years.

Another indication of the impacts of DRDC's research activities are the receptions which proposals for volumes on this work have received. As noted above, Rowman & Littlefield agreed to publish a two-volume edited series on *Scale-Up in Education* developed from the 2003 invitational meeting on "Conceptualizing scale-up: Multidisciplinary perspectives." More recently, the principal investigators began work on a manuscript integrating the results of DRDC research on scale-up and knowledge accumulation in order to extend understanding of what works to improve educational outcomes. Their goal is to present a thorough, thoughtful, practical, and accessible account of the characteristics of educational research that makes a difference – and to distill key implications for those who seek to conduct, use, and fund such research. The premise of this volume is that the challenges of producing and utilizing strong evidence of what works to improve educational outcomes are most easily assessed and addressed when the knowledge production process is conceived in stages – from the development of innovations, to tests of their impacts in ideal and 'real-world' settings, to investigations of their potential generalizability, to evaluations of how well they work for large numbers of learners over long periods of time. Oxford University Press (OUP) expressed an interest in this work. The authors have worked closely with the Press to develop a full prospectus for this volume. Extremely positive and insightful reviews were received and commented upon, and OUP's editorial board "unanimously and enthusiastically" approved publication of this volume, due to be completed in 2009.

Impacts of Center research on support for the IERI research community

The research activities of the DRDC not only made important independent contributions to our knowledge base for both scale-up and scientific communities, but also enhanced the Center's technical support and community building functions. In terms of technical assistance, the research program focused the Center on acquiring the expertise most relevant to project needs

and on producing research that projects could actually use. In terms of community building, having a research program of its own gave DRDC unique insights into the issues and concerns of IERI projects. This translated into more effective PI and special topic meetings and, perhaps more importantly, provided DRDC with the legitimacy needed to establish trust and gain cooperation for community-building activities. The missions of the DRDC that appear distinct on paper in reality overlapped and intertwined, producing a support Center that in the end was more than the sum of its parts.

Impacts on the development and career trajectories of young scholars

Through its research activities, DRDC has provided training and development opportunities to young scholars with interests in educational research, policy, and practice, as well as research design and methodological issues more generally. To date, DRDC has provided support: four post-doctoral research fellows; 22 graduate students (including students affiliated with the Departments of Sociology and Comparative Human Development and the Irving B. Harris Graduate School of Public Policy Studies at the University of Chicago, and with the Measurement and Quantitative Methods Program and Educational Policy Program in the College of Education at Michigan State University); and nine undergraduate students enrolled in programs of study at the University of Chicago and Harvard University.

DRDC places high priority on ensuring all staff, research assistants, and other associates receive ongoing research and research administration training, and have the opportunity to participate in personally and professionally rewarding activities as they develop expertise that will assist them in achieving their longer-term academic and career objectives. To this end, DRDC has supported Center staff and graduate student research assistants in attending a variety of courses, and attending and presenting results of their research at meetings for professional development purposes, including meetings and research conferences of the American Educational Research Association (AERA), the American Sociological Association (ASA), the American Evaluation Association (AEA), the Council of Chief State School Officers (on “Connecting Policy and Data – Comprehensive Education Data Systems for 21st Century Learning”), the National Center for Analysis of Longitudinal Data in Education Research (CALDER), the National Center for Education Statistics (NCES) Forum & Data Conference, the Society for Research on Adolescence (SRA), and the Society for Research on Educational Effectiveness (SREE).

Many of the young scholars DRDC has supported have since gone on to accept positions as faculty and researchers in university and not-for-profit settings. At the time of writing, these young scholars had accepted positions at institutions including the Lynch School of Education at Boston College, the Chengchi University, the Chinese University of Hong Kong, The Methodology Center and The Prevention Research Center at The Pennsylvania State University, the University of Iowa, and the College of Education and Human Development at the University of New Orleans.

5. EVALUATING IMPACTS

Evaluating the impact of a research support center is, in principle, no different than determining the effectiveness of an educational intervention. Both require proof of concept and evidence that the intervention will remain effective when applied to larger and more diverse populations. However, much of the data used for this self-study were collected to improve DRDC services rather than to supply experimental evidence of their effectiveness. Thus a random sample of IERI projects was interviewed to provide a more rigorous summative assessment of the effectiveness of the DRDC. The experiences and reflections of those who provided DRDC services are critical here too, since rigorous evidence of effectiveness may not provide information about the causal mechanisms that produced this effect. Together, the interviews with investigators and reflections of DRDC staff can help illuminate this “black box of causation” by identifying specific practices that impacted the IERI research community and thus might impact the success of future support centers as well.

Overall effectiveness of the DRDC

Evidence of DRDC's effectiveness comes both from mining data collected as part of normal operations and from results of the interviews with 25 PIs. DRDC records reveal that project involvement with the Center varied considerably. Although nearly 90% of projects participated in one or more DRDC-sponsored activity, projects that ended earlier in the Center's funding cycle were much less likely to be involved in Center activities (see Appendix E). Excluding these, about 83% of projects whose funding period overlapped fully with the DRDC were either moderately (42%) or highly (42%) involved. A multivariate analysis confirms this, showing that a project was significantly *less* likely to be involved in Center activities if it ended early in DRDC's funding cycle ($p < .001$). Projects receiving technical assistance were significantly *more* involved with DRDC ($p < .01$), as were projects with large awards ($p < .05$) and projects focusing on science ($p < .05$). Project involvement did not vary by research methodology or a topical focus on reading or math.

Perhaps most interesting here is the correlation with receipt of technical assistance. It may be the case that being involved with DRDC made projects more aware of our TA services or more willing to use them. Alternatively, receiving TA services may have provided investigators and their projects with more familiarity with and trust in the Center and its staff – ‘selling’ them on the broader mission of DRDC. Either way, getting projects involved tended to breed more involvement. Although smaller projects seemed to benefit more from PI meetings, larger projects tended to become more involved DRDC. This may be because large projects had more relevant experience with scale-up, and thus were recruited to present at meetings and conferences, or because any technical assistance to such projects was more complex, and thus more contact was required and stronger networks formed.

PIs from the random sample interviews were asked to rate DRDC from a scale of 1 (poor) to 5 (excellent) in terms of the professionalism of DRDC staff (4.77), the quality of DRDC products and services (4.26), and the overall usefulness of DRDC to their projects (3.84). Exhibit 5.1 shows the relationship between PI ratings of DRDC and the level of project involvement. Note that a few PIs declined to rate the DRDC because they felt that their projects lacked the

involvement or experience needed to give a valid assessment. Others said they probably would have given higher ratings had DRDC services been available earlier.

Exhibit 5.1: Project Ratings of DRDC, by Involvement Level



More involvement is associated with higher ratings for both DRDC staff and the quality of DRDC products and services ($p < .05$). Ratings of DRDC's overall usefulness show a similar pattern, although the association does not attain statistical significance. A multivariate analysis paints a similar picture. The overall usefulness of DRDC support is independent of project timing, size, topical focus, research design, and receipt of technical assistance. This suggests that a support center, viewed as an intervention itself, can be scaled up to serve a diverse population of research projects with a variety of needs.

