September 30, 2002

Experimental Design to Measure Effects of Assisting Teachers in Using Data on Enacted Curriculum to Improve Effectiveness of Instruction in Mathematics and Science Education

DEC Project: Year 2 Report

Funded by a grant from the National Science Foundation, Research on Learning in Education program (REC #0087562)

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Council of Chief State School Officers
in partnership with
Wisconsin Center for Education Research and
TERC Regional Alliance for Math and Science Education

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"Data on Enacted Curriculum Project"

Year 2 Progress Report

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Data on Enacted Curriculum Project: Year 2 Progress Report

Executive Summary

The three-year NSF-funded study uses a randomized field experiment with middle schools as the experimental unit to test the effects on classroom instructional practices of a school-based model for professional development. Baseline data on instructional practices were collected in the spring of 2001 for both treatment and control schools; the dependent variables are to be measured in spring 2003. In the interim, treatment schools are receiving professional development to assist math and science teachers in using their own school survey data on enacted curriculum and student achievement results to improve the effectiveness of their instruction. The Data on Enacted Curriculum (DEC) project is funded under a grant from the National Science Foundation, Research on Learning in Education program (REC #0087562).

The professional development model was designed for and is being tested in middle schools in large urban districts: Charlotte-Mecklenburg, Chicago, Miami-Dade, Philadelphia, and Winston-Salem. Across the districts, approximately 40 middle schools were recruited to participate, with half randomly assigned to receive the treatment. Control schools will receive the treatment following the collection of dependent variable data (in spring 2003 through winter 2004).

Project Design. The treatment developed and provided by TERC Regional Alliance for Mathematics and Science was based on *Using Data/Getting Results: A Practical Guide for School Improvement in Mathematics and Science* (Love, 2000). Prior to the NSF project, TERC personnel had been providing professional development for teachers to use student achievement data. Current work extends use of student achievement data to include use of instructional practices data based on teacher surveys.

Treatment Model. Each treatment school has formed a mathematics and science leadership team consisting of five to seven members, at least one of whom is an administrator; the others represent a range of grades for both mathematics and science. Professional development is being provided to leadership teams in district-level workshops. Leadership teams work with all math and science teachers in the school.

The treatment consists of professional development workshops and technical assistance. Three workshop over the first year are: a two-day workshop just prior to the beginning of the school year, focusing on "using data and collaborative inquiry;" a one-day workshop mid-school year, on "investigating instructional practice and content data, and cognitive demand aligned to state assessments;" and a third one-day workshop at the end of the school year, on "analyzing student work as a means of monitoring progress." Before, between, and after these three workshops, technical assistance is provided at the school level involving both leader team and math and science teachers.

Initial Evidence. As the DEC project is now (September 2002) only at the end of Year 2 out of three, results of the treatment effects on instructional practices cannot yet be expected. The work is, however, midway through delivery of two years of treatment, and thus, some data and analysis of level of implementation of the treatment are available. Not surprisingly, there are substantial differences between schools, largely a function of principal leadership. There are also substantial differences among districts. Nevertheless, there are many schools in which the quality of implementation is high.

A project treatment cannot have an effect if a treatment is not received. The Charlotte-Mecklenburg school district has undergone extensive staffing changes between 2001-02 and 2002-03, with up to two-thirds of all middle school mathematics and science teachers being reassigned. Philadelphia is involved in a state takeover of district schools. In Chicago, the key district administrator went on leave during the year 2001-02. These events have created challenges to the implementation of DEC. In contrast, Miami-Dade district leadership has been stable and put priority on the project. Not surprisingly, implementation is best in the Miami-Dade site.

Implementation Summary. The project relies on leadership teams in each school to work with the rest of the math and science teachers in their middle school. This presents an interesting contrast between Chicago and Miami, since Chicago has relatively small middle schools and Miami relatively large middle schools. To our surprise, implementation has been on average better in Miami than Chicago. Perhaps the trainer of trainers model (as developed in the DEC project) works better in large schools, though of course the Miami-Chicago contrast is confounded with more stable and forceful advocacy for the project in Miami. Chicago also put a priority on reading instruction for the 2001-02 school year, which appeared to take time away from science, but not mathematics instruction.

More generally, implementation seems to be positively influenced when there is time for leadership teams to meet and to work with other teachers, when there is stability of leadership team membership, when the principal of the school is enthusiastic about the treatment, and when district staff are knowledgeable about the treatment and advocates for its implementation and success. Each of these factors varies in important ways from district to district and school to school within each district.

Summary of Data Collection: Year One and Two: Thus far, a great deal of data has been collected, and much of it has been analyzed. Teacher surveys completed in year one (2000-01) focus on classroom practice, instructional content, teacher characteristics, attitudes and beliefs. Principal surveys, also completed in year one, concern policies, programs and practices. Field notes from observations of professional development workshops, site visits and leadership team interactions complement the survey data, as does a collection of district and school documents outlining mathematics and science programs, improvement plans and policies. Responses to surveys were excellent, with a 77% response rate from teachers and a 79% response rate from principals.

School participation, however, has not been without its problems. Of the 40 schools originally recruited to the study, four dropped out before random assignment due to low survey responses. An additional three schools randomly selected as treatment schools discontinued participation after workshops began due to principal decisions. One control school was randomly selected to become a treatment school after the middle school was converted to a high school in year one.

Now, toward the end of Year 2, an additional district has been recruited (Winston Salem), and eight schools have been added (randomly selected as four treatment schools and four control schools).

Use of Survey Data in Treatment. All of the initial teacher survey data has been analyzed and was provided to school leadership teams within three months. School reports contain approximately 150 pages of text, tables and charts. In addition, assessments in math and science have been content analyzed. The leadership teams have received descriptive analyses and content maps from the systemwide student assessment instruments (state or district) that are being used in math and science in each treatment school, and, in addition, we provided measures of the alignment of math and science instruction in their school to the tests.

Teacher Characteristics in Project Schools. Of the 559 teachers responding to the spring of 2001 survey, 70% were female, 44% were white, 33% African American, and 20% Hispanic. Twenty-nine percent had two years of experience or less; 30% majored in a field other an education, mathematics or science.

For the most part, random assignment of schools to treatment or control resulted in no statistically significant baseline differences. There were, however, some modest differences favoring treatment school teachers in the amount of participation in professional development; this finding was slightly more true for mathematics than science.

Summary of Project Progress: Year 2. At the end of Year 2, the study is on track. Baseline data have been collected and analyzed, and, in the case of treatment schools, results provided to school leadership teams. Attrition from the sample has been replenished by adding a fifth district. Implementation varies by school and even by district, but that is to be expected. The good news is that several schools, especially those in Miami, are using the data on student achievement and instructional practices in ways supported by the treatment. In Miami, several treatment schools experienced large achievement gains by the end of the first year of treatment. They are attributing their gains, in part or in whole, to the treatment.

There is great enthusiasm in education research these days for randomized field trials. Thus, our experiment is timely. Andy Porter was recruited by the Campbell Collaborative to write a paper on the project for a conference in Bellagio, Italy, November 2002, "Progress and Prospects for Place-Based Randomized Trials."

Experimental Design to Measure Effects of Assisting Teachers in Using Data on Enacted Curriculum to Improve Effectiveness of Instruction in Mathematics and Science Education

Data on Enacted Curriculum Project

Year 2 Progress Report

The Council of Chief State School Officers (CCSSO) was awarded a grant from the National Science Foundation (NSF) in Fall 2000 to conduct the Data on Enacted Curriculum (DEC) study. The collaborating organizations on the project are Wisconsin Center for Education Research and TERC Regional Alliance for Mathematics and Science. The project is supported by NSF Grant REC #0087562 under the Research on Learning in Education program.

The purpose of the three-year study is to determine the effects of a professional development model based on the use of rich, in-depth curriculum data on improving instruction in math and science. The model is based on research on effective professional development with teachers, which shows the development must be: (a) based on content standards and emphasize subject content and active learning strategies, (b) focused on continuous improvement of practice using data and formative evaluation, and (c) build on school-based collaboration and networking aimed toward sharing teaching ideas, models, and strategies for improvement. The main steps in the three-year study are: baseline data collection, implementation of treatment (professional development/assistance model), follow-up data collection, and evaluation of effects.

Outline of Year 2 Progress Report

At the end of September 2002, we are submitting a report to NSF on the progress of the study to this point. The report describes the process of implementing the study design and data collection, initial observations about the implementation of the professional development model, and preliminary findings from analysis of base line data. The report has the following sections:

Executive Summary: Year 2 Progress Report
Part 1 Introduction: Study Objectives and Design
Part 2 DEC Professional Development and Assistance: Treatment Model
Part 3 Data Collection and Initial Analyses: Years 1 and 2
Part 4 Analysis of Implementation of DEC Model

Part 1

Introduction: Study Objectives and Design

Schools across the nation are working to adapt and improve curricula and teaching practices to meet the standards for learning established by states and school districts. In mathematics and science education, "standards-based reform" typically means that teachers must plan and implement their curriculum and teaching in relation to challenging content standards with high expectations for student knowledge and capacities. A major question for education decision-makers is how best to assist teachers in improving their curriculum content and teaching practices, with the ultimate goal of improving student achievement. An important research question is how to measure and analyze the extent of change in teaching practices related to professional development initiatives.

Research Questions

The primary research question being tested in the study is:

1. What are the effects on classroom instructional practices of a school-based model for assisting teachers in using their own school survey data on enacted curriculum and assessment results to improve the effectiveness of their instruction?

To answer this question, two additional questions will be analyzed with study data:

2. To what extent is classroom instruction aligned with state standards and assessments, and what is the extent of variation in practices and content?
3. How is the professional development model, based on use of data, effectively implemented in large, urban districts to the school level?

The program model and research design for the project will test several assumptions underlying many current reform efforts:

- Schools need a method of consistent, reliable data collection, analysis and reporting to teachers on the "enacted curriculum," i.e., the content taught in classrooms and teaching methods and practices.
- Teachers and administrators need workable strategies for analyzing and using both assessment results and enacted curriculum data, and they need incentives for working collaboratively with the data towards the goal of improving instruction.

This project offers a randomized field trial test of the effects of both these concepts in instructional improvement using a program model and research tools that have been field tested but have not previously been combined in a controlled research study.

Experimental Design

The study design focused on testing the model with middle schools in large urban districts (specifically, Charlotte-Mecklenburg, Chicago, Miami-Dade, Philadelphia, and Winston-Salem). The study sample consists of 40 middle schools located in these districts. All the math and science teachers in the schools are the target groups for the surveys and professional development model. An experimental design is used to measure the effects of the program model and compare instruction in treatment schools vs. control schools. The study design consists of seven steps:

(a) Baseline data collection from all schools and science/math teachers;
(b) Random selection of schools into 2 groups;
(c) Technical assistance and professional development implementation in treatment schools, using school data reports;
(d) Implementation research in study sites and validation of survey data;
(e) Follow-up surveys with science/math teachers in all schools;
(f) Analyze change in teaching practices and attribute effects of model ;
(g) Provide technical assistance and professional development to control schools.

Schedule-Timeline

The following graphic and flow chart (figure 1) illustrates the timing of key steps in the project. The dotted line shows the three year time period for the project. The study will take into account the activities of the study sites prior to its start, and we show this by the boxes with standards, assessment, curriculum and their existing science-math initiatives and professional development. The overall goal of the project will be to assist in improving student achievement, for the study sites, and with what is learned from the experimental design to apply to other schools.

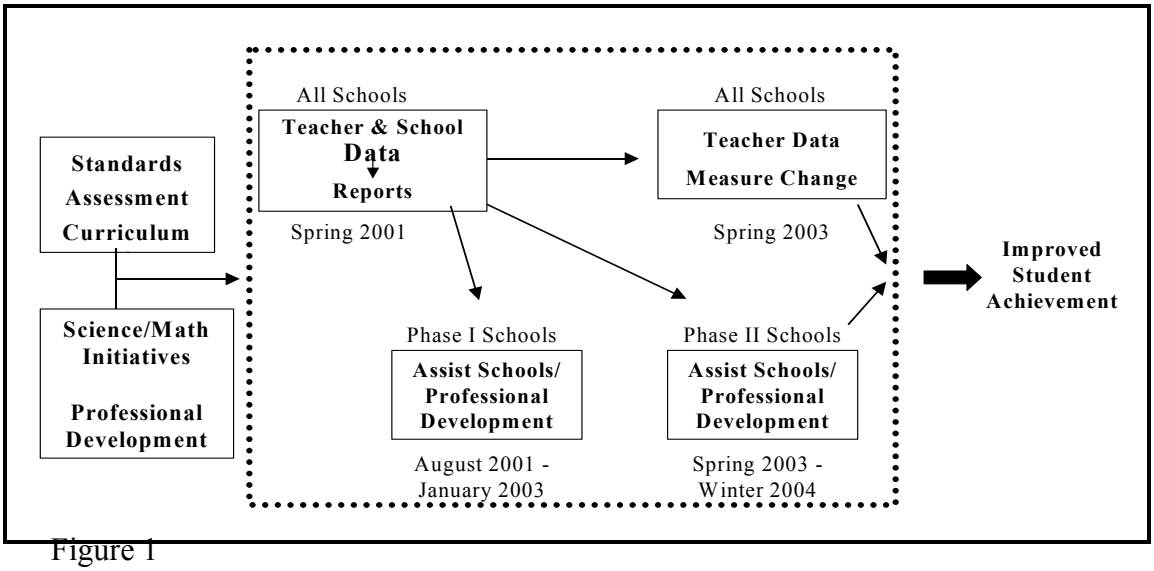


Figure 1

The project team is led by Rolf K. Blank, director of education indicators at CCSSO. Andrew Porter and John Smithson of the Wisconsin Center for Education Research (WCER) at University of Wisconsin-Madison are leading the research design and data analysis, conducting the project's data collection, analysis, and reporting. The data-based technical assistance with schools is led by Diana Nunnaley and Mark Kaufman of the Regional Alliance for Mathematics and Science Education at TERC.

Data Collection, Analysis, and Reporting

The survey instruments for the DEC project were developed and tested in a project conducted by CCSSO and WCER from 1998-2001 that involved 11 states and over 300 schools. The survey instruments were designed with math and science specialists from the 11 collaborating states. The surveys provide reliable, comparable information on classroom instruction practices, subject content (content topics by teacher expectations for learning), and teacher preparation. The project also developed data analysis and reporting methods for use of curriculum data by state leaders and local educators for multiple purposes—including analyzing differences in instruction across schools and classrooms, evaluating improvement initatives such as professional development, and analyzing alignment of curriculum with state standards and assessments. Two project reports summarize the results of the study, and demonstrate the survey and reporting tools being applied in the DEC project (Blank, Porter, & Smithson, 2001; CCSSO, 2000).

DEC Professional Development and Assistance Model

The professional development model for the DEC project is based on standards-based improvement of instruction, continuous improvement of practice using data and formative evaluation, and school-based collaboration and networking aimed toward sharing teaching ideas, models, and strategies for improvement. The steps in the assistance model process with schools are:

- **Two-Day PD Workshop**: Working in school planning teams, teachers and administrators learn to use rich, in-depth data to inform decisions about curriculum and improved practice; gain skills in analyzing survey data and organizing data-driven dialogue; learn how to set measurable student learning goals and use curriculum data in school improvement plans.
- **Provide Assistance in schools**: School leaders use new skills with curriculum data to work with math and science teachers in their schools. Project team provides assistance with data applications on-site, through resources, and phone/email. Math and science specialists incorporate data into their ongoing work with teachers.
- **PD Follow-up Workshops**: During the school year, staff assist teams in further analysis of data, especially analysis of alignment of assessments, standards, and teaching practices. The Goal is to

move from inquiry about data into action with improving teaching. An additional one-day workshop is convened with leader teams.

- **Evaluate Progress, and Refocus Assistance**: At the end of year 1, project team meetings with staff of each school help determine progress, identify problems, and focus on further action steps for next school year. In year 2, new staff in schools are brought into the model in year 2, and assistance is continued through mid-year when the follow-up survey is conducted to measure results.

Analysis of Implementation of DEC Model

The study includes methods of data collection, observation, and interviews in study sites to document how the DEC professional development and assistance model is implemented and to analyze why and how it has effects with the schools and teachers. Surveys were administered to all principals in year one to provide comparable data on the context for implementing the model with schools and districts. Interviews with district staff were conducted in year one as well. Observations and data collection about local participation in workshops and technical assistance were completed with all study sites, and further in-depth case studies were completed with two districts (Chicago and Miami-Dade) and selected schools in each district. One of the research staff was assigned primary responsibility for organizing the implementation data across sites, and analyzing and describing the results by the end of year 2.

Part 2

DEC Professional Development and Technical Assistance:

Treatment Model

Goals and Design of DEC Model

The DEC project treatment model has the goal of developing skills of math and science educators on use of data to improve instruction by use of an inquiry-based approach to learning and improvement. The project staff implemented the model by working with school leadership teams through centrally located workshop sessions and school-based, on-site technical assistance meetings.

Table 1: DEC Model Outline, Phase 1

March- April, 2001	Complete Surveys of Enacted Curriculum
August	Introductory PD Workshop Leader teams (2 days)
October – November	Technical Assistance (half-day session each school)
January –Feb., 2002	PD workshop #2 (1 day) Use of Data
March – April	Technical Assistance (half-day session each school)
May – August	PD workshop #3 (1 day) Analyzing Student Work
Sept. – October	Technical Assistance - (half-day)
January – February, 2003	Workshop or TA as needed
March – April	Complete Follow-Up Surveys

The DEC model and set of activities presented to the school teams and the district staff has the following specific goals for the work with Math and Science Leadership Teams at schools:

- Learn to use rich, in-depth data to inform decisions about curriculum practice, assessment, organization, and materials.
- Gain skills in collecting, analyzing, and displaying data, working collaboratively, organizing data driven dialogue.
- Learn how to set measurable student learning goals, develop data-driven local improvement plans and sustain process.

The goal of the DEC model is to assist teams in identifying key areas of learning and then focusing teachers specifically on what is needed to improve instruction in these areas. This approach to technical assistance is based on the prior work of Schmocker (2002) and Fullan (2000) on effective strategies for improving student achievement. The general approach underlying the DEC model was summarized by Nancy Love in her book, *Using Data Getting Results* (2000):

…… to support those leading mathematics and science education reform at the school or district level to themselves become inquirers into how to best improve student learning.

Part 2 of the Year 2 Progress Report consists of five sections:

- Developing Data Skills
- Treatment Model in DEC Phase 1
- Timeline of Activities
- Content Description of DEC Treatment
- Summary

Developing Data Skills of Educators

The DEC project plan for implementation of the professional development and assistance to schools recognized that few teachers, or administrators, had been involved in a professional development process for analyzing data. The project sought to introduce key ideas and train staff in applying strategies for working collaboratively in a group of professionals to begin to ask tough questions about which students are/are not learning, what content is being learning, and why some students are not learning. In other school improvement initiatives driven by data, such as the Charlotte-Mecklenburg district approach to analyzing North Carolina state "End of Grade" test scores, school groups have undertaken the challenge of learning skills for working with student achievement data. However, the approach to using data in DEC involving instructional and curriculum data is new, and few schools or districts have had the advantage of adding to their analysis the kinds of data that are generated when an entire mathematics and science department completes the Surveys of Enacted Curriculum.

A major intent of the DEC treatment model has been to involve mathematics and science leadership teams directly in the processes and techniques for using their data to highlight important questions, and to discover tentative causal factors. Secondly, and of equal importance, has been the goal of designing the professional development workshops in ways that model "best practice" in professional development and to provide resources and support that enable participants to engage their own colleagues in the processes.

The content and processes that have been introduced in the DEC model through hands-on activities, simulations, and direct engagement with their own instructional and curriculum data have been adapted from the book, *Using Data/Getting Results: A Practical Guide for School Improvement in Mathematics and* Science (2000), developed by Nancy Love at the Regional Alliance for Mathematics and Science Education. Another source that has added greatly to the overall design of the workshop

process and activities is **The Adaptive School: Developing and Facilitating Collaborative Groups** (Wellman and Garmston, 1999).

The DEC approach is based on having educators learn how to approach data in ways useful to instruction and this involves a new way of talking about their data. The following scenario extracted from Ruth Johnson's book *Using Data to Close the Achievement Gap (2002)*, illustrates why the implementation plan began by introducing data-driven dialogue.

> The leadership and data teams had spent a considerable amount of time collecting and disaggregating data and preparing a presentation for their colleagues about the achievement gap in their schools....Achievement gap patterns were apparent. On every indicator of achievement there were disparities by race, ethnicity, and income. Also, the data showed minority students were disproportionately placed in lower-level class groupings and special education, and they also were consistently on lists for disciplinary infractions…
>
> After the presentation, the teams asked the faculty to examine and discuss the data in small groups and to propose some solutions to improve student achievement and to close the gap. … Teachers said that the achievement disparity had to do with poverty and that there was enough research to prove it, and still others claimed that the parents did not care and that the kids were uncooperative.
>
> Others had silver bullet solutions such as this or that program or creating another remedial course. Some resented the fact that the data were disaggregated and felt that doing so was racist. They claimed that they did not see color and that this presentation was divisive. There were others, however, who saw the data as confirming their assumptions about what was happening to different groups in the school. They were glad that there would be an opportunity to have dialogue around these patterns and to pose some solutions. They had heard about schools with similar demographics that were significantly closing the gap, and they believed that the data picture in their school could change.

Treatment Model in DEC Phase 1 Schools

Increasingly, school improvement teams are finding themselves facing a deluge of requests for data as well as data reported to their schools. However, experience of the DEC team was that few districts have supported schools with the experience or knowledge of the processes and techniques that would help them to mine their data, and apply the findings to improved instruction. The DEC Phase 1 (treatment) schools were no exception to the pattern.

The districts that volunteered for the DEC study are large districts with active assessment and accountability departments that provide regular reports to schools on their student results. But, we observed that few of the staff we worked with in the Phase 1 schools had any experience in how to disaggregate and triangulate data about the students in their lowest achievement levels. None had prior access to data illustrating the range of instructional practices or pedagogical beliefs that was represented across their staff. In even the most experienced data-savvy teams, there had never been a means of analyzing student achievement in light of data revealing the extent of their content coverage – what was actually taught and the cognitive demand levels held by the staff across topics within that content.

The DEC project sought to provide the catalyst for teams to move in the direction of skills and knowledge for meaningful, useful data dialogue. We faced the obstacles of low staff experience with data and a prevailing situation of little structured time for faculty in most schools to discuss their practice in light of student achievement goals. The DEC project staff needed to begin working with schools to structure the conditions under which staff could explore what happens in a professional community of learners.

Developing School Leader Teams. Another goal of the DEC treatment model is to develop the capacity of school leadership teams to engage a larger group of their own staff in dialogue about their data and inquiry into their own teaching and learning. The Leader team participates directly in the professional development workshops where they work on plans and strategies for involving all of their math and science teachers in developing skills with data analysis and data-driven dialogue about improving instruction.

The Phase 1 schools were asked to form a "Mathematics and Science Leadership Team" at the outset of the Project. Teams were to include at least one administrator– the principal or the assistant principal for curriculum, mathematics and science department chairs, lead or master mathematics and science teachers, and other math and science teachers such that a range of grades and subjects were represented across the group. They were advised to form a group consisting of five to seven members who would participate in all project professional development workshops and meetings throughout the project.

District Support. In addition to school teams, the DEC Project asked each district contact person to involve district-level instructional support staff by inviting them to participate in all workshops. We also provided the option of scheduling separate workshops for an entire district group who had other relationships and roles in supporting mathematics and science instruction in the schools. The rationale for involving a larger support network was to ensure that everyone working in the schools had knowledge of the processes, techniques and goals for the DEC work and that schools would benefit from the added support for moving ahead on their own to engage more of their staff in the same processes**.**

Table 2: Timeline of Activities for DEC Professional Development and Assistance

Date	Event and Purpose	Participants
March, 2001	Introduction to DEC goals, design, and requirements (3 hour session)	District curriculum staff, principals, department heads
March – April, 2001	Site visits to all participating schools (2 –3 hours)	Principals and other staff
April – May, 2001	Complete Surveys of Enacted Curriculum	All mathematics and science teachers
August, 2001	Intro. Leader PD Workshop on Using Data & Collaborative Inquiry (2 full days)	School leadership teams & district support staff
October – Nov. 2001	Technical Assistance (3 hr. sessions in Phase 1 schools)	School leadership teams
January –Feb., 2002	PD workshop on Investigating Instructional Practice, Content and Cognitive Demand Aligned to State Assessment . Outcome to identify student learning goals (1 day)	School leadership teams
March – April, 2002	PD workshop on Using Data, Collaborative Inquiry and a grounding in the DEC project	District Support Staff and Instructional Specialists
March – April, 2002	Technical Assistance to establish measurable goals and to design structure for on-going data analysis by the staff on a regular basis (3 hr. sessions in Phase 1 schools)	School leadership teams
May, June & August, 2002	PD workshop on Analyzing Student Work as a means of monitoring progress (1 Day)	School leadership teams and district support staff
September – October, 2002	Technical Assistance - Analysis / comparison of newest student achievement data (3 hours)	School leadership teams
January – February, 2003	Workshop or TA as needed	School leadership teams
March – April, 2003	Complete Surveys of Enacted Curriculum	All mathematics and science teachers

Content Description for DEC Treatment

Initial Visits. The DEC project engagement with the schools began in the Spring of 2001 with site visits to all participating schools. Visits to the schools enabled us to become familiar with their setting, to meet the staff, to collect background information about their staff and students and to answer additional questions about the project, their responsibilities, goals, etc. Importantly, for developing the content of the professional development activities, we identified from school staff the range of materials and curricula for teaching mathematics and science. Also, we gained information about the kinds of professional development members of their staff had attended in recent years. This enabled us to gain more in-depth information about their experiences with standards-based curricula and the level of professional community that did or did not exist across their departments. (These interviews augmented the administrator and tacher survey data also collected in Spring 2001.) At the same visits, we collected staffing lists, class schedules and copies of their school improvement plan.

Workshops. Professional Development sessions were held at a central location with every effort made to provide a professional environment. Initial introductory sessions were held at hotel conference centers or at district professional development centers where available. Activities were supported through wall posters, color print-outs of charts, large wall-size data charts, and multi-media resources. Participants had access to colored markers, colored post-its, and dots, chart paper, scissors, and glue, in order to make their work visual.

These sessions were scheduled for the days preceding the opening of school and generally, were held at a time before staff was required to be in their buildings. Arrangements were made for teachers to receive professional credits where they were available. The final two professional development sessions were held at schools that offered to host the day's work or at a district professional development center. In two districts it was possible to schedule the final session prior to the end of the school year and one district scheduled their session before the opening of school in August.

Following are outlines of the content in the series of three workshops provided in each site in Phase 1. [See Attached File A: DEC Overview for Power-point slides used in the PD workshops.]

Professional Development Workshop #1:

Introduction to Collaborative Inquiry and School Improvement

[Two-day introductory workshop for leadership teams and district support staff]

Objectives: Participants Learn How To—

- Develop strategies for work with data to be a positive, collaborative learning experience

- Use DEC and other data as part of a process of continuous improvement with the focus on student learning
- Engage in data-driven dialogue
- Create the conditions for safe and effective use of data
- Access the *Using Data-Getting Results* resource

Professional Development Workshop #2:

Investigating Instructional Practice, Content, and Cognitive Demand

[A one-day continuation of the initial workshop with additional data based on results of their surveys now aligned with each state's own student assessment items. School leadership teams presented their internal work to this point.]

Objectives: Participants aimed to:

- Dig deeper into learning issues through survey of practice and disaggregated student achievement data
- Formulate a Learner-Centered Problem
- Set measurable Student Learning Goals
- Develop a Learner-Centered Action Plan
- Develop a plan for monitoring results
- Engage in team planning for completing their action plan.

Professional Development Workshop #3

Looking at Student Work: One Strategy for Monitoring Progress Toward Student Learning Goals

Objectives: Participants aimed to:

- Explore reasons to look at student work
- Experience the process for looking at student work
- Reflect on student thinking through evidence of students' mathematical or scientific thinking
- Discuss implications for teaching and learning
- Engage in team planning for how to support process of looking at student work

Every workshop provided time for teams to work independently as they reflected together on the work and made plans for moving the work along at their schools. Follow-up sessions gave teams time to present the results of their work to the other teams. This resulted in a great deal of sharing of information that benefited all of the teams.

Resources and Materials provided to Phase 1 Teams. Each member of the schools mathematics and science leadership team received the following materials through the course of our work together.

- *Using Data/Getting Results: A Practical Guide for School Improvement in Mathematics and Science with CD-ROM* is designed to help school-based teams take a straightforward approach to using data as a tool for improving mathematics and science education. While the guide is tailored to math and science, the processes and tools can be applied to school reform efforts in other subject areas. The guidebook uses the process of inquiry to support change in four major areas:
    a) improving student learning,
    b) reforming curriculum, instruction, assessment;
    c) overcoming obstacles to equity, and d) building critical supports, such as public support and quality professional development.

  Included is a large collection of survey instruments and forms for data collection, analysis, and planning.
- *Ideas That Work: Science Professional Development,* Eisenhower National Clearinghouse
- *Ideas That Work: Mathematics Professional Development*, Eisenhower National Clearinghouse
- *Whole-Faculty Study Groups: A Powerful Way to Change Schools and Enhance Learning* by Carlene U. Murphy and Dale W. Lick.
- EDThoughts: What We Know About Mathematics Teaching and Learning*, edited by John Sutton and Alice Krueger, Mid-continent Research for Education and Learning*
- EdThoughts: What We Know About Science Teaching and Learning*, edited by John Sutton and Alice Krueger, Mid-continent Research for Education and Learning*
- *Classroom Assessment and the National Science Education Standards*, National Research Council.
- Workshop hand-outs consisting of all slides and posters used throughout all professional development sessions.
- PowerPoint Slides of workshop materials for use by members of the Leadership Team in their school.

Technical Assistance to Phase 1 schools. Our approach to assistance is based on the expectation that schools will enter the project from many different perspectives with different sets of individual challenges. Meeting with the leadership teams individually allowed project staff to adapt and modify information and resources to meet the needs of individual schools, while at the same time, attempting to move them along a continuum toward establishing student learning goals and continuing their investigation of factors related to reaching their student learning goals.

Technical assistance meetings began with the school leadership team updating the DEC project staff on their progress since the previous session, or on the factors impeding their progress. The DEC staff was then in a position to pose the next set of questions, offer suggestions for consideration, and to locate and adapt resources needed by the schools to take their work to the next step. This was "joint work," involving everyone in working through the issues a school had begun to investigate, pointing out particular tools that could help with this stage of the work, and designing workshop content for in-service release day meetings being planned by the staff. Working on-site made it possible for project staff to come away with more of an "insider's perspective" on the workings of the school.

Focus of School Teams. The DEC staff observed that the Phase 1 schools generally shared the goal of raising student achievement in math and science, and they were aware of the need to increase scores by large percentages over time while making incremental improvements each year. A common thread across the sites was that school leader teams gained skills in analyzing achievement data and curriculum survey data to identify areas of high need.

The content area of Measurement was identified as a critically low skill area having implications in both math and science in the majority of our Phase 1 schools. Other areas of focused attention we observed from the schools were: Probability, Problem solving, Algebraic thinking, and Geometry.

The DEC teacher survey results reported to schools in 2001-02 played a key role in helping some teams identify areas of instruction for focus. Teams pinpointed key practices where there were wide differences in practice among teachers in the same department or subject. In response, a few schools have designed follow-up surveys for their entire faculty to gain more specifics on their teaching with specific topics and needs.