Principal investigators were also asked to elaborate on what was most useful about having DRDC as a support agency to the IERI community and how the Center might have provided better support to their specific projects. Several PIs agreed that “proof of concept” had been demonstrated. *“I like generally the idea of the DRDC and the idea of people being able to get together and talk through what it is that they’re doing,”* said one PI. *“The more compatible the projects are, the more overlap there is in some of the goals for the original funding, the more likely it is that that’s going to be successful.”* Another stated, *“most if not all of the things DRDC did is a very good model. I think they provide...an excellent template for how to do this kind of work well.”* A third PI concluded *“that DRDC serves as a model of multi-university partnership,”* while a fourth observed:

I thought that it was a very interesting concept to have DRDC, and while I’m sure there are ways in which they would do their work differently, I really thought that it represented a nice solution to that problem, how do you become more than a group of just individual researchers, how could we do our work more synergistically, and that’s what I thought they were trying to do.

Much of this success was attributed to the composition and quality of DRDC staff and investigators. One PI noted that the “*knowledgeable, very responsive staff...did a lot of outreach to sort of pull information out of us, which is what you have to do with busy people.*” The staff also was key for “*providing real guidance on research issues,*” which another PI attributed to “*the resources of the various individuals associated with DRDC, [who] provided a nice compliment to one another to be able to anticipate and provide a level of service and support to the research community.*” A PI of one of the first projects funded under the IERI program thought that the Center “*would’ve been more useful to me had it come online earlier*” but still appreciated efforts to build community, noting that “*what they’re good for is getting people connected, getting lines of communications open.*”

Although PIs interviewed had recommendations for how specific activities such as PI meetings might be improved, many of which are noted in the preceding sections, few could think of how the overall mission of the Center might be changed. One wished that DRDC could have done more “*to link researchers with the world of practice or with educational leaders and administrators, policy makers.*” Although he thought such efforts might be beyond the scope of any technical support center and “*that every research group is responsible for trying to build those connections as well,*” this PI remarked that it “*would sure be nice to do it in partnership with an organization that has the broader view, has perhaps more connections, is aware of what other researchers are doing,... who’s helping with that kind of networking, but for the purpose of linking researchers to practice.*” Another PI thought that DRDC may have spent too much effort on creating “*deliverables,*” although he understood that this is inevitable given current funding practices. In the end, most PIs felt that DRDC was an experiment worth repeating. Said one,

I think it is a mistake that often occurs within organizations that we think we have to start over from scratch and lose the lessons that have been learned through the IERI process, specifically the lessons that have been learned by the folks who have worked at DRDC. [This] would be a grievous error. So as we move forward, I think NSF and other agencies should look at how they provide support to PI’s in the process beyond just giving the standard, you know, the money and the manuals.

Reflections and recommendations for future support centers

The above findings speak to the value of continued investments in the programmatic support center concept. A second goal of this self-study was to identify insights from the DRDC experience that might inform other programmatic support centers’ efforts and programs of activity. Such insight also may be informative in making decisions regarding the nature of such investments, and the approaches and activities which are particularly promising in ensuring such centers support not only projects and their investigators, but the program as a whole in furthering the achievement of NSF’s mission. The following recommendations are based on the served community’s assessments of the Center and its activities, and our own reflective self-study. We confine ourselves here to considering lessons which seem particularly relevant to the STEM education research community served by the Directorate for Education and Human Resources (EHR), although suspect many of these same issues would be pertinent to other programmatic support initiatives across the agency.

Reflections and recommendations on the provision of technical assistance

Our experiences with DRDC have shown that even the most sophisticated research teams seek professional development on methodological issues. This is understandable as technical issues in design, statistics, and software are continually being advanced. Moreover, because investigators are often on the cutting edge of design work themselves, a textbook solution may be inadequate. This underscores the value of programmatic resource centers devising strategies for monitoring the served community's TA requirements and involving experts skilled in a wide range of methodological approaches; analytic techniques; theories of classroom learning, teaching, and assessment; and experience synthesizing, targeting, and effectively communicating complex findings to stakeholders with diverse information requirements.

1. Develop an infrastructure to monitor project-specific technical assistance requirements on an ongoing basis

We found that the most useful way to identify a program's likely need for technical assistance is to conduct a needs assessment, asking projects about their past, current, and anticipated technical assistance needs. Such an activity is critical in identifying, tracking, and prioritizing problems which seem most critical to the field, and to develop plans for addressing investigator requests. That said, one-time inquiries into project needs – particularly when these inquiries are made through a single, busy individual (e.g., the project PI) – are likely to be insufficient not only to determine the full range of technical assistance requirements, but also to develop the confidence projects' require in order to entrust the programmatic support center with the provision of those TA services. Key issues include (1) the dynamic nature of the research process, with new issues arising as the study progresses; (2) the numerous types and levels of TA requirements likely to be experienced by individual members of a project team (particularly project teams which are characteristically multidisciplinary, as was the case with the IERI research community); and (3) the challenge of establishing trusting relationships with projects to ensure full disclosure of anticipated challenges given the limited number of contacts required to schedule an interview and the relatively short time-frame of the needs assessment.

We would strongly encourage other programmatic support centers to allocate resources to continuing efforts to document new TA requirements as they arise. While direct periodic inquiries (e.g., e-mails from senior support center staff to project PIs to touch-base periodically, reminding them of the TA services available to their projects) are important, and may be welcomed, our experience suggests it is also important to (1) provide both informal opportunities for PIs to approach center investigators and staff (e.g., establishing the friendly and responsive demeanor that encourages informal e-mail and telephone contact; attending professional association meetings the served projects attend and being available for informal conversations) and more neutral ways of registering requests (e.g., online forms to submit requests for TA consultations), and (2) encourage the development of the trusting relationships that engender confidence in the center's capacity to provide TA assistance in the format projects' require.

2. Focus center resources on the provision of technical assistance in areas that are particularly labor and/or time intensive for projects to address independently

Our experience suggests there may be particular value in focusing center resources on technical assistance in areas that are particularly labor and/or time intensive. Examples of such activities are those at the beginning of the study process that involve obtaining access to study populations and/or extant data (e.g., permissions, protocols, human subjects protection and institutional review board procedures, compliance with the provisions of the Family Educational Rights and Privacy Act (FERPA) and other federal and state regulations¹⁵), and those at the end of the research process associated with the accumulation, synthesis, and targeted communication of study findings. This is not to say that programmatic support centers should play a lesser role in the provision of project-specific technical assistance of the sort our experience at DRDC suggests many investigators find critically important (e.g., issues of data analysis). Indeed our experience suggests such TA requests are likely to form the mainstay of project-initiated short-term requests for assistance from their support center. It seems, however, that there are important economies of scale to be achieved by concentrating a proportion of a support center's TA resources on the development of guidelines, toolkits, templates – and the provision of individualized TA consultation – designed to address some of the more time-intensive, cross-project aspects of the research process which are essential to generate and realize the full potential of scientifically based evidence on innovations' prospects to scale to interventions that improve STEM education.

3. Establish connections with a pool of experts within and outside the community willing to assist the center in providing technical assistance to projects

In order to address the broad range of TA requirements likely to arise in multidisciplinary research communities with diverse research interests, we believe it is important for programmatic resource centers to have in place – and to be resourced to tap – a pool of experts willing to assist the center in providing technical assistance to projects. Staffing programmatic support centers with individuals whose institutional ties and social networks provide connections to a wide range of experts is one strategy for establishing the necessary connections. Given the wide range of expertise developed within distinct programmatic areas, one option for enhancing the pool of experts from which support centers could draw would be to encourage the development of cross-center relationships and collaboration, perhaps providing a password-protected online TA referral resource. For example, the Division of Learning in Formal and Informal Settings (DRL) in NSF's Directorate for Education and Human Resources has recently identified a cycle of innovation and learning to which various DRL programs contribute knowledge. To the extent that programmatic support initiatives are established at distinct stages in this cycle, it would be helpful for center staff to develop connections with each other so that as innovations and interventions mature and move through the cycle, appropriate cohorts of experts could be positioned to advise them on questions that arise across the cycle.