Summary: Challenges, Time, Scheduling

A challenge for the DEC schools is providing adequate time to set school priorities for improvement, and analyze their curriculum and instructional data to reflect on student work and monitor progress of students' skills. Specific issues:

- Teams had to work to modify master schedules to allow teams and staff to meet
- Schools had to revise professional development plans, set by schools or district, to include release days
- Use of school improvement funds to support after-school or Saturday team meetings.

A key area of learning for teachers in using the DEC data was how to connect the data on the content areas of low student achievement in mathematics and science according to sub-groups of students, and then relate the findings to relevant data on instructional practices and content from the Survey of Enacted Curriculum results. The data for each district and almost every school showed a wide range of differences in instructional practice across the department, grade levels, and student achievement

level. The necessary time and attention of school teams to attend to these analyses represented a significant planning challenge. This portion of the data analysis needs a great deal of structure along with access to relevant research on how to interpret the data, as well as ample time to discuss the implications for teaching and learning.

Part 3

Data Collection and Initial Analyses: Years 1 and 2

Objective: Data for Analyzing Research Questions

Part 3 of the DEC Progress Report describes the survey data collection carried out in Years 1 and 2 of the three-year study. The data will allow the study team to address the first two of the three research questions for the overall study. (Part 4 of the Report addresses the third question.)

1. What are the effects on classroom instructional practices of a school-based model for assisting teachers in using their own school survey data on enacted curriculum and assessment results to improve the effectiveness of their instruction?
2. To what extent is classroom instruction aligned with state standards and assessments, and what is the extent of variation in practices and content?
3. How is the professional development model, based on use of data, effectively implemented in large, urban districts to the school level?

Part 3 is organized in the following sections:

- Data Reports to Schools
- Teacher Survey Results: Baseline Data for Study
- Comparison of Phase 1 & 2 Samples
- Teacher Surveys on Implementation of DEC Model
- Alignment Analyses: Measures of Change in Instruction
- Principal Survey Results

Tables on Teacher Survey results are reported in Appendix B: Data Chart & Table. Responses of School Principals are in Appendix C: School Administrator Survey Results.

The data collection in the DEC study provides baseline information on the districts and schools participating in the study. Combining baseline data with upcoming year 3 survey results will permit analyses of change in instructional practices for Phase 1 (treatment) schools in comparison to Phase 2 (control) schools, and support analyses to determine whether differences can be attributed to the program treatment

In this Part, we also describe alignment content analyses to determine if Phase 1 (treatment) schools move towards greater alignment with tests and/or standards than Phase 2 (control) schools. When combined with appropriate achievement data, alignment analyses will permit examination of the degree to which student achievement gains can be attributed to the DEC treatment. Finally, using data collected as

part of the implementation study, researchers will be able to identify important characteristics that contribute to successful implementation of the data driven approach to school improvement employed in this study.

Data Reports to Schools

The data collected in Year 1 of the study supported important elements of the DEC Initiative. The data provide baseline information to assist the professional development leader (Regional Alliance/TERC) in tailoring activities and assistance to the specific needs of each school leadership team. Results from teacher surveys reported at the school level provide relevant school-specific data for the school leader teams to work with as they learn to use the communication and problem-solving skills necessary for working with curriculum and other data as part of school improvement efforts. (See Part 2 on the DEC Model.)

The amount of data provided to schools for this purpose has been substantial. Each Phase 1 school received a customized school-based report within three months after initial administration of the teacher surveys. These reports contain more than 150 pages of school-specific data organized into charts covering twenty categories of survey results (see Table 1 in Appendix B). Each category of charts was disaggregated based on seven grouping variables:

(1) Grade-level,
(2) Class achievement level,
(3) Class size,
(4) Percent minority,
(5) Percent female,
(6) Percent LEP, and
(7) Amount of professional development.

While the full set of school data results tended to provide more information than schools required for their individual needs, the broad range of data collected insured that all schools were able to find relevant data within their school report that addressed particular areas of concern or interest. The training provided to school leadership teams made use of these data as a starting point for conversations and activities by the teams during workshop and technical assistance visits.

The reports produced for schools from teacher responses on the Surveys of Enacted Curriculum provide a rich and multi-faceted look at instruction, teacher attitudes, beliefs and characteristics, as can be gauged from the list of Charts in Table 1 in the attachment Appendix B. (The full set of Charts for each Phase 1 school and each district are available. Sample reports were included in the Project Year 1 report, Fall 2001.) In the Year 2 Progress report, we give a brief description of the teacher sample, examine

issues of 'teacher buy-in' to the project, and describe initial results of alignment analyses. Results from Principal Surveys will also be reviewed in order to highlight key similarities and differences between districts.

Teacher Survey Results: Baseline Data for Study

Teacher surveys for the DEC project were initially administered in the Spring of 2001. A follow-up administration was done in the Fall of 2001 at the request of some Phase 1 schools that wanted to include new teachers or elementary teachers and/or increase the response rate among veteran teachers in order to get a more complete picture of practice in the school. An additional eighteen surveys were collected from six schools spread across the four districts as a result of the survey follow-up in the Fall of 2001.

Response Rates. The SEC survey instruments are extensive and require significant effort for teachers to complete. Typically teachers require 60 to 90 minutes to complete the entire survey. Moreover, teacher completion is voluntary, and steps are taken to insure that teachers have the opportunity to opt-out of completing the instruments without penalty and without the knowledge administrative and district staff. Despite these obstacles to favorable response rates, the rates in the Spring 2001 teacher survey were very good. Across 36 schools in the intial four large urban districts, the response rate was 77% for mathematics teachers and 76% for science teachers. This is similar to response rates found in other studies using the Surveys of Enacted Curriculum or similar instruments (Porter, et.al., 2000; Gamoran, et.al, 1997; Porter, et.al., 1993).

Given the complexity of the survey tools, the response rates for this study are quite good, but they require effort to achieve. The primary efforts for the DEC study included teacher briefings to explain the nature and purpose of the instruments, group administration led by principals or district staff, district compensation/incentives for teacher participation (ranging from gift certificates for ice cream to professional development credit, to monetary compensation), and follow-up reminders through site-based coordinators.

Response Rates as an Indicator of Teacher Buy-In. The SEC teacher surveys are long and demanding. As a result, survey completion suggests some level of teacher 'buy-in' to the data collection process, particularly since teachers received written instructions explicitly informing them that participation was completely voluntary and anonymous. It is worthwhile then to consider the response rates for districts and schools as some modest measure of the extent of teacher buy-in for the DEC project.

Of the original forty schools that agreed to participate in the study, four schools (two each from Chicago and Philadelphia) had to be dropped even before random assignment into treatment and control groups was conducted. In each case this was due to low survey response-rates from teachers in those

schools. It should be noted that the minimum number of teachers required for participation in the study was very low (a minimum of two teachers reporting on the same subject, either mathematics or science). In the first three months of working with Phase 1 schools, an additional three Phase 1 schools dropped (two from Charlotte-Mecklenburg and one from Philadelphia). Of these three, one school dropped citing lack of teacher support (with 50% teacher response rate), and another cited being "too busy" to participate in the study (despite having a 94% response rate). The third school (from Philadelphia) had to drop from the study because it was losing its middle school student population and becoming a high school. (Note that the study focuses on middle school grades only.) As a result of the school attrition in Philadelphia (two prior to random assignment and one after the initial workshop), this district had a total of 5 schools participating, 2 in Phase 1 and 3 in Phase 2. Worried about further attrition in Philadelphia, the research team decided to randomly re-assign a Phase 2 school to Phase 1, in order to increase the Phase 1 sample size in Philadelphia.

Thus, by the end of Year 1, almost 20% (7 of 40) of the original sample was lost due to response rates, or teacher 'buy-in' issues. This underscores the importance of teacher and principal buy-in when pursuing school-level data-driven models. It may also be suggestive of the extent to which schools are prepared to engage in data driven decision-making more generally. If teachers are not willing to share information on instructional content and practice (de-privatize practice), data-driven dialogue and planning becomes impossible. Thus teacher support is an essential ingredient for school-based data-driven models to succeed.

Table 2 in the Appendix B attachment provides response rates disaggregated by school, and the range for each school runs from 0% to 100% teacher participation. The single school with no teacher respondents to the survey was among the initial four to drop from the study. The other three schools that dropped had response rates of 33% or less. Response rates in the remaining schools ranged from 17% to 100%. Fourteen of the thirty-six schools had 100% participation and seven other schools had more than 90% participation among mathematics and science teachers. Thus slightly more than half of the forty original schools surveyed had higher than typical response rates for these types of instruments based on previous survey administrations (i.e., >75% response rate).

Response rates clearly differ by district (see Table 2 in Appendix B). Miami-Dade, despite having more participating schools and teachers than the other three districts, had a 90% response rate, far above other district averages. While strong support for the project can be found in each of the districts, the amount of teacher and school staff support noted in Miami-Dade by the research team (see discussion of implementation activities) appear to support the assertion that response rates provide a reasonable measure of teacher support.

Teacher Characteristics & Sample Representation. Teacher survey reports were collected from 559 teachers, representing just over 75% of the mathematics and science teachers across all participating schools (note these numbers include schools that have now dropped from the study).

Teacher Sample Demographics (N= 559)

- 70% female
- 40% White
- 33% African-American
- 20% Hispanic

In Table 3 of Appendix B, we see that respondents spanned the range of experience, from one to more than twenty years of teaching experience. Twenty-nine percent of responding teachers had no more than 2 years experience (18% were concluding their first year of teaching), while 30% of responding teachers reported 12 or more years of teaching experience.

Tables 4 and 5 provide data about highest degrees, majors, and certification status of the teacher sample.

Highest Degree

- 55% Bachelors degree only
- 33% Master's degree
- 10% Multiple Master's degrees
- 1% Ph.D.

Major

- 32% Elementary education
- 6% Middle school education.
- 9% Mathematics education,
- 6% Science education
- 30% Other field (not education, mathematics or science)

Certification

- 10% Emergency or temporary
- 19% Subject specific (mathematics or science)
- 71% Elementary or middle school certification.

Differences in certification patterns reported by teachers become apparent when reported by district (see Table 3 in Appendix B). Charlotte-Mecklenburg teachers reported fewer temporary or emergency certifications (2% compared to 10% for the sample), while Philadelphia and Chicago both

reported somewhat higher rates of temporary or emergency certification (16% and 15% respectively). Charlotte-Mecklenburg teachers also reported noticeably more subject specific certifications (29%, compared to 19% for the sample).

In Tables 6 and 7, data are reported on teacher professional development in math and science.

Professional Development time (last 2 years)

- 27% Over 100 hours
- 23 % Less than 30 hours
- 8% None

Comparison of Phase 1 & 2 Samples of Teachers: Evidence of Random Selection

Since comparison of outcomes for the Phase 1 and Phase 2 groups is a central component of the experimental design, it is useful to consider how the two groups compare in terms of teacher characteristics and administrative policies. Tables 3-7 report teacher characteristics by phase for each district. Comparisons are made within and not across districts, as the experimental design calls for analyses to be focused at the district level. Clearly districts vary on these characteristics, but our interest is in comparisons within districts and between phases.

When compared district-by-district, analysis revealed no statistically significant differences on teacher characteristics (e.g. gender, ethnicity, experience or certification) between any Phase 1 and Phase 2 groups (see Table 3 in Appendix B). Some differences were noted for Miami-Dade and Chicago however, when Phase 1 and Phase 2 groups were compared on amount and types of professional development (see Tables 6 & 7 in Appendix B). For example, in Miami-Dade, Phase 1 mathematics teachers reported modestly more time (6-15 hrs. on average for Phase 1 teachers, compared to less than 6 hrs. on average for Phase 2 teachers) on professional development activities focused on standards, implementing new curricula, multiple strategies for assessing students, portfolio assessments, and participation in a mentoring program. In Chicago, Phase 1 mathematics teachers reported on average almost sixteen hours in new methods of teaching, compared to less than six hours on average for Phase 2 teachers. Phase 1 mathematics teachers from Chicago also reported modestly more time in professional development focused on meeting the needs of all students and participation in a teacher network or study group (see Table 6 in Appendix B).

Similarly for science, no significant differences on teacher characteristics were noted between Phase 1 and Phase 2 teachers in any of the four participating districts. Only one district had any notable differences with respect to professional development in science. Miami-Dade Phase 1 science teachers reported somewhat more participation in a mentoring program or on an educational committee or task force than reported by Phase 2 teachers (see Table 7 in Appendix B).

Teacher Surveys on Implementation of DEC Model

At the end of Year 1 of the study, a single page, four-item follow-up survey was administered to Phase 1 teachers. Despite being a very short survey, distributed with convenient business reply envelopes for each respondent, and no request for identifying information, 9 of the 17 (remaining) Phase 1 schools returned no follow-up surveys. Of the eight schools that did return follow-up surveys, response rates ranged from 10% to 100%. While these numbers are themselves somewhat indicative of the extent to which the intervention was (tentatively) successful in schools, the results of the implementation survey are even more revealing.

The survey asked four simple, yes/no questions. 1) Did you participate by completing a teacher survey? 2) Regardless of whether you completed a survey, did you see any results of this survey reported for your school? 3) Have you participated in any discussions about the survey results reported for your school? 4) Have the survey results, or discussions about the survey results, caused you to plan or make any changes in your instruction?

Despite the simplicity of the survey, the questions highlight key elements of the data use model, and provide some indication of the extent to which the leadership teams were successful in drawing the attention of teachers to data-driven dialogue and planning (see Implementation Study for more on school roll-out).

The results of the survey are reported in Table 8 of Appendix B. The response rates for the schools mirror quite well the evidence to date on the level of engagement by leadership teams with the broader population of teachers at the school. Those schools reporting high response rates on the implementation survey are also, without exception those schools for which the research team has collected evidence of efforts by the leadership teams to engage the school more broadly in the project (see discussion on program implementation elsewhere in this report). Question 1 (whether the teacher had completed a teacher survey), allowed the respondent to indicate when the survey had been completed (either during the original administration, in the Spring of 2001 (Q1a), or during the follow-up survey administration in the Fall (Q1b). Based on teacher reports for question 1, with the exception of a very few teachers at one school, only teachers that had completed the teacher practices survey responded to the follow-up survey. Thus in large part, the results reported for items 2 thru 4 are provided by teachers that had taken the time to complete the earlier teacher survey of classroom practices and instructional content.

In general, the pattern of responses (and non-responses) to the implementation survey reflects the experiences and expectations of the DEC Study team. Of the eight schools responding to the follow-up survey, only School 93 had 100% of its teachers reporting that they had seen survey results, had discussed those results, and had made or were planning to make changes in their classroom practice. It should be noted that this is a small school, with only two mathematics and two science teachers. In those schools

with larger numbers of responding teachers, the percentages for seeing and discussing survey results ranged from 50% to 90%. Aside from the small school noted above, the school reporting the most impact (with 80-90% of responding teachers reporting seeing and discussing data results, in turn leading to changes in practice) is School 811. This school is highlighted in the alignment analyses section below.

Alignment Analyses: Measures of Change in Instruction

Central to the design of the experimental study underlying the DEC project are a series of alignment analyses designed to determine if instruction in Phase 1 (treatment) schools moves toward closer alignment with state standards and/or assessments than do Phase 2 (control) schools. To conduct these analyses, two types of data are essential. One is a description of the content of instruction provided to students. The second is a description of the assessment (or standards) to which students (and/or their teachers and schools) are held accountable. These descriptions must be quantitative and they must be rendered into a common language, so that quantitative comparisons can be made. Such data provide a baseline measure of alignment for each of the participating schools (both Phase 1 and Phase 2).

Procedures for Alignment Analysis. For the DEC project, both types of data have been collected. The description of instructional content was collected from teacher surveys, which were completed by 75% of the mathematics and science teachers in the DEC schools. Descriptions of state, local and other assessments were collected as part of a content analysis workshop held in the fall of 2001 for DEC districts.

For details on the specific procedures for calculating alignment see Porter and Smithson, (2002). In general, the procedure requires making a detailed comparison of two content descriptions (e.g., instruction and assessment) that is then reduced to a single index running from 0 to 1, with '1' representing perfect agreement (or alignment) between the two descriptions and '0' indicating no agreement whatsoever.

In considering alignment measures it is important to note the "target" used for aligning instruction. Typically, instruction will be aligned to either content standards or assessments. Which to select will largely depend upon the purpose for which the measures will be used. Content standards (if they are sufficiently detailed) are useful for providing a general description of desired instruction, as content standards cover a larger domain than is possible with assessment instruments. However, if one intends to use the alignment measure as a tool for determining the effects of instruction on student achievement gains, then the assessment serves as a better target. Content standards also vary significantly by state, and some are likely to be more conducive to content analyses than others. Thus far, for the DEC project, only assessments have been content analyzed. This is in part because the participating schools and districts tend to be more focused on the assessments, as these are what their accountability is based on.

Arrangements for Analysis Workshop. A content analysis workshop was held for the DEC project during the Fall of 2001. Each of the four participating districts provided staff and the relevant assessment instruments for the workshop, and in some cases representatives from the state education agencies also supplied staff to participate. The goal of the workshop was to conduct content analyses on the mathematics and science assessments used in the districts and schools as part of their accountability program.

Two of the four districts (Charlotte, Philadelphia) were able to provide the relevant statewide assessment in mathematics (at present none of the participating states have a science assessment, though each state is moving toward one). In Miami-Dade the state permitted content analysis of the assessment specifications and practice tests, but would not allow access to the actual state assessment. In Chicago, the state would not provide either the instrument or the test specifications, but district level assessments for mathematics were analyzed. For science, the districts selected those assessments that are given the most weight in schools. These assessments tended to be either ITBS or SAT-9 assessments. One district provided a district level science assessment in addition to the SAT-9 assessment used in that district.

For mathematics, all but one district provided assessments targeted at each of the three middle grades (6-8) targeted for the study. In mathematics for one district, and in science for all four districts, assessments were provided for only one or two grade levels. Thus assessment measures can be differentiated between 'targeted grades' (i.e. alignment based on grade level match between instruction and the assessment) and 'all grades' (e.g. only a grade 8 test was available, and alignment for all teachers (grades 6-8) was determined based upon that assessment. Though the 'targeted grades' alignment measure is in general the preferred measure, this reduces significantly the number of classrooms for which alignment measures would have been available (particularly in science). Moreover, the grade 8 test is typically intended to measure content learned across all the middle grades, not just 8th grade only, and thus has descriptive value to the school as a target of instruction.

Tables 9 and 10 in Appendix B report both types of measures (targeted grades and all grades) as available. Since alignment measures are calculated at the classroom level, the district measures reported represent the average alignment across classrooms (see the 'Count' column for the number of classrooms included in the average). The StD column in Tables 9 and 10 in Appendix B reports standard deviations for the reported means, providing a measure of the variability of instructional alignment among teachers.

Results of Year 1 Analysis. The measures of alignment represent the condition of Study schools at the beginning of the project, providing baseline measures of alignment. Once year 3 teacher data are collected, the change in alignment between Phase 1 and Phase 2 schools can be compared, and the hypothesis that Phase 1 schools will move toward greater alignment than Phase 2 schools will be tested.

For mathematics in particular, alignment measures for Phase 1 and Phase 2 schools are remarkably similar. As already noted, only Philadelphia was not able to provide an assessment for each of the middle grade levels. As a result, the 'targeted grade' alignment measures for Philadelphia are based on small numbers (5 Phase One and 2 Phase Two classrooms), and thus was the only district where an 'all grades' alignment measure was necessary. When looking at alignment of grades 6-8 classrooms to an 8th grade mathematics test, Phase 2 classrooms appear to be less aligned than Phase 1 classrooms (.10 vs. .14 respectively). Note however that the sample size for Phase 1 mathematics classrooms is double the size for Phase 2 mathematics classrooms in this district.

Alignment measures for science tend to vary, with Phase 1 schools tending to have slightly higher alignment measures than Phase 2 schools. Miami-Dade is a notable exception, with no difference in alignment noted between Phase 1 and Phase 2 schools, whether based on targeted grades or all grades. Only Chicago provided a science assessment for each of the three grade levels, and the difference noted between Phase 1 and Phase 2 schools on alignment is not statistically significant. Charlotte-Mecklenburg provided no science assessment for content analysis, and so the Grade 8 NAEP assessment was used as a target for calculating alignment. When limited to grade 8 classrooms only, Phase 1 schools reported slightly (but statistically significant) higher alignment than Phase 2 schools. When all grades for Charlotte-Mecklenburg are included, alignment measures between Phase 1 and Phase 2 schools are not significantly different.

In addition to these types of baseline and longitudinal alignment analyses, it is possible to use alignment results in conjunction with achievement gains in order to demonstrate whether increased alignment leads to increased student achievement. Using alignment measures in conjunction with achievement gain scores can also serve as a diagnostic tool to assist schools in identifying other factors that may be impacting student learning either positively or negatively. However, the collection of achievement data for these purposes was not included in the current study, partly due to budgetary constraints and partly because three years seemed an insufficient amount of time to expect program effects to appear at the student level. It should also be noted that appropriate achievement data for use with alignment measures can be difficult to obtain, since student level achievement gain scores are seldom available. Even in districts that test students each year, and maintain student achievement scores in a manner that allows tracking of individual scores from year to year, the tests used from year to year may not be well aligned to one another, making 'gains' difficult to interpret. For research purposes the ideal gain measures are based on a pre/post- test administered at the beginning and end of the school year to students in selected classes.

Principal Survey Results

In addition to teacher surveys, a principal survey was distributed to each participating school for the principal or her/his designee to complete. The response rate for the principal survey, at 79% was quite similar to the overall teacher response rate. No significant differences in principal response rates were noted by district.

The nine sections of the principal survey indicate the type of data collected with the instrument. Sections include:

1) Use of Mathematics and Science Standards in Instruction,
2) Standards for Mathematics and Science Instruction,
3) Effects of Standards,
4) School and District Policy,
5) Resources,
6) Decision Making,
7) Professional Development,
8) Use of Data, and
9) Principal Background.

The data are used primarily to provide researchers and PD providers valuable contextual information about each of the schools. As with the teacher surveys, these surveys will be re-administered in year 3 of the project, and will allow researchers to examine changes in the reports provided by principals in order to determine any differences attributable to program effects.

Year 1 results of the principal surveys (see Appendix C) reveal a common pattern among principal reports, with a few notable exceptions. For example, principals tend to agree that both state and district curriculum frameworks and content standards exert a positive (ranging from a somewhat positive to a strong positive) influence on mathematics and science instruction. Principals also tend to agree that teachers are the most important source of information in helping the school improve mathematics and science instruction. Assistant principals and district administrators are most often identified as the second most important source of information for improving instruction. Most principals also agree that the curriculum at their schools is very consistent with state and district content standards as well as the state assessment.

The notable exception to these opinions are reported by principals from Philadelphia. It will be recalled that Philadelphia was involved in a state takeover after having failed to meet state standards. Principals from Philadelphia reported that the state content standards tended to have little or no influence on mathematics and science instruction in their schools. *District* content standards by contrast, were

viewed as having as positive an influence on instruction as reported by principals in the other three districts. Similarly, principals from Philadelphia reported that state content standards were not effective sources of information for improving mathematics and science instruction. These principals also reported that their school's mathematics and science curriculum was less consistent with state content standards and assessments than reports of principals from other districts (see responses to Items 1-3).

Philadelphia principals also reported disagreement with the following statements, with which other principals from other districts tended to agree with (see Item 4):

- The adoption of content standards has led to substantial improvements in teaching in this school.
- Teachers were adequately involved in the development of the standards.
- Standards have had enough effective advocates to get them accepted by teachers.
- Standards were written to match what teachers were already doing.
- Parents/community leaders are pleased with these standards.

These opinions appear to reflect the kind of tensions between Philadelphia and the state education agency in place during the first two years of the DEC project. Despite these tensions, school principals and leadership teams from Phase 1 schools in Philadelphia remained actively engaged in the project throughout this period. Probably the most notable impact on DEC schools, as a result of the battle between state and district principals in Philadelphia was a lack of district participation in the project and district support to provide schools the professional development time necessary to engage with teachers using the DEC model.

While Philadelphia principals tended to differ noticeably on these issues from other school principals in the study, there are differences reported by principals from some of the other districts that are worth noting. For example, Miami-Dade principals reported making use of departmental improvement plans and summer school attendance for at-risk students to a greater extent than reported by other districts (Item 11). Miami-Dade principals also reported that their school had written a curriculum guide or other document listing the instructional objectives for mathematics and science more often than reported in other districts (Item 14).

Miami-Dade principals reported more professional development opportunities being offered for implementing content standards, and on new curricula and new methods of teaching more often than reported by other principals (Item 21). Principals from schools in Miami and Chicago reported substantially more professional development in the areas of in-depth study of content, meeting the needs of all students, and multiple strategies for assessment than the other two districts. The most common type of professional development activity reported across all districts focused on educational technology. Perhaps not surprisingly, Philadelphia principals reported noticeably more availability of professional

development opportunities focused on teacher networking and study groups focused on improving teaching (Item 21).

Regarding data use, principals (regardless of district) reported that state and district test scores tended to be used to identify priorities for resource allocation and professional development, for evaluating alignment of teaching with standards, and for curriculum development. The most common data used for teacher evaluation were classroom observations and reviews of student work. Student performance on state tests were also indicated as being used for teacher evaluations by 30% of the principals in Districts 3 &4, by 40% of principals in Charlotte-Mecklenburg, but not by *any* principals in Philadelphia (Item 24).

According to school principals, the most common disaggregations of state assessment results reported to schools are on the basis of race/ethnicity, gender, LEP status, and students with Individual Education Plans. Reporting by poverty status was also common for Districts 1 & 2, but less so for Districts 3 & 4. Most surprisingly, less than a quarter of the principals in Chicago reported receiving or requesting assessment results reported by race/ethnicity, gender *or* poverty status (Item 25). Presumably this will change with new federal legislation mandating, and holding schools accountable to student performance as recorded among these groups.

Part 4
Analysis of Implementation of DEC Professional Development and Technical Assistance

Description of Implementation of the DEC

Treatment and initial analysis of qualitative data on effects of DEC professional development (PD) and technical assistance (TA). This part addresses research question 3 in the study design (as described in Part 1: Introduction):

3. How is the professional development model, based on use of data, effectively implemented in large, urban districts to the school level?

This Part is comprised of three sections:

- Participation of Phase I schools in PD/TA
- Factors affecting extent and quality of school participation
- Miami school case study—progress on professional community conducive to data-driven improvement.

Participation of Phase 1 schools in PD/TA

In Part 3 of the Report we provided an overview and comparison of the DEC sample of teachers, schools and districts, and we described initial analyses of data from the surveys and alignment analyses. This section provides further information about school-level participation in the DEC model.

The DEC initiative has relied heavily on a *turn-key* or *training-of-trainers* approach. With the turn-key model, each school selects a School Leader team whose members are expected to attend all PD/TA sessions, and then lead other school staff through similar data-driven instructional improvement learning experiences. The participation of School Leadership teams in Phase I DEC PD/TA sessions to date is summarized on four dimensions in Table 1 below.

Table 3: School Level Participation in DEC Professional Development and Technical Assistance

District	School ID	Total Sessions Attended	Average Number Attending	Percent Sessions Attended by Admin.	Participation Stability Index
Charlotte	66	3	1.67	100%	55.33%
	68	3	2.33	100%	58.25%
	62	3	2.67	100%	66.75%
Chicago	91	5	4.80	80%	65.71%
	92	5	2.20	60%	73.33%
	93	4	3.25	100%	54.42%
	97	5	3.20	80%	45.71%
Miami	80	6	4.33	67%	48.16%
	811	5	4.20	100%	62.88%
	87	6	4.00	17%	44.44%
	810	5	4.40	100%	73.33%
	85	6	3.67	83%	48.85%
	88	4	2.75	75%	60.00%
Philadelphia	72	5	4.40	100%	30.91%
	70	3	5.00	67%	55.52%
	76	5	2.60	60%	60.00%
Overall Average	**na**	**4.56**	**3.47***	**78.12%***	**57.32%***

*Overall average weighted to reflect number of sessions attended by schools.

Sessions attended. The first dimension of participation is the total number of sessions attended by one or more members of a school's School Leader team. The total number of sessions attended by schools ranges from 3 to 6, with an average of 4.56 sessions attended per school. As of the date of this report all schools had had an opportunity to participate in 5 sessions in the following order: Initial Project Overview meeting, Professional Development Session #1, Technical Assistance Session #1, Professional Development Session #2, and Technical Assistance Session #2. Professional Development Session #3 had also been conducted in Miami and Chicago. Schools that attended fewer sessions than others in their district missed the Initial Project Overview meeting unless otherwise noted.

Some schools in Charlotte and Philadelphia attended as few as 3 sessions. The Philadelphia school that has participated in only 3 sessions to date joined the study late after a school that had already participated in two PD/TA sessions dropped because it ceased to be a middle school. Participation in Charlotte schools was impeded by two events. First, the state decided to re-norm its "End of Grade" tests, used to determine whether students are able to advance in grade levels and course sequences. Many schools felt it would be impractical to proceed with data-driven decision-making until such time that the state provided them with the results for the End of Grade tests since this information would be the basis

for many instructional decisions. Next the district embarked on a major reorganization that included a district wide school choice plan.[1]

Uneven school participation in Chicago and Miami was due to local school factors. School 93—probably the most engaged and committed DEC school in Chicago—did not attend PD Session #3 because it conflicted with other end of the year school-wide activities. The principal at School 93 has indicated that they will make up the missed session in Fall 2002 if possible. School 97 was a 'no-show' for PD Session #3.

Although Miami School 87 participated in six PD/TA sessions, two were abbreviated, repeat sessions conducted with a newly constituted Leadership Team. Restarting the initiative at School 87 became necessary when administrative and staff turnover resulted in near total attrition of the original School Leader team. School 88 was a no-show for PD session #3.

Average attendance. The second dimension of participation is the average number of persons attending DEC PD/TA sessions as part of a school's leadership team. School averages range from 1.67 persons to 5, with an overall weighted sample average of 3.47 persons. Charlotte schools to date have averaged 2.22 persons, Chicago has had 3.37 persons, Philadelphia has had 3.85, and Miami has had 3.94 people on average at DEC PD/TA sessions.

Principal participation. The third participation dimension is the percentage of DEC PD/TA sessions at which a school's representatives included the principal or an assistant principal. Charlotte stands out for having an administrator present at 100% of its schools' DEC P/TA sessions. However, until recently Charlotte was also the most difficult district in which to schedule and conduct sessions and keep schools involved once they had begun. Other districts were fairly similar in terms of administrative participation (Miami, 71.04%; Philadelphia, 77%; Chicago, 78.95%). Differences in principal participation rates are much larger within than across districts. One Miami school that changed principals several times during the 2001-02 school year had an administrator present for only one of six DEC PD/TA sessions. Meanwhile, two Miami schools had administrative representation at all of their sessions. Philadelphia and Chicago schools ranged from 60% to 100% administrator participation. An additional pattern in administrative participation that is not evident in the Table 1 above was also observed. In schools that had 100% administrator representation at DEC sessions, administrators generally attended for most of if not the entire session. In schools that had administrator participation in fewer than 100% of

[1] Charlotte-Mecklenburg Public Schools embarked on a massive reorganization of schools, students and teachers upon coming out from under a federal desegregation court order. The district responded by instituting a wide-open school choice program. The choice initiative resulted in the reassignment of more than two-thirds of all students and staff. The logistical challenges in the reorganization overwhelmed school and district staff making it difficult to schedule DEC PD/TA during the last several months of the 2001-02 school year.

sessions administrators sometimes further reduced actual participation in PD/TA by coming just for the beginning of sessions or circulating in and out of sessions.