¹⁵ E.g., the Protection of Pupil Rights Amendment, PPRA.

Reflections and recommendations on efforts to build community

Considerable untapped potential can reside in large, diverse communities of researchers from a variety of disciplinary backgrounds and traditions exploring different types of educational research issues at different stages in the innovation-efficacy-effectiveness-implementation-knowledge accumulation cycle. Through our experience with DRDC, we have learned several successful practices for galvanizing such a large and diverse community by soliciting participation and cooperation, giving investigators voice in determining how their technical center supports them, and establishing processes that enable us to utilize resources efficiently to service projects' needs effectively in a timely fashion.

4. Establish the center as a collaborative partner with strong ties to and strong support of agency program staff

Our experiences speak to the value of a programmatic support center developing an identity which encourages the community it serves to perceive it as a collaborative partner in providing resources to pursue issues of interest not only to the community as a whole, but also to subgroups with particular methodological and substantive foci and questions. It also speaks to the value of the programmatic support center developing the kind of relationship with agency program staff that allows all parties to perceive it not as a substitute, but as an additional conduit for raising ideas with program officers.

Our experiences also confirmed that building a community of geographically diverse scholars with pre-existing social networks and intersecting yet often disparate research interests, backgrounds, and demands upon their time can be challenging. For a technical support center to be successful, projects must be willing to share information, ideas, concerns, and recommendations with center staff, and to become actively engaged in shaping its agenda and portfolio of activities. Similarly, projects must be willing to expend their own most valuable and potentially scarce resource – their time – to establish and deepen relations with others, collectively or on an individual team member basis, if a true community is to develop that is more than a collection of individuals with more or less regular and strong connections to a support center.

Clear signals from the agency that projects are viewed (and expected to play a role) as members of a distinct programmatic research community may be necessary to encourage investigators to take a first step towards developing a relationship with the support center. However, such an approach is not likely to encourage ongoing, active participation in, or commitment to, the community or the center that serves it. Key to the establishment of a vibrant community are (1) commitment to a set of shared ideals; (2) perceived value from not just membership but active (even if only periodic) participation in the community and its activities; and (3) a support center that does not position itself in a hub-and-spoke but instead in a facilitating, bridging – and active member – relationship with the community.

5. Establish the legitimacy and authenticity of the center and its activities

For an activity – or the idea – of the community to be perceived as legitimate and authentic, it must have a reasonable rationale that explains why it is important. Activities deemed valuable by the community are particularly likely to be perceived as legitimate. Our experiences at DRDC speak to the importance of soliciting investigators' comments on how core activities (e.g., PI meetings, online services) should be organized and might be improved. Such comments help to shape and iteratively refine services to improve investigators' assessments of activities as legitimate and authentic – a perception that positively shapes understanding of the interests which link the community and give it legitimacy. As noted above, a second key element in establishing legitimacy and authenticity is communication. Our experiences at DRDC underscored the importance of communicating the messages to the community we serve; we expect these messages will be equally important to other programmatic support centers.

A third aspect to establishing the legitimacy and authenticity of an activity is follow-through. DRDC was committed to following up and reporting back on the results of our activities (e.g., to agency staff and the served community). Legitimacy is enhanced when such reports honestly reflect the lessons learned from less than successful activities. Certainly not every activity we attempted at DRDC to benefit the IERI community was entirely successful. For example, we learned that projects were reluctant to share instruments and data on a secured section of the DRDC website. Sharing and attempting to understand this with projects, we learned that investigators might be more likely to contribute materials to existing repositories, or to engage in such sharing with additional support from DRDC. We also, we think, helped to establish in skeptics' minds the understanding that such ideas were not being advanced in our interest, but instead that their programmatic support center was committed to pursuing activities which were of genuine interest to the program and the community.

Reflections and recommendations on the importance of an ongoing Center research program

Our experience with a research and technical center in support of IERI demonstrates that both expertise and sensitivity to research problems are strengthened when investigators offering technical assistance are actively pursuing closely-related research agendas. For example, DRDC investigators collaborated to develop a conceptual frame for organizing and integrating research at distinct stages of the scale-up process (see Schneider & McDonald, 2007a&b; McDonald, Keesler, Kauffman, & Schneider, 2006; McDonald, forthcoming) that provided an important schema for offering technical assistance on study methods, design, and analyses, and for organizing, discussing, and generalizing results and impacts of the IERI program (see e.g., Hedges, 2007b). DRDC investigators also led programs of research to better understand and provide advice regarding both sample design (and statistical power) for multi-site randomized intervention trials (see Hedges, in press, 2007a&b; Hedges & Hedberg, 2007a&b; Konstantopoulos, in press, a&b) and methods for estimating causal effects in non-experimental designs, providing opportunities to leverage the informational content of observational data (see Schneider, Carnoy, Kilpatrick, Schmidt, & Shavelson, 2007). We highlight these examples to underscore the value of programmatic support center research initiatives to projects, the program as a whole, and the STEM education research community more generally.

6. Develop and actively pursue a research agenda consistent with the goals of the program and the needs of the projects it supports

DRDC's research agenda was primarily stimulated by the needs of the IERI investigators and the kinds of projects they were pursuing. In this way, the support Center's research agenda helped to guide the development of TA services just as the IERI program's articulated needs helped to shape our methodological research. Our experiences at DRDC underscored our belief that a center can become more than the collection of services it offers only when, by design, each service leverages the capacity of individual projects to serve the community as a whole. Our vision was to design Center activities in accordance with NSF's objectives for the Center and the program it served, and projects' expressed demand for the services we could, under the terms of our Cooperative Agreement, provide. Enriching our services with findings from our research – and enriching our research with directions from the field regarding priority topics – helped to ensure the benefits of each were leveraged to achieve the Center's mission in support of the IERI program. For example, DRDC's research on scale-up suggested important programmatic benefits might be realized (e.g., assisting investigators and program officers in identifying unpromising lines of inquiry) by establishing systems to document (a) unanticipated consequences of interventions and studies to establish their impacts, and (b) characteristics of studies with adverse or insufficiently promising impacts. We strongly recommend that future programmatic support centers similarly pursue research agendas and design their activities to be integral to and inseparable from the center's strategy for enhancing capacity and forming a productive community consistent with the mission of the programs it serves.

7. Develop and provide a service for providing pre-publication peer review of project and programmatic findings

DRDC's research on knowledge accumulation and utilization suggested the value of establishing a mechanism to provide pre-publication peer review of findings. Such a mechanism can be critical in a time when high stakes accountability encourages research users to seek independent confirmation of the quality of evidence from individual studies and meta-analyses based upon them. Particularly valuable would be a vetting process that, analogous to but faster than the traditional scholarly peer review process, would enable appropriate contextualization and effective communication of findings within particular decision-making windows. Both our research and our experiences synthesizing IERI program findings (e.g., for the *Just the Facts* brochure described in Section 4) suggest a service future programmatic support centers might usefully provide would be to develop and support rapid vetting processes (e.g., advisory panels of blind reviewers) that would give an external seal of approval, like that currently most commonly provided through academic peer review, to findings in a timely fashion. Ensuring early vetting of findings is arguably particularly important at the earliest stages of the innovation-to-implementation cycle, when promising ideas may fail to be pursued if evidence warranting future investment cannot be provided.

8. Supplement periodic assessments of individual center activities with an ongoing reflective self-study process in which all center staff participate

Our experience suggests it will be important for future programmatic support centers to similarly conduct assessments that combine traditional self-study methodology with more summative evaluation methodologies and indicators. Two major benefits are likely to obtain. First, as described by Sablan, the self-study process “develop[s] participant ownership and commitment to ... [the] mission and goals, resulting in greater motivation to solve problems and improve” processes (1997: 17). Our experience supports this, and leads us to conclude that particularly in their first years of operation, centers can benefit greatly from the internal community-building and organizing function the self-study process provides. Ongoing self-study has the potential to energize and empower center staff to adopt a user-oriented approach to the design and conduct of center activities.

A second, related, benefit is the invaluable role self-study – with reflective, thoughtful, and honest analyses of the meanings and implications of all available evidence on center performance and impacts – has to play in total quality management and continuous process improvement. For self-study to achieve its full potential in this regard it may, however, be necessary not only to combine more traditional empirical evaluation research methods in a hybrid continuous assessment process, but also to consider the development of new indicators, metrics, and data to document center impacts.

9. Identify and work with agency staff to pursue opportunities to develop new metrics, indicators, and datasets to more accurately assess center and programmatic impacts

In the 2004 proposal for the supplementary award that funded DRDC’s self-study, we stated that we would consider DRDC to be successful “if we are able to provide technical assistance to the majority of IERI projects; publicize successful interventions and problems of scale-up through scholarly journals and more general publications; enhance the quality of research designs for studying scale-up; and increase communication and interaction among IERI investigators and the wider research and educational community.” As we moved through our self-study, we identified several areas in which the development of new metrics, indicators, and datasets would enable more accurate assessment of the impact of center activities, and the contributions of the center as a whole to the program we served. For example, the pattern of web usage we observed on the DRDC web site coupled with the increased utilization of the web more generally as a means of exchanging scientific findings suggest there may be better ways to document and analyze the accumulation and exchange of knowledge, the development of scientific research communities, and their impact upon innovation and creativity in STEM education research. Once shared with agency staff, these insights suggested opportunities for future research to document and analyze the accumulation and exchange of knowledge and the development of scientific research communities, and their impact upon innovation and creativity in the social sciences. It seems likely that additional opportunities will be presented as centers continue to explore the best mechanisms and measures to employ in order to understand their role in the generation and accumulation of programmatic knowledge that is more than the sum of the findings of individual

supported projects. These, too, are issues that may fruitfully be addressed through cross-center initiatives and inter-program collaborations.

In our experience, self-study played an important role in prompting us to consider the limits as well as the implications of the information we were able to document regarding the impacts of our activities. Ongoing, critical introspection is essential to any successful self-study; we found the insights and knowledge gleaned from this process invaluable in tailoring our services and in considering how evidence generation and knowledge accumulation can be promoted in support of programmatic objectives. We would strongly encourage future programmatic support centers to similarly commit to developing and implementing an ongoing program of critical self-analysis with the objectives of identifying opportunities to improve the services they provide; the impacts they have; and their capacity to generate, accumulate, and share knowledge in support of the programs they serve.

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APPENDIX A Methodology

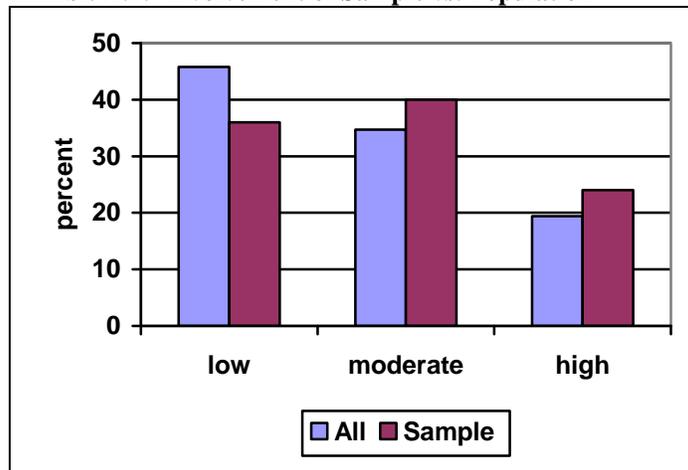
Sample selection

In order to obtain more specific and detailed feedback from projects, we selected 25 projects at random to be interviewed by phone. Since the selection was from a pool of 77 relevant projects, the five investigators representing more than one IERI project were more likely to be selected. Two such PIs were selected, meaning that the sample is slightly biased toward PIs who had more time to become involved with DRDC. The in-depth interview was designed to last 20-30 minutes using the protocol that follows.

Nonresponse bias

In order to reach the desired 25 respondents, a total of 33 PIs were contacted. Five PIs did not respond to the request for an interview, while three declined to be interviewed. As might be expected, these eight non-respondents were more likely to have overlapped early in DRDC's award period and were less involved with DRDC than average. Exhibit B.1 indicates that the involvement level of the 25 PIs interviewed is slightly biased towards more involved projects, which may be warranted given their ability to provide more detailed feedback. Nevertheless, a goodness-of-fit test suggests that the random sample is still representative of the population.

Exhibit A.1: Involvement of Sample vs. Population



Projects that did not participate in the in-depth interviews were given the opportunity to provide feedback via a brief online survey using the form that follows. Forty-seven PIs representing 49 projects were emailed a link to the online survey and were contacted twice more by email and once by phone to increase the response rate. However, only 12 out of 47 PIs (26%) completed the survey.

Instrumentation

DRDC Self Study: Feedback from Projects

Respondent #1: _____ Interviewer: _____

Respondent #2: _____ Date: _____

Respondent #3: _____

Interview Protocol

I. Preliminary Information

Thank you for speaking with me.

As you know, DRDC was funded by the Interagency Education Research Initiative to conduct research on scale-up, facilitate communication among IERI projects, and provide the kinds of technical assistance that projects might find helpful. DRDC also was directed to conduct a self study that would (1) evaluate the center's efficacy in supporting the IERI program and (2) inform future efforts to support NSF-funded programs.

As part of this self study, DRDC has randomly selected 25 IERI projects to provide feedback on how well DRDC has fulfilled its mandate and how the IERI community might have been better supported.

Your participation in this interview is entirely voluntary. The information you provide will be included in a report to the National Science Foundation. None of your answers will be individually identifiable unless you direct us otherwise. You can choose not to answer any specific questions.

Do you have any questions before we begin?

Do we have your consent to proceed with the interview? May we also have your consent to record this interview?

***** TURN ON TAPE RECORDER *****

II. Familiarity with DRDC

1) As part of its community and capacity building efforts, DRDC organized three Principal Investigators meetings and three special topic meetings. Did you or another member of your project attend the IERI PI meetings in:

- 2004 2005 2006

On a scale of 1 (poor) to 5 (excellent), how useful were the PI meetings attended:

1 2 3 4 5

Did you or another member of your project attend any of the following topical meetings:

- Conceptualizing Scale Up: Multidisciplinary Perspectives* (2003)
- Measuring Reading Comprehension in Young Children* (2004)
- Video Research in Education* (2005)

On a scale of 1 (poor) to 5 (excellent), how useful were the special topical meetings attended: **1 2 3 4 5**

2) Another set of DRDC activities aimed at communicating project activities and findings beyond the IERI research community. Did you or another member of your team:

- contribute information about your project for posting on the public section of the DRDC website or for the *Just the Facts* brochure?
- provide DRDC with information about project presentations at AERA, AAAS, or other academic conferences?
- attend or participate in an AERA session organized by DRDC?