Stability of Participation. The fourth dimension of school participation in DEC PD/TA is captured in the *Participation Stability Index*. This index reflects how consistent schools were in who they selected to participate in DEC PD/TA sessions. To calculate the index for a school we list every school staff person who has attended a session, calculate the percentage of all sessions attended by each individual, sum the percentages, and divide by the total number of staff members attending one or more sessions. Thus the index reflects the average rate of participation among the individuals in the school who attended one or more DEC PD/TA session. A school that sends the same people to every DEC session would score 100% on the index. The lowest scores would occur when a school sends a different group of people to every session. The greater the number of sessions and the number of unique individuals sent the lower the index. An index of 20% would be considered very low. Such a score would be given, for example, to a school that sent a total of 20 different people to 5 DEC PD/TA sessions with no individual attending more than once.

The stability index for Phase I schools ranges from 31% to 73%. There is also considerable dispersion of schools between the two extremes. The difference between the lowest and highest school represents a very large gap in the continuity of the School Leader teams. When the post-intervention Survey of Enacted Curriculum is administered and analyzed we will be especially interested in the relationship between the continuity in School Leader teams and the degree to which teams fulfilled the turn-key function by using DEC data and strategies to increase the capacity and motivation of other mathematics and science teachers to make appropriate changes in classroom instructional practice. One may think of the index as a kind of *opportunity to learn* (OTL) indicator for school improvement teams. Though, as will be discussed below, the reasons for instability in School Leader teams may vary, studying the relationship between Leadership Team OTL and DEC school-wide impacts represents a promising avenue of inquiry.

Factors affecting extent and quality of school participation in DEC process

The ultimate purpose of DEC PD is to help increase school capacity for improving mathematics and science teaching and learning. Such capacity is based primarily on two considerations. The first is structural factors, including the extent to which resources and policies (i.e., especially district, state, and federal) are arrayed to maximize support for, and minimize constraints on, high quality teaching and learning. The second factor is professional community. Favorable structural supports alone are not sufficient for coordinated, school-wide enhancement of teaching and learning if teachers lack knowledge of how to collaborate effectively (Loucks-Horsley, Hewson, Love, Stiles, 1998).

DEC implementation analysis turns to the work of Karen Seashore Louis for a conceptual framework of professional community. Louis, Kruse, and Marks (1996) identify five critical dimensions of professional community.

1. *Shared Norms and Values*. This includes shared belief that students can learn at high levels, and common understandings of the roles of teachers, students, principals, and parents. In schools where teachers have high autonomy students likely encounter a broad range of expectations and instructional practices, some of which may be at cross-purposes. In schools with shared norms and values, teachers' interaction with students is consistent and mutually reinforcing. SEC data are used in DEC PD partly to help teachers address the extent to which there is a shared belief that all students can learn challenging content, and that all teachers are engaging all students in challenging work in daily instruction.
2. *Focus on Student Learning*. Keeping the focus on student learning is central to professional community. Instructional practices are not seen as ends in themselves. The emphasis is on what students know and can do. In DEC, schools are encouraged to assess instructional practices in terms of evidence of the impact of practices on student knowledge and capabilities. Such evidence includes standardized achievement test scores, SEC surveys, and student work samples.
3. *Reflective Dialogue*. "Reflection intensifies teachers' awareness of their practice and its consequences." (Louis, Kruse, and Marks, 1996, p. 182) DEC aims to help institutionalize sustained reflective dialogue in schools around the relationship between classroom practice and student performance. The DEC *PD Leader* draws on standardized test scores, SEC survey data, and knowledge of best instructional practices to help teachers gain insight into school-wide instructional practices and student learning.
4. *Deprivitization of Practice*. It is difficult for teachers to recognize ineffective practices or identify instructional alternatives when they work in isolation. Teachers who share their experience with colleagues have increased opportunities to recognize problematic practices and improve them. Instruction in schools with deprivitized practice is more likely to throw light upon ineffective practice and provide teachers with the motivation and ideas needed to maximize effective instruction. In the hands of the DEC *PD Leader*, the SEC data become a tool for deprivitizing practice through reflective dialogue. DEC PD emphasizes the importance of engaging in reflective dialogue for the purpose of supporting improvement, not for singling out and embarrassing or penalizing teachers with problematic practices.
5. *Collaboration*. Collaboration is enhanced when practice is deprivitized and reflective dialogue becomes routine. Teachers gain access to increased array of technical competencies

when they collaborate, and they have opportunities to reaffirm and deepen shared norms and values in and through interaction.

Below we report on five factors that affect the extent and quality of school participation in the DEC initiative, based on implementation research for this study. The factors include:

1. Time for School Leader teams to meet,
2. Stability in School Leader team membership,
3. Sharing the DEC model with all mathematics and science teachers,
4. Principal participation and support, and
5. District priorities and policies.

For each factor we discuss observed supports, obstacles, and how the DEC PD/TA *PD Leader* has worked to optimize DEC participation and rollout. The primary emphasis is on how supports and obstacles affect the formation of broad and deep professional community in DEC schools. Throughout the section we also indicate possible adaptations in the PD model and further data collection activities under consideration as it relates to specific issues.

1) Time for School Leader teams.

Securing meeting time for school leadership teams has been perhaps the single greatest challenge and has occupied much of the DEC *PD Leader*'s time. Leadership teams need substantial time together as a group to have the kind of interactions and conversations conducive to the formation of robust professional community. Time is needed not only for teams to attend PD/TA sessions, but to jointly explore relevant student achievement data, SEC data on classroom practices, research and practitioner knowledge of best instructional practices, and issues of curriculum alignment and assessment.

Supports. Support for School Leader teams has come from principals and district administrators alike. Many principals in the study have seen the DEC initiative as providing a timely source of instructional guidance that can play an important role in helping their schools achieve greater alignment to state and district standards and assessments. Accordingly they have hired substitute teachers to cover for School Leader team members to attend PD/TA sessions, or released members from school- or district-wide PD activities to participate in DEC sessions. On occasion, at least in Miami, the district has also provided stipends for teachers participating in DEC PD activities held on non-contract days.

Obstacles. The most serious obstacle to school leadership team meeting time, as well as to the participation of other teachers in DEC-related activities, is the general scarcity of teacher meeting time, and the heavy demands placed on available time by various pressing issues. This problem is structural in many respects. Resource constraints have led many urban school districts such as those in DEC to cut back on the amount of time teachers have for planning, staff meetings, professional development, and in-services. In Miami, a severe shortage of certified mathematics and science teachers, combined with a

shortage of classroom space, has led the district to offer such teachers salary bonuses to increase their class load to seven from six. The vast majority of mathematics and science teachers have opted for the increased class load and made room for it by dropping their one daily planning period. In Miami School 811, the principal took the unusual step of using categorical program money to purchase an additional hour of teachers' time each day in order to restore to them a daily planning period.

Miami is fortunate to the extent that teachers have the first 35 minutes of every day for meetings of departments, instructional teams, grade level teams and the whole faculty. In contrast, resources in Philadelphia were spread so thin that a decision was made to eliminate much teacher planning and meeting time including school faculty meetings.

Another structural impediment to team meetings in all districts is a shortage of substitute teachers. Most schools report difficulty securing substitutes, especially getting four or more to cover simultaneously for members of the DEC team. Usually coverage for DEC Team meetings combines the use of substitutes with other school staff (teachers with planning periods, classroom aides, curriculum specialists, etc.). However, issues remain, even when coverage is secured. Teachers worry that substitutes will not be able to maintain classroom control and that little teaching or learning will occur in their absence.

An obstacle that has both structural and cultural facets concerns the many demands placed on teachers' limited planning time. In addition to preparing lessons and grading student work, teachers are asked to participate on school committees, attend numerous meetings, and keep up with administrative tasks in response to principal and district requests for information. Spending time in DEC schools one often has the distinct impression that it is simply not possible for teachers to actually satisfy all pressures placed upon them to perform functions that are not integral to providing instruction. This problem has cultural dimensions in cases where district or state administrators and policymakers place new demands on teachers without eliminating existing tasks or increasing teacher planning time. When administrators and policymakers lose track of priorities it contributes to the fragmentation of teachers' daily experience. In schools where fragmentation of teacher experience is high, teacher professionalism is often tacitly measured by the willingness of the individual teacher to work many extra hours in isolation for no additional pay. This version of professionalism is in sharp contrast to the one promoted in DEC where professionalism is understood to include meeting extensively to focus on the particulars of instructional practice and its impact on student learning—to work toward shared understandings, goals, and increased school-wide capacity to produce targeted forms of achievement.

DEC staff strategies. The DEC *PD Leader* has consistently and ardently facilitated communication among school leader team members, principals, and district administrators to increase opportunities to meet. Often the *PD Leader* has acted as an advocate for teachers who indicate that they

would value meeting but need to be given permission and support by the principal to do so. Principals sometimes indicate that they in turn would like their school to participate, but need permission from district administrators to make necessary adjustments. The *PD Leader*'s efforts often succeed, however the amount of effort she has invested in simply helping schools and districts establish meeting opportunities has been a constant reminder of how much organizational change many schools must undergo if schools are to routinely allocate sufficient time and support for teacher professional learning and school-wide capacity building.

The *PD Leader*'s strategies for encouraging support for school leader team meeting time have ranged from pragmatic to normative. In a pragmatic vein, the *PD Leader* has catalogued strategies used successfully in some schools and shared them as appropriate with other schools (e.g., use of Title I, Urban Systemic Initiative, or Eisenhower Professional Development funds to support teacher participation in DEC sessions; holding of Saturday or evening meetings with childcare provided; use of in-service time dedicated to school improvement planning to focus on DEC-related issues and tasks). A more ambitious, long-range strategy the *PD Leader* has encouraged schools to consider is block scheduling, as this often increases teacher opportunities for collaboration and professional development.

On the normative side, the *PD Leader* has been a vigorous advocate for a form of teacher professionalism that is rooted in researched-based practice, and measured by school-wide continuous improvement for higher and equitable student achievement. As will be evident in later sections, the *PD Leader* has conducted the PD/TA in a way that has earned her much respect from teachers and administrators alike, and the *PD Leader* has used the authority and respect accorded to her by teachers and administrators to implore them to fully embrace data-driven school improvement activities.

It is clear that the *PD Leader* expects schools to address and make substantial progress toward reducing barriers to professional community and organizational capacity building activities. The *PD Leader* conveys the strong expectation that obstacles will be overcome and not allowed to become excuses for inaction. She underscores the importance of working to negotiate barriers by helping in whatever way she can to facilitate communication among teachers, principals, and district actors and provide them with alternative strategies based on her broad and deep exposure to schools throughout the country successfully undertaking such work. In so doing she becomes an integral part of the school and district teams—a source of leadership for data-driven instructional improvement for every DEC school. The *PD Leader*'s sense of shared responsibility for forging ahead against challenges is conveyed in the way she uses the term "we" when addressing teams. It is the "we" of "we are in this together", and "together we can succeed".

It is clear from observing PD/TA sessions that all DEC participants accept and respect the *PD Leader* for the supportive, albeit insistent approach she takes. Although difficult to quantify, one cannot

overstate the importance of the authority the *PD Leader* has earned with DEC teams by being a colleague—one who has something unique to contribute to a group of people who are also recognized as being integral to successful implementation of a collaborative initiative. In DEC we are gathering qualitative data that will help increase the understanding that researchers, professional developers, district support staff, and system managers have of the nuances of establishing authority in professional development settings so as to maximize participant commitment.

2) Stability of School Leader teams

The DEC schools that have tended to move farthest and fastest to integrate DEC methods and data into school improvement planning appear to be the ones that were able to keep a core group involved in DEC professional development and technical assistance all along. Staff turnover in numerous schools has led to changes in School Leader team membership. Such changes have resulted in teams having to go back over old ground instead of sustaining forward movement. In some schools DEC Team membership has been stable, but teams have alternated participation instead of having all team members participate in every DEC professional development or technical assistance event. This has slowed team progress toward shared understanding of the DEC model, available data, improvement targets, and improvement strategies.

Supports. Given the numerous structural obstacles to School Leader team stability discussed below, we feel the stability index indicates that schools placed a high priority on enabling core team members to participate consistently in PD/TA activities. If we were to exclude cases where School Leader team instability arose from structural factors, such as teacher reassignment and medical leave, we believe the overall index would rise substantially. However, our interest is not in maximizing stability rates for reporting purposes, but to convey realities of the schools where we, along with other researchers and professional developers, are working. Presenting the unvarnished challenges and facts puts researchers, professional developers, policymakers, and district and state administrators in the best possible position to collaborate to devise new strategies to support school improvement.

Obstacles. Structural factors in Charlotte are likely to pose substantial challenges to maintaining continuity in that district's School Leader teams in the 2002-03 school year. As noted elsewhere, Charlotte has undergone extensive staffing changes between the 2001-02 and 2002-03 school years, with up to two thirds of all middle school mathematics and science teachers being reassigned. School Leader teams tend to include mathematics and science department chairs wherever possible. When more than half the teachers in a district move it is likely to result in many instances where two teachers who were previously departmental chairs end up in the same school, and some schools end up with no teachers who have ever served as chairs in these departments. If this happens it will result in substantial turnover in

School Leader teams and this turnover may well be matched among building administrators and teachers who are not chairs.

Staffing changes are only half the story in Charlotte. A substantial majority of students will also be changing schools for the 2002-03 school year. Not only that, but because of a district decision to limit parental choice as little as possible, some schools have taken on huge enrollment increases while others have plummeted. For example, one school went from 1100 students in 2001-02 to 1650 in 2002-03. The school has added dozens of portable trailer classrooms, has many teachers floating among classrooms, has a new principal, and went from being a school with primarily low-income and minority students to primarily wealthy white students. A central challenge in Charlotte for 2002-03 is to lead schools undergoing extensive reorganization come to see the data-driven instructional guidance and school improvement approach contained in DEC as an integral part of their strategy for staying focused on core issues of teaching and learning.

Fortunately, despite major changes in the district administration and student assignment in Philadelphia, it appears staffing in the district's DEC schools has remained relatively stable. With the exception of School 87, staffing in Miami has also proven to be fairly stable. We have not yet determined the rate of turnover in Chicago, though at least two School Leader team members there indicated they would retire at the conclusion of the 2001-02 school year.

One other structural obstacle to continuity in School Leader team membership that bears mention is the interruption of participation of many team members due to maternity leave. Middle school mathematics and science teachers in DEC districts are predominately female. As noted earlier in this report, 70% of SEC survey respondents were female. A number of School Leader teams were affected when members left for maternity leave.

We encountered relatively few examples of cultural obstacles resulting in high rates of turnover on School Leader teams. Most teachers who participated as leadership team members appeared to appreciate the opportunity and value continued participation. The major exceptions we noted to this appeared in some Chicago schools. For reasons we will discuss momentarily, one or two teachers from each of two schools expressed some misgivings about participating in DEC PD. In school 97, the principal appeared to have made a decision early on to accommodate the DEC project's presence without giving it a high priority. This school was a "no-show" for PD Session #3, and new faces came and went from the DEC PD/TA meetings the school did participate in. This principal was among those who participated the least in DEC PD/TA sessions in that the principal would frequently leave for portions of sessions after helping get them underway. Although we regret this principal's decision to limit participation in the project we respect the principal professionally and were favorably impressed with this person's capabilities in numerous respects. We will be especially interested to discuss this principal's

approach to the project and the principal's views of its potential advantages or disadvantages when we do post-intervention interviews later in the study.

DEC PD Leader strategies. The PD Leader stressed the importance of maintaining as much stability in core leadership team members as possible so that the team would have the greatest opportunity to interact at a level sufficient to build community and facilitate collaborative actions to improve teaching and learning. Based on anonymous teacher evaluations routinely administered at PD sessions it is evident that teachers generally find the sessions to be highly relevant and informative. The PD Leader gets consistently high marks in terms of clarity of communication and importance of topics addressed. This, in addition to the clear commitment to the initiative by many administrators, may explain why teachers generally attend when at all possible.

3) Sharing the DEC model.

There are two basic models for PD delivery: (1) direct delivery by professional providers, and (2) indirect delivery with a training-of-trainers approach.