3) Did you or another member of your team have any other opportunities to interact or communicate with DRDC staff? If so, please describe:

III. Evaluation of DRDC (Summative)

4) DRDC provided a number of community building and research resources to projects on its website. Did you or another member of your team:

use the DRDC website to find information about PI meetings, AERA sessions, or other meetings of interest to the IERI community? On a scale of 1 (poor) to 5 (excellent), how useful was the information provided:

1 2 3 4 5

access assessment, dissemination, legal or other research resources on the password-protected IERI Community zone? On a scale of 1 (poor) to 5 (excellent), how useful were the resources provided:

1 2 3 4 5

find information about other projects, publications, and presentations on the DRDC website? On a scale of 1 (poor) to 5 (excellent), how useful was the project information provided:

1 2 3 4 5

5) DRDC also provided individual technical assistance and meeting workshops designed to build the capacity of IERI projects to carry out their research. Did you or another member of your team obtain direct or indirect assistance from DRDC for:

Study design? On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

Sample design? On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

Measurement, IRT? On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

Qualitative analysis? On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

Quantitative analysis? On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

Facilitation, networking? On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

- Dissemination of findings?** On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**
- Other project needs?** On a scale of 1 (poor) to 5 (excellent), how useful was the assistance provided: **1 2 3 4 5**

6) On a scale of 1 (poor) to 5 (excellent), how would you characterize the:

- Professionalism** of DRDC staff: **1 2 3 4 5**
- Quality** of services/information provided: **1 2 3 4 5**

IV. Evaluation of DRDC (Formative)

7) Now I would like to ask you about your overall opinion of DRDC and centers like it. On a scale of 1 (poor) to 5 (excellent), how useful were the services and information provided by DRDC? **1 2 3 4 5**

PROBE: Can you elaborate on that (i.e. what was most useful about having DRDC as a support agency to the IERI community)?

8) From your perspective, is there anything else DRDC could have done to better support your IERI project?

- 9) Should NSF decide to provide support services for future educational research initiatives, what advice would you give (*i.e. what kinds of support would be most valuable to the next research community*)?

- 10) Would you like to make any other comments about DRDC?

THANK YOU!

And please contact us immediately if you have further comments or suggestions...



DRDC AUDIENCE SURVEY

Question 7 (marked with an asterisk) is mandatory.



DRDC was funded by the Interagency Education Research Initiative to conduct research on scale-up, facilitate communication among IERI projects, and provide the kinds of technical assistance that projects might find helpful. DRDC also was directed to conduct a self study that would (1) evaluate the center's efficacy in supporting the IERI program and (2) inform future efforts to support NSF-funded programs. We would greatly appreciate a few minutes of your time to answer the following questions.



1 As part of its community and capacity building efforts, DRDC organized three Principal Investigators meetings (2004, 2005, 2006) and three special topic meetings (*Conceptualizing Scale Up*, *Measuring Reading Comprehension*, *Video Research in Education*). On a scale of 1 (poor) to 5 (excellent), how useful did you find the meetings attended:

1 2 3 4 5 N/A
Poor Excellent

General impression:

1 2 3 4 5



2 DRDC provided a number of services and resources to projects on its website. On a scale of 1 (poor) to 5 (excellent), please rate the usefulness of the following online resources:

1 2 3 4 5 N/A
Poor Excellent

Meeting information (PI meetings, AERA, or other meetings of interest):

1 2 3 4 5

Research resources (assessment, dissemination, legal, sharing):

1 2 3 4 5

Project information (summaries, publications, and presentations):

1 2 3 4 5



3

DRDC also provided individual technical assistance and meeting workshops designed to build the capacity of IERI projects to carry out their research. On a scale of 1 (poor) to 5 (excellent), how useful were the following kinds of capacity building services:

	1 Poor	2	3	4	5 Excellent	N/A
Study design:	<input type="radio"/>					
Sample design:	<input type="radio"/>					
Measurement, IRT:	<input type="radio"/>					
Qualitative analysis:	<input type="radio"/>					
Quantitative analysis:	<input type="radio"/>					
Facilitation, network building:	<input type="radio"/>					
Dissemination of findings:	<input type="radio"/>					
Other:	<input type="radio"/>					

4

On a scale of 1 (poor) to 5 (excellent), how would you characterize the *overall*:

	1 Poor	2	3	4	5 Excellent	N/A
Professionalism of DRDC staff:	<input type="radio"/>					
Quality of services and information:	<input type="radio"/>					
Usefulness of services/information:	<input type="radio"/>					

5 We would appreciate any other comments you might have on DRDC's support services, community building activities, and efficacy in supporting the IERI program:



6 We would also appreciate any suggestions you might have for future initiatives to support other research programs:



7 * Please provide the name(s) of the IERI research project(s) for which you are responding. (PLEASE NOTE: This information will be used for analysis purposes only. Responses will not be attributed to projects without the Principal Investigator's express permission.)



Thank you for participating in our survey. When you are satisfied with your answers above, please click the Submit arrow below to record your responses. Your browser will take you to the DRDC home page.

Thank you!



APPENDIX B



**Conference Evaluation Form
Participant Survey**

Name (if willing): _____

100

Field/Specialization: _____

Overall, please rate Day 1 sessions on the following:	Very (5)	Some What (4)	Neutral (3)	Little (2)	None (1)
1. Relevance of topics to your current research	5	4	3	2	1
2. Interest in the topic more generally	5	4	3	2	1
3. Appropriateness of the agenda	5	4	3	2	1
4. Functional allocation of time	5	4	3	2	1
5. Opportunities for participation	5	4	3	2	1
6. Value of the session to your project's advancement	5	4	3	2	1
7. Value of the session in terms of your own professional and research interests	5	4	3	2	1

Poster Reception

- ❖ The meeting included an opportunity for projects to present their work through a poster reception. How useful did you find this as a tool for learning about projects in the IERI community and as an opportunity to share your own work?
 - Very Useful Somewhat useful Indifferent Not very useful Not useful at all
- ❖ How important is it to you that we keep the poster reception in the meeting agenda?
 - Very Important Somewhat important Indifferent Not important Strongly against
- ❖ Are there any other comments you would like to make about the poster reception?

Overall, please rate Day 2 sessions on the following:	Very (5)	Some What (4)	Neutral (3)	Little (2)	None (1)
1. Relevance of topics to your current research	5	4	3	2	1
2. Interest in the topic more generally	5	4	3	2	1
3. Appropriateness of the agenda	5	4	3	2	1
4. Functional allocation of time	5	4	3	2	1
5. Opportunities for participation	5	4	3	2	1
6. Value of the session to your project's advancement	5	4	3	2	1
7. Value of the session in terms of your own professional and research interests	5	4	3	2	1

In order to help us organize meetings in the future, we would appreciate your input on the actual organization and preparation of this IERI meeting.	Very (5)	Some What (4)	Neutral (3)	Little (2)	None (1)
1. Were the meeting materials available in a timely matter?	5	4	3	2	1
2. Were your questions dealt with appropriately and timely?	5	4	3	2	1
3. How useful was the website in keeping you up-to-date with updates?	5	4	3	2	1
4. Overall, how was your experience at this meeting?	5	4	3	2	1

❖ Is there anything else you think should have been available on the meeting website?

❖ In general, how can we improve this meeting so that it best meets your needs as an IERI researcher?

If you have further comments or feedback please email us at DRDC-INFO@norc.org.

Please leave your completed evaluation form in the box at the REGISTRATION table.

Thank You for Your Feedback!

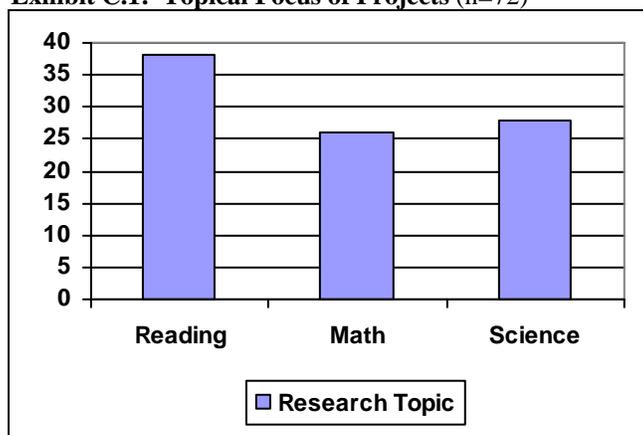
APPENDIX C

Characteristics of IERI Projects Participating in the Self Study

Although every project funded under IERI was contacted at various times to participate in DRDC-sponsored activities, only 77 projects had funding periods that exposed them to the full range of services provided by the Center, and thus are considered primary sources of data for the purposes of this self-study. Since five PIs received more than one major IERI award, the population of PIs most able to comment on the full range of the Center's services reduces to 72. Responses from these five PIs are attributed to the larger or more recent award (typically supported by a full as opposed to a planning grant).

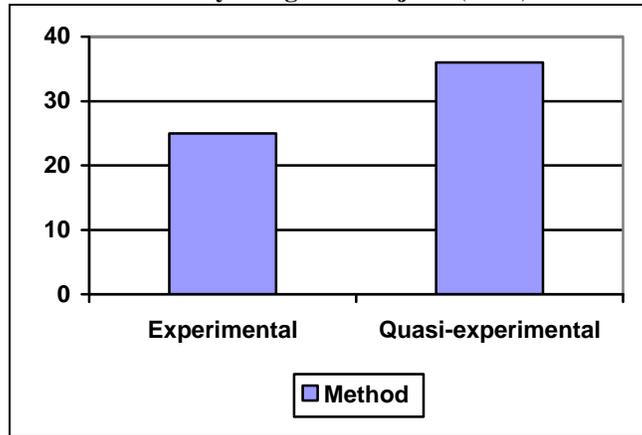
Exhibit C.1 illustrates the topical focus of the 72 projects participating in this self study. Overall, 38 projects included a reading intervention component, while 26 focused on math and 28 on science interventions. Note that many projects focused on multiple topics, e.g. science/reading or math/science, and that IERI made relatively more awards to math and science projects over time.

Exhibit C.1: Topical Focus of Projects (n=72)



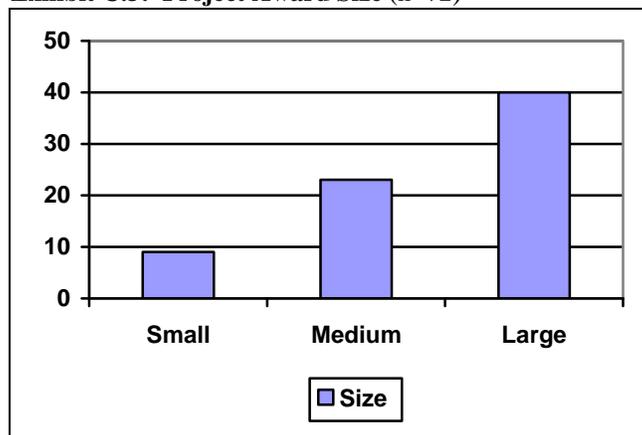
Of the 71 projects for which DRDC could gather sufficient information, Exhibit C.2 shows that 25 included random assignment with controls as part of their research design and 36 employed quasi-experimental research designs.

Exhibit C.2: Study Designs of Projects (n=71)



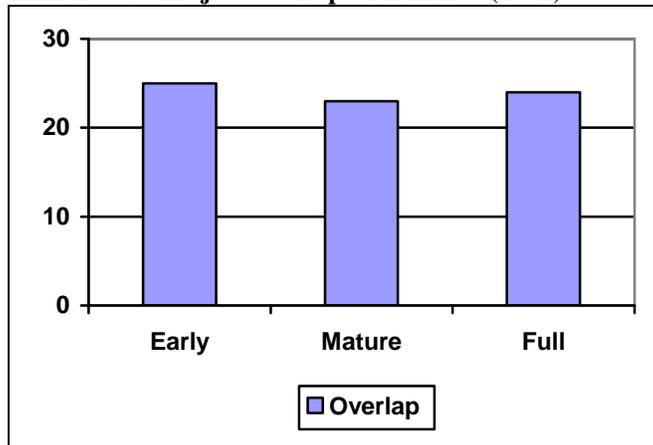
More than half of the projects used for analysis are categorized as being “large” (40 out of 72), meaning an award of \$2 million or more. Medium-sized projects (23) were awarded between \$500,000 and \$2 million, while small projects (9) received less than \$500,000 (see Exhibit C.3).

Exhibit C.3: Project Award Size (n=72)



Finally, the award period of a project relative to DRDC's primary operational period affects opportunities for interaction and hence the project's perception of DRDC and the activities it sponsored. Projects active in the early period also were funded under a significantly different IERI program than were later projects. Exhibit C.4 shows a relatively equal distribution of projects that overlapped with DRDC *early* in its operations (July 2002 to December 2005), only when DRDC was a *mature* organization (January 2003 to July 2007), or over the Center's *full* award period (July 2002 to July 2007).

Exhibit C.4: Project Overlap with DRDC (n=72)

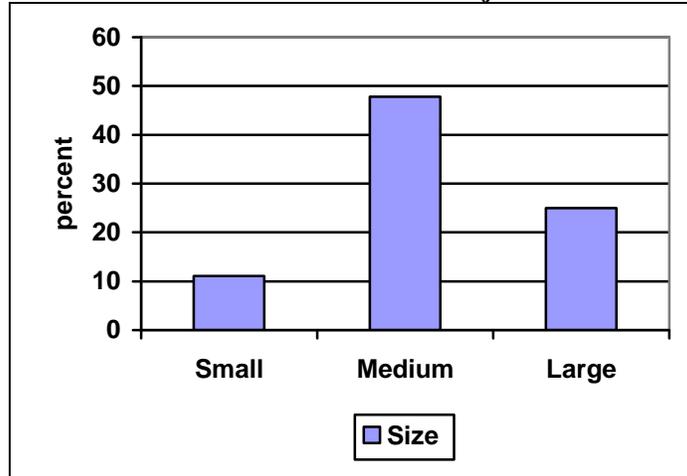


APPENDIX D

Project Use of Technical Assistance

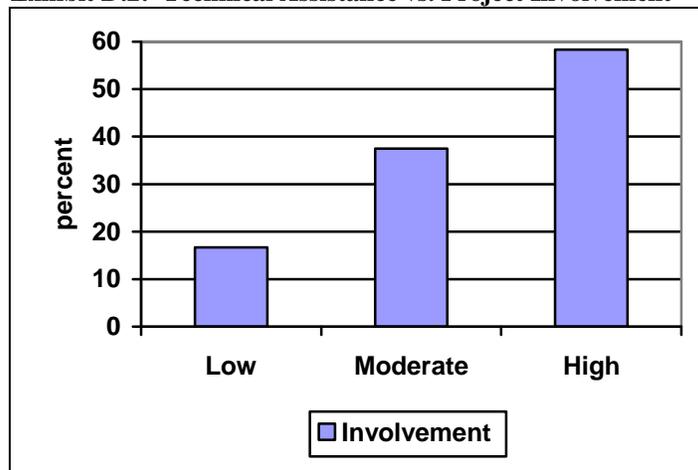
The DRDC database of IERI project demographics provides some insight into the types of projects that received technical assistance services from DRDC. The average size of the projects receiving assistance was nearly \$3.5 million, with a modal value of \$1 million. This clustering around projects with “medium” award sizes (\$500,000 to \$1,999,999) is shown in Exhibit D.1.