In DEC the first model (direct) would not have been logistically feasible. It has been difficult enough getting the leadership team members released for activities. Further expanding sessions to include all mathematics and science teachers in all DEC schools would probably have been impossible under current conditions. Most PD initiatives that rely heavily on direct delivery try to do most of their work during summer months and pay stipends to teachers for participation. DEC has not had resources for this.

Although direct delivery of PD to all mathematics and science teachers was not feasible, the research clearly indicates that school-wide involvement is most conducive to the activities, communication, and interactions teachers need to have to pursue broad change in instructional practice. The desire to exert indirect impact on all mathematics and science teachers in participating schools instead of affecting only leadership team members led DEC researchers to chose the turn-key model.

There are several challenges with the turn-key approach. First, turn-key training requires the PD Leader to split attention between issues directly related to classroom teaching and learning, and the process of working collaboratively with colleagues to increase the school's ability to come together to productively examine and improve instructional practice. Second, it is difficult to ensure the quality of PD delivered by those who have been trained to perform as turn-keys. Third, one must be alert to the possibility that turn-key training may come into conflict with school cultural norms and thereby be resisted by some staff members. Research has shown that American teachers spend relatively little time in reflective dialogue about instructional practice. Furthermore, teachers have generally shied away from merit pay plans or other policies that would tend to differentiate among teachers. With turn-key training there is always the concern that those who do receive PD directly from the Lead Provider will be seen by those who do not as performing their role inappropriately. Turn-key training may engender division and

produce little beneficial change when the teachers receiving PD perceive that the turn-keys are using the situation to push their own instructional preferences or use their new-gained status as local experts to arbitrarily de-legitimize the practices of others.

To date we have observed that the turn-key approach has resulted in fairly broad exposure of mathematics and science teachers to the data and processes shared with School Leader team members in PD/TA sessions.

Table 8 in Appendix B summarizes the results of an Implementation Survey recently administered to schools to assess the degree to which DEC data and activities have been shared with all mathematics and science teachers in participating schools. As reported earlier, the overall averages for schools that responded to the survey were encouraging in that the majority of teachers indicated that they had seen the survey results, discussed them with colleagues, and many indicated they had made or would make instructional changes as a result. The results were especially encouraging in Miami where surveys have come back from 5 of 6 schools with a substantial majority indicating that DEC has led to changes or planned changes in classroom practice.

***Supports*.** The main support for rolling out DEC data and processes beyond the leadership teams has been the turn-key training conducted by the PD Leader (see below). Another important source of support has been principals. Principals who have themselves participated relatively fully in DEC PD/TA have encouraged their Leadership Teams to share the information and engage all math and science teachers in data-driven dialogue for improved teaching and learning.

Obstacles. Some principals have not pushed DEC to the extent they might have. One principal in Chicago told us "DEC has a very powerful professional development model, but it really needs to be done school-wide." Nonetheless, this principal was one of two in Chicago who gave his 2 School Leader team members the most time to meet among one another and with other teachers to present data and discuss its implications for student performance and school improvement.

The above noted principal's preference for school-wide PD activities was shared by some of the teachers who participated as team leaders in Chicago. This was especially true of Chicago School 91, where three leadership team members who attended PD/TA sessions somewhat regularly said they doubted some of their colleagues would ever grant DEC team leaders the attention and respect needed to lead their colleagues in professional learning experiences. One Team member went so far as to express skepticism that their colleagues would buy-in to *any* PD or school improvement process requiring significant changes in classroom practice.

In allocating available resources to observe the effects of DEC PD/TA on schools we decided to select two districts for relatively intensive study. Miami and Chicago were selected based on the expectation that the initiative might play out quite differently in districts with relatively large schools than

one with relatively small schools. Chicago schools are especially small, especially when one considers that most of the schools in the system that have Grades 6-8 also have Grades K-5. Other districts in the study generally observe the convention of housing middle and elementary grades in separate schools. As we reflect on the observational data we have to date for Chicago and Miami, it appears that some of the local resistance we have seen to the turn-key model in Chicago could in part be related to small school size. Interestingly, the turn-key model per se has not arisen as a major obstacle in Miami. This leads us to ask, is it possible that the internal cultural politics of large and small schools differ in ways that have implications for choosing between a whole-school and turn-key model? Is it possibly more difficult for teachers in small schools to enter into collaboration around instruction, as envisioned by DEC, when a turn-key model is used, whereas a turn-key approach raises no special issues for larger schools? This is an issue to be explored in coming months as our focus turns more from observing PD/TA at the time of delivery to interviewing participants retrospectively about their perceptions of the initiative as it unfolded for them.

Another cultural issue that may affect DEC rollout is the impacts of principal readiness to engage in data-driven dialogue on the level of support principals give DEC from the outset. DEC is *not* a study of outlier schools—that is, all high capacity schools entering into the initiative voluntarily to push further ahead with previously institutionalized practices. Indeed, many DEC schools have a history of low-achievement and a reputation for staying on the sidelines as improvement initiatives pass by. We have observed cases where principals did not appear to readily grasp the nature of SEC data, or—more importantly—did not appear to have strategies for exploring its implications for instruction in their schools once the data were clarified. Low prior knowledge of data analysis and interpretation on the part of principals, where it occurs, is not in itself a barrier to successful implementation of the DEC model. However, if principals who lack prior knowledge in this area simultaneously feel they cannot afford to appear to be learning alongside other School Leader team members then decreased participation in, and school-wide commitment to, the initiative seems a predictable result.

PD Leader strategies. The main strategy for rolling out SEC data and the data-driven instructional improvement process beyond leadership teams has been the incorporation of turn-key training in DEC PD/TA.

The PD Leader has divided the sessions between actually engaging team leaders in the kind of collaborative inquiry and reflective dialogue needed to more fully appreciate how school-wide improvement and teaching to high standards differs from more widely understood than instructional improvement models that treat the individual teacher as the unit of change. In DEC, the PD Leader has asked team leaders to attend to several different aspects of the process. Not only has the PD Leader asked Team Leaders to engage first-hand in collaborative inquiry, but has also consistently engaged them in

issues that arise from the very process of collaborative inquiry. This latter focus is included to better prepare Leadership Team members in avoiding common, unproductive lines of interaction and problem-framing that often derail efforts to explore and interpret data. Also, in addition to preparing Leadership Team members to facilitate group discussion of data about instruction and achievement, the PD Leader asks Teams to surface and resolve organizational barriers to implementation of the data-driven improvement process.

The three main dimensions of PD/TA activities noted above correspond to what we have recently come to refer to as the "*Three A's*" of the DEC process. The first "A" is *acquisition* of first-hand knowledge of relevant data and the collaborative inquiry process. The second "A" is *application* of the knowledge acquired in PD/TA sessions to act as turn-key facilitators of similar professional learning experiences with colleagues. The third "A" involves *adaptation* of the model to local school or district considerations to maximize impact. PD sessions heavily emphasize engaging Leadership Team members in the first two activities (acquisition and application of knowledge about relevant data and the process) for interpreting that data. But these matters receive less emphasis in Technical Assistance sessions so that more attention can be given to adapting the model and process to local circumstances. The general pattern has been for Teams to engage in a PD session, make one or more attempts to conduct DEC-related PD activities back at the school, followed by a technical assistance session where these activities are appraised by the team with input from the Lead PD Leader. It is also common for a portion of technical assistance sessions to be devoted to digging deeper into school data that has previously been only briefly explored, or bringing in new data to further illuminate a learner-centered problem of special interest to a given school.

Having identified the Three A's as important underlying dimensions of PD/TA activities, DEC researchers are beginning work to operationalize these concepts in the form of a standardized PD observation instrument. We believe such an instrument is much needed to systematize descriptions of the relative emphasis of PD on different dimensions of professional learner activities and expectations—not only in DEC, but in all studies of PD designed to foster and support school-wide change for more challenging and equitable instruction.

4) Principal participation.

Many of the ways that school principals have affected DEC PD/TA delivery and rollout have been discussed above. Here we focus on factors not yet addressed.

***Supports*.** DEC implementation has moved fastest and farthest in schools where principals have consistently attended and fully participated in PD/TA activities. Our observations indicate it is optimal for

principals themselves to participate in all sessions, though there are several schools that have made good progress with an assistant principal representing school administration on the Leadership Team.

We have identified several possible reasons why principal participation has such an important effect on the rate and quality of implementation. A first is that when principals, who invariably have harried schedules, invest their own time and energy in an activity, it appears to send a strong signal to staff that the activity is important and teachers' own participation is consequential. Although principal participation may have symbolic implications, we believe teachers also know from experience that principals generally do not have time for things that they think will not make a difference. This tends to be true in part because principals have a degree of control over school resources and opportunities for staff to meet such that activities lacking principal buy-in are significantly constrained. If teachers in fact tacitly or consciously hold such beliefs, it is understandable that the quantity and quality of principal participation in an activity, as perceived by teachers, weighs heavily in teachers' decisions about how intensively to give themselves over to a given activity. Exploring teachers' sense of principal commitment to DEC and how such commitment has affected their own engagement is something we wish to address with teachers in post-intervention interviews.

A second and very concrete way principal participation enhances implementation is by enabling School Leader teams to work with greater confidence and dispatch because teams get instant feedback from principals about alternative improvement goals and strategies. When principals do not attend PD/TA sessions, only so much can be accomplished before suspending activities to get principal input. The drag such interruptions have on Leadership Team productivity and initiative rollout appears to be inversely related to the number of opportunities the Lead PD Leader has to meet with Leadership Teams. At present it is our sense that the number of opportunities for interaction between the PD Leader and Leadership Teams in DEC are limited enough in number that consistent, robust principal participation may be especially important. This is something we will continue to study going forward.

A third point—possibly related to the preceding one—is that principals have more opportunities to see first-hand how the DEC process and data can be dovetailed with existing school improvement goals and activities when they work as integral members of the School Leader team. For example, we are seeing that the impact of DEC PD/TA initiatives depends considerably on the extent to which the initiative becomes integrated into local school improvement plans. This is because school improvement plans in DEC districts lay out the timing and largely the content of professional development and in-service days for the site. If an activity gets written into a school's annual improvement plan, it increases the likelihood of securing appropriate amounts of time and helps institutionalize school commitment to the activity. In order for PD activities not incorporated in school improvement plans to proceed, they must

compete with and displace other PD activities on a case-by-case basis, or other pressing organizational tasks that were not anticipated in the improvement plan but which invariably arise and cannot be ignored.

The fact that PD activities sanctioned in the school improvement plans receive enhanced structural supports initially worked as an obstacle to DEC implementation because DEC PD/TA in Phase I schools commenced at the beginning of the 2001-02 school year—*after* school improvement plans for the 2001-02 school year had been finalized. Although schools generally found ways to work DEC activities into their schedules, we heard comments indicating that the ad hoc way it had to be done resulted in some teachers and principals feeling like DEC constituted an extra demand being placed on them. It appeared to us that some of the same actors who acknowledged the high quality and potential value of DEC activities had some initial resentment of the project because of the perception that it was being piled on top of other tasks.

The advantageous situation of initiatives incorporated in school improvement plans is something the PD Leader appreciated at the outset and worked persistently at turning to the benefit of DEC. This was done by consistently and clearly advocating with principals and School Leader teams for including DEC activities in 2002-03 school improvement plans. We know this has happened in numerous schools, especially in Miami. We are very keen to observe and compare the consequences for rollout in schools that have taken this step to ones where it has not happened.

Obstacles. Reports of school-capacity building and instructional change initiatives frequently report a tendency of some principals or staffs to be slow or highly averse to fully engaging change initiatives. Persistent reluctance of schools to embrace change has been attributed to various beliefs or attitudes of principals or teachers. One that is commonly noted in the research literature and embodied in tenets of standards-based curricular reform pertains to principal and teacher expectations. Staff in some DEC schools clearly do not believe that all, perhaps not even many, of their students can achieve. Similarly, some principals have shown no evidence that they believe their staff is capable of participating effectively in an ambitious capacity-building initiative such as DEC, or if capable, that teachers can actually be motivated to engage as required.

Another phenomenon commonly associated with principals and teachers who resist change is a "wait and see" philosophy. Principals and teachers may believe that if they wait long enough most initiatives will blow over. According to this view, participation represents wasted energy because improvement approaches come and go as policymakers and the public vacillate among various educational goals. For some school people the "wait and see" approach includes the belief that some initiatives are in fact relatively long-lived and fruitful, but that it is strategically prudent to let other schools sort out the wheat from the chaff before committing the limited resources of one's own school's to an approach.

If the reluctance of some schools to commit to data-driven school-wide instructional improvement is based on a desire to see evidence of success before committal, then DEC may be now be poised to win some converts. This is especially true in Miami where three Phase I DEC schools made big gains on state school accountability scores. The state grade for Schools 810 and 811 moved to a "C" from a "D", and School 85 went from a "C" to an "A". In Summer 2002, School Leader team members from Schools 810 and 811 repeatedly told other principals, teachers, and district administrators that DEC had been the main reason for their improved performance. School 85 indicated that DEC was one of several equally important factors in their progress. The experience of School 811 is briefly recounted in a subsequent section of this report. As the study proceeds, we will be interested to see whether and in what ways public recognition of DEC's contributions to school improvement by principals and teachers affects the motivation of other schools to take a more aggressive approach to school-wide implementation.

PD Leader strategies. Ultimately the DEC PD Leader helps principals by enabling them to acquire additional knowledge of collaborative inquiry and data-driven decision-making alongside other instructional leaders. This includes providing principals with the opportunity and motivation to witness and contribute to the expansion of local school capacity for analyzing student achievement, identify potentially appropriate modifications in instructional practice, allocate organizational resources to support modifications, and join with teachers in pragmatic, as opposed to putative, efforts to assess and continuously improve instruction.

The PD Leader started building collaborative relationships with principals at the outset. With other DEC staff, the PD Leader made trips to each site to meet with principals to introduce them to the study. In many cases principals asked mathematics and science department chairs or other instructional leaders to participate in the meeting. Introductory meetings were also used to gather background information about mathematics and science curricula and instruction and learn about existing school goals for improving student achievement in these areas. Throughout the initiative the PD Leader has communicated regularly with principals to adjust the timing of site visits to allow for all schools to participate in PD/TA activities. She has also phoned principals between visits to keep up on rollout activities, developments in schools' goals for DEC-related activities, and further technical assistance and data needs.

Something in DEC that has appealed especially to principals is the PD Leader's insistence that DEC need not—indeed, should not—be treated as "one more thing" schools must do, or a "stand alone" project. The PD Leader has been especially explicit about this with principals because they are the ones who ultimately control whether or not the DEC process will be incorporated in a school's annual improvement plan. The initiative is designed to be a set of tools and processes for supporting local school goals, capacities, and actions. One of few non-negotiables in DEC PD has been that achievement

improvement goals and strategies should refer to and reflect state and district standards, not merely specific items students had trouble with on last year's state test. Beyond that the PD Leader has given principals and schools the main responsibility for determining specific aspects of student achievement to work on, and collaborated with them to identify strategies for using data to get the clearest possible understanding of which kids are not performing well in the targeted area; the specific conceptual prerequisites student lack; and how the school can use local instructional expertise, or the research literature to identify best practices for targeted content.

By resisting the temptation of telling Leadership Teams specifically what to do and how to do it, in favor of helping teams develop their own ability to identify, address, and monitor learner-centered problems, the Lead PD Leader has created a situation wherein the general DEC model must be adapted to local needs and resources to proceed and succeed. DEC PD/TA is a toolbox; principals and teachers are the carpenters. This approach embodies a conception of actors' roles such that it that does not presume to encroach on the authority of principals and teachers. The approach appears to work well with many principals when combined as it is here with the clear expectation that schools should engage in such work, and assistance is given to schools to support their efforts to do so.

5) District priorities and policies

District priorities and policies have had considerable impact on how readily schools have entered into and progressed with DEC-related activities. Consequently, the DEC PD Leader and other DEC staff have invested substantial effort in communicating and interacting with district staff. Important areas of interaction have included the following:

- Presenting the DEC project to district decision-makers and establishing commitment to participate.
- Coordinating introduction of principals and other school leaders to the project.
- Reinforcing district commitment to project over time by arranging for district staff to encourage principal participation, and providing district resources (or district permission to use school resources) to support DEC participation.
- Coordinating random assignment of schools to project phases, and administration of SEC survey.
- Coordinating scheduling and logistics for PD/TA sessions.
- Providing special PD sessions for district staff to increase staff knowledge of the initiative and better enable staff to integrate DEC activities with other district improvement activities and data uses.