Exhibit D.1: Technical Assistance vs. Project Size



Nearly 50% of all medium-sized projects received some form of technical assistance services from DRDC, compared with 25% of large projects and just over 10% of small projects. Exhibit D.2 shows the distribution of technical assistance by project involvement with DRDC. Note that the measure of involvement used here excludes technical assistance itself.

Exhibit D.2: Technical Assistance vs. Project Involvement



Nearly 60% of all projects with high levels of involvement received technical assistance, compared with 37.5% of moderately involved projects and 16.7% of projects which had little involvement with DRDC.

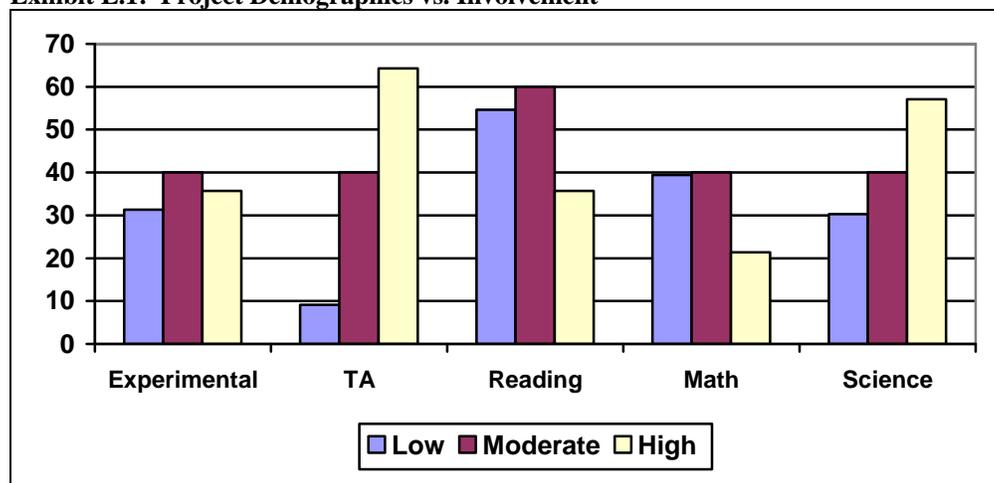
A regression analysis confirms that projects more involved with DRDC-sponsored activities ($p < .001$) and projects receiving a moderate amount of funding ($p < .01$) were more likely to have received technical assistance services. TA consultations did not vary by project research methods (e.g., experimental), when the project was funded (assuming significant overlap with DRDC), or by project topical focus (i.e., math, science, reading).

APPENDIX E

Project Involvement with the DRDC

Using the database of IERI projects, we can explore whether certain types of projects were more or less likely to become involved in DRDC-sponsored activities.¹⁶ Exhibits E.1-E.3 show the percentage of projects having certain demographic characteristics in each of three categories of involvement with DRDC (i.e., low, moderate, or high).

Exhibit E.1: Project Demographics vs. Involvement



The proportion of projects using experimental research designs does not vary much by level of involvement with DRDC, while the proportion receiving technical assistance increases with their level of involvement. The relationship to topical focus appears more mixed, with proportionally fewer math and reading science projects at the highest level of involvement. Projects focusing on science appear to be relatively more involved, although simple statistical analysis does not find a significant relationship between project topical focus and involvement with DRDC. However, the relationship with technical assistance is highly significant ($p < .001$).

Exhibit E.2 shows how project involvement varies by their overlap with DRDC. For example, 41% of projects whose award period overlapped fully with DRDC had moderate and high levels of involvement. By contrast, about 39% of projects which began when DRDC already was a mature organization had low levels of involvement, as did 80% of projects that ended early in DRDC's award period.

¹⁶ These activities included three annual PI meeting (attendee and presenter), three special topic meetings (attendee and presenter), two white papers, the *Scale-Up in Education* volumes, the National Press Club book launch, the *Just the Facts* brochure, sponsored sessions at AERA, a PI planning meeting, technical assistance services, or some other activity such as a joint publication or presentation at AAAS. Involvement with 2 or fewer of these activities is considered *low*, between 3 and 6 is *moderate*, and 7 or more is *high*.

Exhibit E.2: Project Overlap vs. Involvement

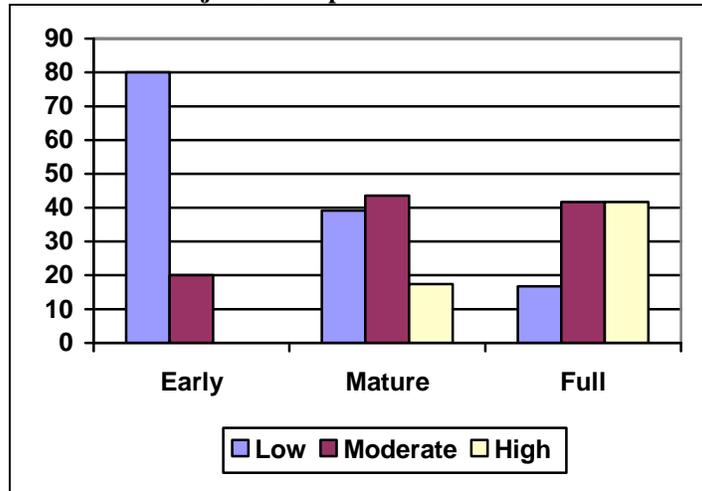
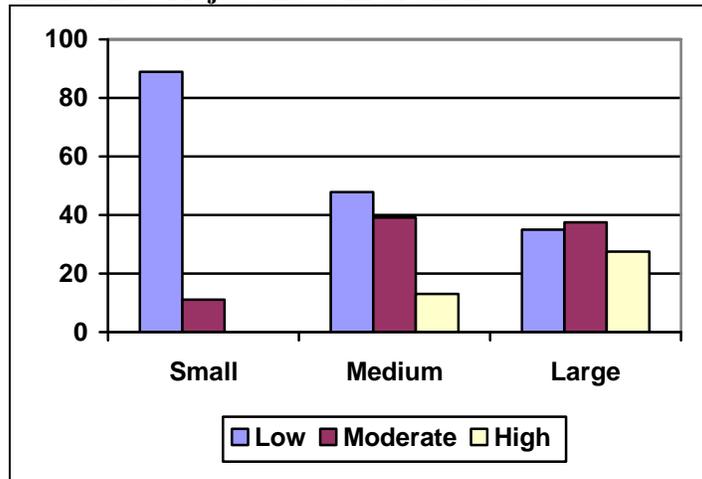


Exhibit E.3 shows how project award size relates to involvement, with nearly 90% of small projects having low levels of involvement. By contrast, large projects are distributed much more equally across involvement levels. The relationship between project size and involvement is statistically significant ($p < .05$).

Exhibit E.3: Project Size vs. Involvement



APPENDIX F

CORRESPONDENCE WITH PROJECTS

One rough measure of “community” is the amount of contact between DRDC and IERI projects supported. To calculate an approximate measure of the number of contacts with projects, we compiled all email correspondence sent and received by DRDC staff from August 2002 through May 2007.¹⁷ It is important to note that records of email correspondence may be incomplete due to staff turnover and staff differences in record keeping. However, the total emails sent by IERI projects is highly correlated with their level of involvement with DRDC ($p < .001$), indicating that the resulting dataset is representative of the population. Another caution is that emails vary considerably in length and content of response, and a given email may represent one response in a “trail” of responses. Thus it is difficult to define what counts as a single, significant email.

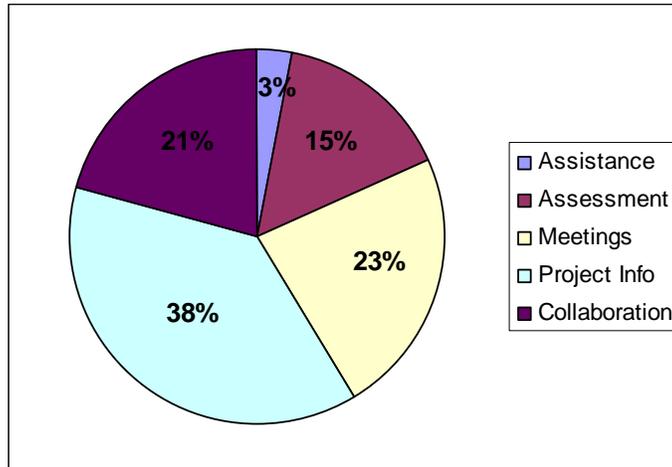
Here, emails were coded by project PI, date sent, and subject of contact. Possible subjects included technical assistance, needs assessment, PI meetings, Scale-Up meeting, Reading Comprehension meeting, Video Research in Education meeting, project summaries, presentations at AERA, DRDC website, *Just the Facts* brochure, Video Research white paper, Social Network Analysis (SNA) survey, and collaboration with DRDC (e.g. joint sessions at professional association meetings or jointly authored items for publication). See Appendix A for a copy of the coding guide and a sample of the coding sheet used. For the purposes of analysis, the above categories were combined to create variables for meetings (PI plus special topic meetings), project information (summaries plus AERA presentations), and collaboration with DRDC (brochure, white paper, SNA, and other collaboration). Only those projects whose funding period overlapped significantly with DRDC were included in the analysis ($n=72$).

Subjects of Emails

Exhibit F.1 shows the proportion of subjects addressed in emails sent by DRDC to projects (note that a single email could have multiple subjects).

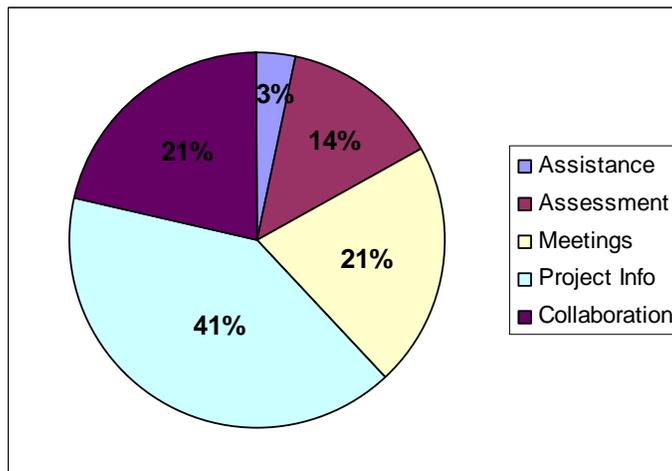
¹⁷ Contacts for technical assistance and needs assessment are understated since many such contacts were made by phone or in person. For example, projects requesting technical assistance may have received a visit from DRDC staff or met with staff at a PI or professional meeting.

Exhibit F.1: Emails Sent by DRDC to IERI Projects (n=1,464)



Emails asking projects for information were the most common (38%), followed by emails about PI or special topic meetings (23%), emails about ongoing or potential collaborations (21%), emails about the needs assessment process (15%), and emails about technical assistance (3%). Exhibit F.2 shows similar results for emails sent by projects to DRDC.

Exhibit F.2: Emails Received by DRDC from IERI Projects (n=1,179)



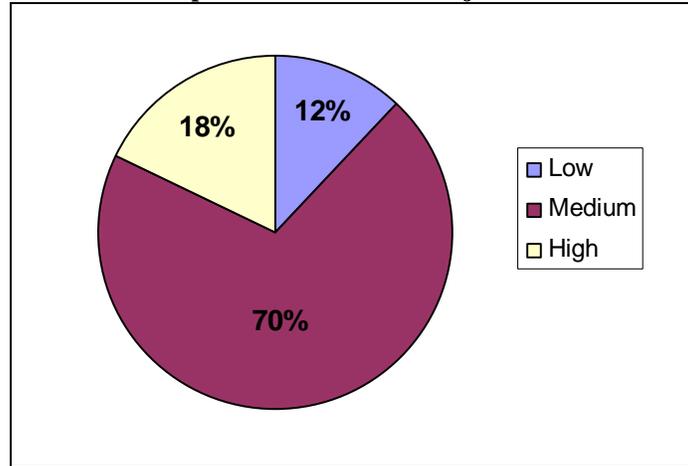
Although emails sent and received by DRDC show the same proportions by *subject*, the proportion of emails sent and received by *project* varied greatly.

Responsiveness of Projects

DRDC averaged 0.81 emails received for every email sent, with a range from zero to 1.26. Exhibit F.3 shows the “responsiveness” of projects to email contacts, with responsiveness

categorized as low (sent/received<0.49), medium (sent/received between 0.50 and 0.99), and high (sent/received>1.0).¹⁸

Exhibit F.3: Responsiveness of IERI Project to DRDC Emails (n=67)



Most projects showed medium responsiveness (70%), though a significant number responded to few emails (12%) or sent more emails than they received from DRDC (18%). This variation in responsiveness can be explained in part by two project characteristics. As might be expected, projects more involved with DRDC were more likely to respond to emails ($p<.05$). Perhaps unexpectedly, however, projects that ended early in DRDC's award period also were more responsive than projects that started when DRDC was a mature organization ($p<.05$). Although this may reflect an actual decline in responsiveness, it might also be due to changes in record keeping over time (i.e., fewer emails kept); a change in the nature of emails sent to projects (i.e., more "announcements" vs. "requests"); or indicate a scaling up of DRDC operations (i.e., more emails to respond to). In the latter case, we might expect responsiveness to be correlated with project size since larger projects could have more capacity to respond. Overall, project size is not related to responsiveness even though having a larger award approaches significance ($p<.10$).

¹⁸ The term "responsiveness" should be interpreted with caution given that responses might have been made by phone or in person, might have been made to multiple issues in a single email, and might not have been required at all (e.g. an email from DRDC noting a new website feature or resource).