It is important to note that some of the supports and obstacles discussed below have state or federal rather than district origins. Our focus here is on how district contexts affect data-driven professional development and school improvement, not especially on the origins of policies that are manifest in the contexts.

Supports. The general climate in DEC districts is supportive of the initiative in numerous respects. All districts strive to perform as well as possible on state accountability measures. It appears districts and schools are gearing up to place even greater emphasis on standardized achievement tests in the coming year in response to new *No Child Left Behind* accountability. One respect in which *No Child Left Behind* and DEC are well matched is the importance they both give to equitable student achievement and disaggregated data. The standards-based orientation of DEC also makes it complimentary to *No Child Left Behind*, as well as to state assessment and accountability systems. Three of four districts participating in DEC in the 2001-02 school year also have an NSF Urban Systemic Initiative (USI). DEC staff members have communicated frequently with USI staff to focus more energy on mathematics and science improvement than could be accomplished by either initiative acting in isolation.

Although they have many commonalities, DEC and the USIs differ in the degree of emphasis placed on two important aspects of instructional reform, and in the capacities each type of initiative brings to bear to support reform. USI capacity-building primarily stresses increasing infrastructure for, and supporting delivery of, PD for standards-based best instructional practices. In comparison, the primary goal of DEC capacity-building activities is using and supplementing available data to help schools identify precisely where it will be most productive to focus actions to enhance curricula and instructional practice. Though the DEC PD Leader frequently recognizes examples of high quality standards-based classroom practice, she has not advocated for specific curricula or conducted full-fledged demonstration lessons. Instead DEC PD has encouraged teachers to turn to one another, the research literature, and district resources such as USI specialists for models of specific high-quality classroom teaching practices.

In addition to providing a generally favorable climate for data-driven instructional improvement, districts have taken specific steps to provide concrete support. In many cases district staff have attended DEC PD sessions to express their support for the initiative, and to keep apprised of how it is being implemented so that they can justify the use of district resources to further project activities. For example, in many cases district administrators have asked principals to excuse School Leader team members from in-services otherwise require of all teachers so DEC participants could attend DEC PD/TA or meet to plan project-related activities. District administrators have also arranged for teachers to receive continuing education credits for DEC PD and have occasionally paid stipends to teachers for participating on non-contract days.

To varying degrees district administrators in all sites have helped DEC staff with logistical coordination. In addition to helping with the "who", "when", and "where" of PD/TA sessions, district administrators have helped the DEC PD Leader obtain reports with more or different student performance data than is typically disseminated to enable Leadership Teams to delve more deeply into aspects of student achievement at the heart of their collaborative inquiries.

An extremely important way that district administrators in two sites supported DEC was by including appropriate district staff in DEC PD sessions for participating schools, or by arranging for extra sessions for groups of district staff. Especially in Miami, special sessions were provided as appropriate for district mathematics and science specialists (who are dedicated full-time to helping schools improve mathematics and science teaching and learning), district mathematics and science curriculum supervisors, assessment and accountability personnel, USI staff, and others. In Chicago, several district representatives attended the initial 2-day PD session, and a 1-day special session was held for USI and other district staff at a later time. A special session was also conducted with USI staff in Philadelphia.

DEC PD sessions attended exclusively by district staff differed from ones conducted with schools. In district sessions, the amount of time dedicated to inquiring into school-level data and engaging in data-driven reflective dialogue was truncated to concentrate more on how district staff may facilitate the engagement of teachers and principals in such activities. Especially in Miami, where district PD sessions have been most frequent, the sessions have enabled DEC staff to learn more about DEC schools as well as district resources available to support improvement. Simultaneously district staff have learned how to conduct their school improvement activities to take advantage of and reinforce DEC. Potential benefits of including district support staff in DEC PD became evident when DEC staff observed a meeting in which district/USI math and science specialists helped an assistant principal and the mathematics and science department chairs at School 88 analyze state achievement scores to identify where to focus school improvement efforts in the then upcoming 2001-02 school year. Seeing that district specialists were already making a start on data-driven instructional improvement, DEC staff realized it might be productive for specialists to see how DEC would help mathematics and science chairs work with other teachers to conduct extensive collaborative inquiry into student performance, and formulate targeted strategies for instructional change. Among other things, DEC staff wanted specialists to be aware of the SEC data that had been collected and analyzed, and how it might be used to help teachers derive increasingly shared instructional goals and practices.

In addition to on-site PD provided for district staff, three DEC districts sent representatives to a four-day SEC meeting held at WCER in July 2002. At this meeting, DEC staff—including CCSSO, TERC, and WCER personnel—provided participants with information about the SEC survey and opportunities for utilizing it to monitor and improve instructional systems at the state or district level.

Substantial time was also given to taking participants through DEC PD activities. The partial overlap between the SEC and DEC groups proved fruitful. The Miami representatives were able to relate how the initiative was working there and how schools were beginning to cite DEC as a major contributor to improvement, attendance by Charlotte and Philadelphia district representatives allowed for strengthening coordination in those two sites for the 2002-03 school year, and the groundwork was laid for bringing a fifth district into the initiative.

Obstacles. Widespread state and district emphasis on school-wide performance on standardized achievement tests is recognized above for creating a climate generally favorable to data-driven improvement. However, many of the specific ways that states and districts analyze and report test data encourages problematic school improvement strategies that DEC has had to contend with. We will belabor the shortcomings of reliance on average test scores, insufficient disaggregating of data, absence of classroom-level or student-level results, scores reported only in reference to benchmarks (e.g., percentage of students meeting or exceeding proficiency), and the like. All such data practices may serve legitimate purposes from a systems perspective, these practices also entail the loss of important information needed by teachers and schools for instructional decision-making. Steps taken by the DEC PD person to help schools supplement the often partial student performance data supplied by districts and states are described below in *PD Leader strategies*.

An obstacle encountered in Chicago was an edict issued by district administration at the beginning of the 2001-02 school year directing schools to give maximum effort to increasing reading scores. Though there seemed to be some confusion about exactly what schools were being told to do, the principals in DEC schools told us that many principals in the district instructed all teachers to give top priority to teaching reading skills and worry less about subject area content. Many schools set aside one to two hours each morning for silent reading and reading instruction. Our understanding is time dedicated to math content instruction was perhaps the least affected of any subject, but time spent on science content was substantially cut to make more room for reading instruction. The edict also tended to make subjects other than reading a low priority for principals when planning professional development and in-service activities. Even two or three of the Chicago schools did not aggressively push DEC roll-out to all staff, it appears likely that mathematics and science improvement would have fallen largely by the wayside in DEC schools were it not for initiatives such as DEC and the USI. When we return to Chicago in Autumn 2003 we will be interested to see whether the district remains so heavily focused on reading. If so we will be looking at the post-intervention SEC survey to see to what extent and in what way the press on reading affected mathematics and science classroom practice.

On the whole the DEC model has appealed to and resonated well with principals and teachers on a case-by-case basis. The biggest challenges have come not in the context of face-to-face interaction

between DEC staff and school staff, but in working against district and state forces beyond the control of DEC or school staff. The state take-over in Philadelphia, and the district reorganization in Charlotte prompted by changing federal legal parameters, drew principals' and teachers' focus off curricular content and learning, placing the emphasis instead on logistical considerations. In Chicago, we believe DEC rollout was hampered when a key district administrator went on leave for most of the 2001-02 school year. DEC had not been present in the district long enough at that point to establish a broad base of support among district administrators. When our main source of district authorization became inactive, it resulted in schools receiving only weak and sporadic signal of support for DEC from the district. The good news is that the DEC staff has strengthened relationships with Philadelphia and Charlotte district staff during Summer 2002, and the key Chicago administrator is expected back for the 2002-03 school year.

PD Leader strategies. Many PD Leader strategies for optimizing the fit between DEC and the various district contexts have been related above. There is one particular strategy that has yet to be mentioned but should be due to its importance in helping schools move beyond the limitations of student performance data routinely provided by states and districts is described next.

Assuming a school has received information on which items on a test are most often missed by students who scored, say, in the bottom quartile, most tests are not designed to reveal, and test reporting does not address, exactly which concepts low-performing students are missing that the students would need to acquire to be ready to succeed on test items. Lacking such information, the typical response of schools is to simply re-teach concepts students scored low on in the very *same way* the material was taught initially. DEC PD Session #3 introduced school Leadership Teams to using collaborative inquiry into student work to facilitate school-wide instructional decision-making in ways that substantially enhance their ability to provide instruction appropriate for increasing student performance on tested content.

DEC PD Session #3—*Looking at student work*—prepares schools to do the following activities to improve mathematics and science instruction school-wide:

- Teachers jointly select student performance tasks (tasks may vary by grade level, but all students at a given grade level and subject should perform common tasks).
- Teachers complete tasks (to insure full teacher appreciation of the kind of knowledge and skills involved in tasks).
- Teachers administer tasks to all relevant classes.
- Teachers choose examples of student work from their own classes that exemplifies below, at, and above proficient performance levels (choosing a variety of student work helps keep focus on what students are or are not comprehending rather than fostering an environment where

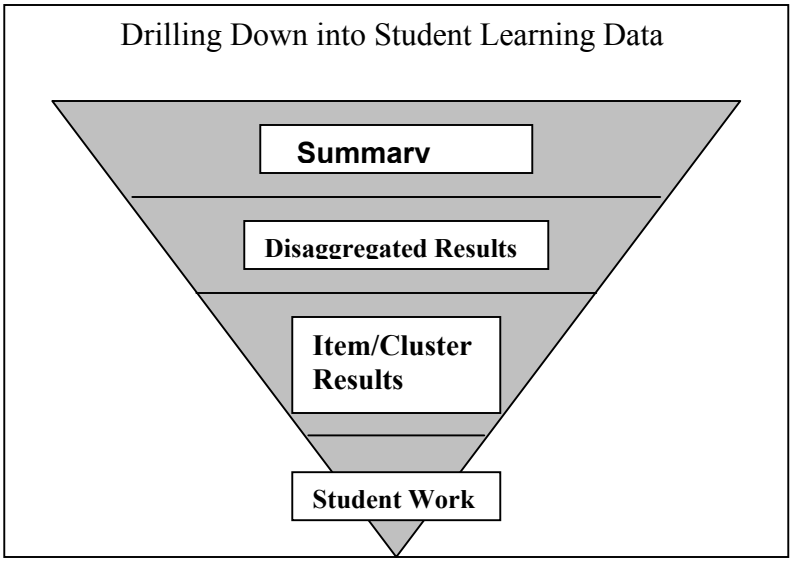
teachers are encouraged to merely showcase high performers. As the DEC PD Leader stresses, perfect student work gives the least information about how to improve instruction).

- Teachers meet to inquire collaboratively into student work samples, including patterns in what students are missing, and similarities or differences in teachers' criteria for assessing student work.
- Teachers identify underlying subject area concepts most lacking in and needed by low-performing students.
- Teachers identify best instructional practices to redress student conceptual weaknesses. (Here the SEC data is brought in to compare to test data. Often teachers cover topics but do so in a way that is poorly aligned to test content in terms of cognitive demand or student expectations. When the concept of content coverage is reported in a way that takes student expectations into account, teachers often realize that they are covering topics at the level of memorization and routine procedures, for example, and not covering problem-solving and application dimensions to the degree emphasized on tests).
- Teachers implement best-practice instruction.
- Teachers repeat above steps to assess progress.

DEC PD has given Leadership Teams opportunities to practice and reflect on each step in the process, then make plans for turn-key training.

The process outlined above, like many DEC PD activities, is too complex to fully describe in the present report. What is important here is how integral it is to cultivate school-level knowledge that is simultaneously grounded in important patterns in broad-scale achievement measures *and* in the specific conceptual knowledge low-performing students do or do have in mathematics and science. Figure 1, below—a PowerPoint slide from DEC PD Session #3—depicts where understanding student work in the context of school instructional practices fits in the broader data-driven instructional improvement model utilized in DEC.

Figure 2. Importance of looking at student work in DEC model.



Source: Adapted from DEC professional development session PowerPoint slide, presented by Diana Nunnaley, TERC.

Simply put, looking at student work in the context of other data is essential to highly successful data-driven, school-wide instructional improvement. To date we have seen any number of schools that have considerable previous exposure to summary, disaggregated, and item cluster results. However, few if any schools appear to have engaged in looking at student work from the perspective encouraged in DEC. It is the premise of DEC PD/TA that schools will become increasingly effective as their capacity to understand student performance from this perspective increases. Further exploring the extent and nature of the effects of this aspect of DEC PD/TA will be an important focus in observations and post-intervention interviews yet to be conducted.

Miami School Case Study—Progress on Professional Community Conducive to Data-Driven Improvement.

On August 21 and 22, 2001, the six Miami Phase I DEC schools came together for their initial DEC professional development session on data-driven instructional improvement in mathematics and science. DEC staff members attending the session were provided with common observation protocols to track aspects of Leadership Team participation thought to affect school readiness for full engagement in the initiative.[2] Based on this limited contact, DEC observers rated school teams (on a scale of 1 to 5, with 5 being high) on their apparent readiness to, or capacity for, full engagement in the DEC initiative. School 811 was rated by two observers, receiving one "3", and one "4". Two other Leadership Teams were rated similarly, two were rated much lower, and one team (School 810) received a "5" from three observers. The following excerpt from one observer's notes summarizes the response of two Leadership Team members from 811 when asked if they thought their school might respond favorably to the PD and instructional improvement approach used in DEC.

The [School 811] assistant principal said, "The science department will do very well with this. Most math teachers, however, are just entering their second year of teaching. They wouldn't have had the time and energy for it last year. Who knows if they will be ready for it this year? A couple of the math teachers are from other countries and are still adapting to American culture and schools."

The curriculum specialist said the math department chair has been pulled out of the classroom to act more as a supervisor or guide to other teachers. The Specialist said the math chair is "*Very* data-driven, and *will* provide leadership."

Another item they related was that their school has been doing some data-driven school improvement already with district math/science Instructional Improvement Teams. The assistant principal agreed with the curriculum specialist when she said, "We have had enough talking, but we need to move on to *doing* something." (Field notes, Miami PD Session #1, Aug 22, 2001).

Approximately one year later we heard the following.

> [*School 811] credits DEC with being a big part of moving from an "F" to a "C" school [on state accountability measures*].—Miami District Instructional Specialist for School 811, July 18, 2002.

and,

> *I love this project. It's the best part of my job—one of the best parts. School 811 and 810] have taken this and really run with it. They are doing it school wide—all subjects. And the improvements these schools have made are due to this lady [DEC PD Leader] right here. 'Cause*

[2]Karen Seashore-Louis' (1996) conception of professional community was central to our observation protocol and is taking on central importance in our framework for analyzing DEC implementation and roll out. This is addressed in greater detail below.

she has lit a fire under them. She just keeps coming"—High level Miami Administrator, DEC PD session for district curriculum specialists, August 21, 2002.

Below we present reflections of Leadership Team members as well as other mathematics and science teachers from School 811 on activities the school engaged in to move from being one with promise to one that was making great strides in actually using the data and school improvement process modeled in DEC PD/TA.

The previous section on implementation supports and obstacles shows that at least three factors affect how readily a school acquires and applies the data and processes included in DEC PD/TA:

- District structural and cultural supports and constraints
- School leadership capacity
- School professional community

School 811 is fortunate to be in Miami, where the district office is especially committed to improving mathematics and science teaching and learning, and has marshaled resources to support work in that area. School 811 also had a number of instructional leaders who were just beginning to come into their own when DEC appeared on their scene. The school's principal had many years of experience in the district, but had been at School 811 only two years when DEC began. During the principal's first year the school experienced considerable teacher turnover because many staff members, for whatever reason, decided not to stay on for the principal's promised push for improved teaching and learning. The principal moved quickly to build very strong relationships with her curriculum specialists and department chairs around a shared commitment to improvement. It appears school leaders were already implementing piecemeal improvement activities before becoming involved in DEC, but the school had not yet settled on a coherent strategy. Something else the school appears to have lacked was a clear, effective model for encouraging stronger school-wide professional community. The comments of School 811 staff related here relate how DEC helped the school address both needs.

Two preliminary matters are addressed before turning to staff perspectives. First, a demographic sketch of the school is provided. Second, an annotated list of School 811 DEC-related activities to date is offered. It is important to understand that many activities we consider to be DEC-related were not necessarily caused to occur by DEC. As noted earlier, the DEC PD Leader has insisted that DEC be something that is integrated with on-going school improvement activities—not tacked on and carried out as a distinct self-contained project. For this reason we consider it noteworthy when DEC data or methods show up in the context of school improvement plans, or are evident in schools' efforts to conduct collaborative inquiry into reading instruction, for example, as well as mathematics and science. Aside from the fact that reading plays a very important role in student success in mathematics and science, it is a strong sign that DEC methods for collaborative inquiry are becoming institutionalized when they become

evident in instructional areas in addition to science and mathematics. Likewise, it is desirable for schools to use the data analysis skills acquired in examining SEC data to delve further into standardized achievement test data.

School demographics and context.

In school year 2001-02, School 811 served approximately 1375 students in grades 6-8. Twenty-six percent of the students were black, 56 percent Hispanic, and 17 percent white. Eighty-five percent were economically disadvantaged. Ten percent were Limited English Proficient. A student mobility rate of forty-six percent was reported for the school. The school was among a relative few in the district designated to serve special education students. This explains the fact that twenty percent of the school's students were in the exceptional education program. In addition to the regular and advanced curricular programs that served the majority of students, the school had a substantial program for gifted and talented students. The school had seventy-two teachers, including seven regular science teachers, eight regular mathematics teachers, and two mathematics and two science teachers dedicated to special education students.

For school year 2001-02 the school ceased receiving funding for a magnet program, and saw a decline in Title I funding. The school received support that included classroom aides and an instruction enhancement program from Florida International University, and student interns from Miami Dade Community College. In school year 2000-01, sixty-four percent of the school's students scored at Level 1 (the lowest level) on the state assessment in reading, and fifty-four percent were at Level 1 in mathematics.

Like almost all schools in DEC, School 811 faced many challenges with limited resources. The school's annual improvement plan for 2001-02 (finalized in late October, 2001), discussed school challenges and strategies pertaining to instructional delivery.

> *[School 811] has identified several issues concerning school improvement in the Educational Delivery Process. Among these are the results of the Enacted Curriculum Teacher Survey completed by all mathematics and science teachers. The results of this survey indicate that teachers requested additional training in the use of technology in their classrooms. The Science and Mathematics Instructional Improvement Team (see above) have supported the decision to provide for Saturday training sessions in Best Practices for all staff members who are interested…Best Practices Self-Assessment surveys indicated that teachers need and want additional strategies to address Sunshine State Standards Benchmarks for Reading and Mathematics. In order to meet these needs, the teachers will continue to meet for weekly curriculum training, facilitated by the curriculum specialists.* (School 811 Improvement Plan for 2001-02).

DEC-related activities at School 811.

Following is an annotated list of DEC-related activities at School 811 to date. Descriptions of school meetings are based on information provided by School Leader team members. School 811 rolled out DEC data and processes more intensively than many schools. Two other schools in Miami, two in Philadelphia, and one in Chicago would have a level of intensity similar to School 811. Other schools would have a list of DEC implementation activities consisting of entries similar to the ones below, but would have lists that are shorter to a greater or lesser degree.

- ***4/10/01***. Initial site visit. Introduction of project to Leadership Team by DEC Staff.
- ***4/10/01-4/20/01***. SEC survey administration.
- ***8/21/01-8/22/01***. DEC PD Session #1. Introduction to data-driven collaborative inquiry based on three phases of dialogue, initial sharing of SEC survey results for school and district, and team planning for turn-key activities with other mathematics and science teachers.
- ***9/27/01***. Meeting of mathematics and science teachers and chairs, curriculum specialists on School Leader team. Staff are presented with one chart from SEC results and guided through 3-phase dialogue around the data.
- ***11/7/01***. DEC TA Session #1 held at School 811. AP and all other members of DEC Team attended. Discussed what they had done so far and planned for introduction of all staff to DEC at upcoming early release day in-service.
- ***11/15/01***. Early Release Day workshop introduced DEC to entire school faculty. Leadership Team provided overview of DEC, including nature of SEC data, organizing for data-driven dialogue, the seven norms of Collaborative work, *Using Data, Getting Results* resource book. Staff got into groups, and one Leadership Team member led each group in Phase I dialogue. The groups engaged in an activity using the "Herringbone" activity from *Using Data, Getting Results*. Written feedback from staff to Leadership Team characterized by team as "highly positive".
- ***11/17/01***. Early Release Day. Grade level teams met to discuss students who scored in bottom 25% on FCAT Reading. Staff provided with list of low-performing students. District/USI Mathematics and Science Specialists attend and support teams. Discuss possible problems and formulate grade level team action plans for improving achievement. School's curriculum specialists assemble team information to create *Faculty FCAT Action Plan*.
- ***11/26/01***. Science and Mathematics Instructional Improvement Team (IIT) meeting. Meeting included districts/USI mathematics and science specialists, School 811 principal, four other members of School Leader team, and sixteen other mathematics and science teachers. IIT established four goals for 2001-02 school year, including;

  - Gather and use student-specific FCAT performance data (each strand) to individualize instruction and improve student performance on the FCAT.
  - Analyze and use *Data on Enacted Curriculum* information to identify both school-wide and target group areas of weakness (strands) to direct the development of school-wide initiatives to improve student performance on the FCAT.
- ***12/08/01***. Saturday Best Practices workshop.
- ***1/28/02***. IIT meeting.
- ***1/31/02***. DEC PD Session #2. Main topics included,
  - School Team data presentations
  - New SEC survey reports—including new charts showing alignment of school instructional practice to FCAT
  - Formulating learner-centered problems
  - Learner-centered action plans
  - School Team planning
- ***2/6/02***. "An articulation meeting was held with all elementary schools in our feeder pattern. [School Leader team member] gave an overview of the DEC process and the importance of data driven decisions. The school also related using data to assist teachers in subject selection for students." (From meeting minutes provided by school Leader team member).
- ***2/23/02***. Saturday Best Practices workshop.
- ***2/25/02***. IIT meeting.
- ***3/18/02***. Mathematics and Science teachers met to examine and discuss selected SEC survey results. DEC Team Leaders engaged teachers in three-phase dialogue. Also read and discussed article on TIMMS findings, Nancy Love statement about student expectations, and areas for further collaborative inquiry.
- ***3/21/02***. Early Release Day. FCAT debriefing held. School Leader team administered *FCAT Enhancement Survey*, and *Survey of Perceptions of Attitudes, Readiness and Commitment to Change*, from *Using Data/Getting Results* (Love, 2002). Team promised to graph and share results at subsequent faculty meeting.
- ***4/22/02***. DEC TA Session #2. Attended by Principal, Assistant Principal, School Curriculum Specialist, Mathematics Department Chair, and District/USI Mathematics and Science Specialists. Science Chair on maternity leave. Discussed school's strategies and progress for improving student performance in four areas identified through DEC process: (1) Measurement, (2) Nature of Science, (3) Analyzing Information, and (4) Hands-on/Active Learning. Leadership team members related

anecdotes about how DEC process helped make staff comfortable with, and motivated to engage in, data-driven improvement.

- ***8/19/02***. DEC implementation researcher conducted one DEC involvement focus group session with two mathematics and three science teachers, and second session with five members of School Leader team (Principal, Assistant Principal, Science Chair, and two curriculum specialists) for School 811.
- ***8/20/02.*** DEC PD Session #3. Attending from School 811 were Assistant Principal, Mathematics Chair, Science Chair, and Curriculum Specialist. Focus was on *Looking at Student Work*. Discussed how to use collaborative inquiry into student work samples to augment information provided by standardized achievement data to guide instructional decision-making. Leadership Teams practice three phases of dialogue in analyzing student work. PD Leader coached teams on ways to focus on student conceptual development that underlies work samples, and ways to alter instruction to increase student conceptual development in mathematics and science. PD Leader presented strategies and tools for engaging school staff in looking at student work.

School 811 perspectives on DEC participation.

We conclude this section of the report with comments on DEC participation related by School 811 administrators and staff. Many comments are excerpted from tape transcripts of focus group sessions conducted with School 811 staff on August 19, 2002. Other comments are from notes taken during DEC PD/TA sessions attended by School 811 staff.

Every school in DEC is unique to some degree, and additional school implementation case studies are planned. However, as different as schools may be, we expect to see many of the same experiences described by staff from School 811 repeated elsewhere.

To a large degree we let the participants speak for themselves. The main thing we would underscore is how DEC has given school staff both valuable data for analyzing instructional practice, and a method for utilizing data. The method is one not rooted merely in technique, but one that supports professional learning by encouraging the formation of broader and deeper professional community. The DEC process promotes collaborative inquiry into student performance data and classroom practice. The process seeks to deprivitize classroom practice, increase reflective dialogue, and engender a data-based focus on equitable student learning. These aspects of professional community flourish best when instructional leaders understand the importance of keeping improvement activities non-putative and relevant to teachers' concerns.

Following are selected comments that illustrate the nature and impacts of DEC participation for School 811.

On the larger DEC process:

I think once [our reading curriculum specialist, math chair, and I] came back from the first two-day DEC [session] and we presented what we had learned, and we came and we shared that with the staff, and we shared some results of some—some tests the students had taken here; that the staff really got into it. Once they—they saw the results, and 'Hey, look, this might be something different', and we kind of opened up their eyes, and I think they all bought into the idea of the data. You know, data's really going to help us. Because we looked at all the data, and this is where, you know, we need to go. And once we all sort of got on the same page, it just took off from there. We were already doing some things with reading, writing and thinking in the curriculum; but then I think the data just really, really helped and just added to it; and then the whole staff kind of bought into it. And—and we've really worked collaboratively to—to try to get, you know, the outcome. And it showed with the FCAT [Florida Comprehensive Assessment Test] scores this year.—School 811 Science Chair, August 19, 2002.

And,

All groups and grades improved. Still 50% of our kids are at level 1 so we have a lot left to do. We did a lot of work looking at the data over the summer. We did a lot of curriculum mapping. When I came here the last time and I saw you [DEC PD Leader] and I saw the data, I said when we go back I want to meet with the math teachers and show them the data and I want them to look at it and say "Oh my god!" And science said they wanted to do that to. And we talked about why we were teaching all the same stuff over and over again and hardly ever getting to this other stuff [more challenging work]. We used your data—your charts and content maps—to have that conversation with our teachers about what we were covering and how much.—Math Chair

On factors affecting staff buy-in, and garnering buy-in, to DEC process:

This was for us, based on what we needed; created within the—the community in which we are. Because in schools such as this and others, regardless of which end of the spectrum you're on, people tend to say, "Well, that won't work for our kids," or "This isn't—isn't good for our kids," or whatever. So, when you have projects downloaded on you from outside—and "We want this survey for a district reason"—it becomes suspect.—Principal

And,

Curriculum Specialist: *One department in particular, you know, was always looking for other reasons that the kids were not performing a certain.... Like, if we looked at the strands on the benchmarks, and said.... We saw that the kids were—were deficient in main ideas, for instance. And, you know, one—one department's response was always, "Well, it's all the other kids' fault. It's not our kids' fault." You know, "Everyone else is doing poorly." But when I took the data apart and I started to show them specifically how, you know, these kids <u>were</u> kids that were tied to their program and, you know, were not performing the way they should be, at—at—you know, for their level, it really.... And I used a lot of questioning. "Well, what would make you think that?" And it was all from DEC that I got the sense....*

Researcher: *"Have you really looked at the data?"*

Curriculum Specialist: Right. *"Here, let me show you," You know. And it caused that person to really take pause. And now, I've been able to.... Where I never worked with them before, I've been able now to go in.... Because I kind of showed them some hard-core numbers, they've been receptive to having me come in and give them some strategies to help their students to do better.*
And,

Science Teacher: *Before, they used to, like, just tell us what they would like us to do; or, you know, it would help if people did this. Towards the end of.... Well, even last year, they started this more.... You know, they came in with the--the first set of graphs; and we broke down the graphs and everything. Everybody got in groups, and they compared them as groups; and then they presented what they observed. So, it became more the teachers.... The teachers were encouraged to be more interactive in the meeting, instead of, "OK, this is what's going on. This is what we want you to do."—more or less. Where, this is what we all discovered, and we all shared what we discovered; and then, "How are we going to deal with the problems?" It was more ... What do you call it? Inclusive ...*

Math Teacher: *Collaborative.*

Science Teacher: *... and collaborative with the teachers--which we didn't really have before.*

On including all faculty members in DEC at School 811:

[District specialists] were a little bit concerned, in the beginning, that we brought other subject areas. And we said, "What's good for the goose is good for every little chicken in this school." —Principal.

And,

I know we talked about five years down the road, but we couldn't.... We didn't have the luxury of waiting. And I think that we took this whole process as so valuable and really, you know, gave it to the rest of the staff. I think that was essential to making it work. I really do. —Curriculum Specialist.

On creating school-wide shared goals and practices:

The whole point not just to do it for the individual grade levels, but—and subject areas, but that everyone knows what the other person is doing.... So, say you're on a team and your—your, you know, eighth-grade.... You're a science teacher, but the.... But, like, this year, for instance, the language arts teachers are going to take over a lot of the editing on the Science Fair projects and things, that was taking them so much time away from their—their subject areas. So, that everyone else will kind of know what the other person's doing and support them.—Principal.

And,

Like, for an example, at the beginning of the year, we have to hit Science Fair, right off. We have to get started then, so they're learning scientific method at the same time. Now, math is going to be doing data analysis at the beginning…Because, like, when they're doing their Science Fair projects, they'll

get this information, but they don't know what to do with it. They don't know how to draw a conclusion about it, or they don't know how to make a graph about it, or things like that. And if they can see that it's not just a science project.... It infuses math, it infuses language arts—different things like that. That they can see it across, instead of, "This is just a science project." —Science Teacher.

Finally, on impact on collegiality and professional community:

When you're interacting more with these people, you're not just in your own little world. "I'm teaching science. This is what I have to cover. This is it." You see that—you know, all the other things that the kids are learning, what the teachers are trying to get across to them; and maybe you can help with that, at some point. —Science Teacher.

And,

And last.... The previous two years that I've worked.... I—I have to say, I have become more aware, like, of the ESE teachers, and the gifted teachers, as well, through our science department meetings; whereas before, I wouldn't think, "Oh, I could go to an ESE teacher and maybe get some type of resource materials."—because I was under the assumption that they taught something different to their kids. I was.... I didn't know that we all had the same curriculum--you know, grade-level curriculum. But, you know, you become more aware of what your colleagues are teaching, what their role is in the school and everything. —Science Teacher.

And,

Before I was isolated in my own world. I said, "My business is these four walls, with my kids. Now, I have more interaction with these—with my colleagues. As she said, I know them pretty--more closely. And—and I realized that we share the same problems. We share the same kids. We share the same everything, because we share the same kids. —Math Teacher.

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Appendix A

Overview of Data Enacted Curriculum Professional Development and Technical Assistance Model

Appendix B

Data Charts & Tables

District Identifiers:

D1	District 1	Charlotte-Mecklenberg Schools
D2	District 2	School District of Philadelphia
D3	District 3	Miami-Dade County Public Schools
D4	District 4	Chicago Public Schools

Appendix C

Administrator Survey Results

District Identifiers:

D1	District 1	Charlotte-Mecklenberg Schools
D2	District 2	School District of Philadelphia
D3	District 3	Miami-Dade County Public Schools
D4	District 4	Chicago Public Schools