NAVIGATING THE CHALLENGES OF HELPING TEACHERS USE DATA TO INFORM EDUCATIONAL DECISIONS

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In this paper we present a model of collaborative evaluation that has been used to engage teachers in data-based decision making for improving teaching and learning in mathematics and science. We examine three external challenges that threaten the process of continuous school improvement; namely, making sense of data, policy changes, and curriculum changes. In addition, we describe how the collaborative evaluation model facilitated progress beyond these challenges.

Keywords: data-based decision making, evaluation, mathematics education, science education

Across the country, administrators are using various methods for collaboration and teaming to help teachers improve their professional work. Professional Learning Communities (PLCs) are functioning in many schools, with attention to characteristics such as supportive and shared leadership, shared values and norms, collective learning and application of learning, supportive conditions, and shared practice (Hord, 2004). The PLCs have typically been established to embody the principles of ensuring that students learn, developing a culture of collaboration, and focusing on results (DuFour, 2004; DuFour & Eaker, 2002; DuFour & Eaker, 1998). Concurrently, data-based decision making has become a common practice for school administrators engaged in school improvement processes with the intent of improving teaching and learning.

It is imperative that principals also employ processes to help teachers examine various types of data and think about how data can be used to inform instructional decisions that lead to increased student achievement. In the advent of the accountability movement it makes sense to have teachers take a more proactive role with data. Using data diagnostically to inform decisions about how to improve student achievement is an effective method for helping teachers change instruction and impact student learning positively (Englert, K., Fries, D., Martin-Glenn, & Douglas, 2007; Kowlaski, Lasley & Mahoney, 2008). As a result, there is a growing need for administrators to provide leadership in data analysis and data use for the purposes of making informed educational decisions.

The process of engaging teachers in data analysis is potentially fraught with challenges. School administrators are well aware of the internal hindrances they might face motivating staff and finding time for teachers to meet as a group and examine data. However, there are also external forces that administrators will face when they engage teachers in the process of using data to inform decisions. It is important for educational leaders to be aware of external forces so they can help teachers properly prepare for data-based decision making and overcome the challenges that can thwart progress.

The purpose of this study was to identify external challenges that urban schools might face when using student data to make decisions and to analyze how a collaborative evaluation model for data-based decision making might help administrators confront the external challenges identified. In this paper we describe a collaborative evaluation model that we developed with funding by the National Science Foundation (NSF). The model uses an innovative immersion approach to data-based decision making combined with the concept of PLCs that helps school administrators and teachers improve school practice (Huffman, Thomas, & Lawrenz, 2008). We used the collaborative evaluation model in schools to overcome external forces that hindered progress toward improved practices.

School administrators and teachers are faced with an array of tests used to judge annual yearly progress (AYP). In

many ways schools are bombarded with data. State tests, district tests, national tests, and classroom tests are all used to gather information about student achievement. This can lead to a situation in which schools are overwhelmed with information about students. There are so many different tests and sources of data that it is sometimes difficult to figure out how to react in such a way that helps students improve. Sometimes teachers will meet with one another to discuss data, but typically teachers are on their own to sort through the information and figure out how best to respond.

Some schools have moved towards collaboration to help teachers work with data and develop a data-based response. Collaborations that engage teachers in inquiry, reflection, and data-based decision making have all been shown to be powerful tools for influencing an individual's beliefs and theories of teaching and learning (Bissex, 1994; Cochran-Smith & Lytle, 1993, 1999; Huffman & Kalnin, 2003; Huffman & Thomas, 2009). Participating in collaborative inquiries can help teachers become what Kowalski, Lasley, and Mahoney (2008) describe as "evidenced-based decision makers" (p. 256). They contend that evidence-based decision makers not only know how to implement decisions, but also know how to examine school and classroom environments in a broader sense.

Helping a teacher become an 'evidence-based decision maker' involves more than just looking at the student test scores from ones' own classroom. It involves school administrators helping teachers look more broadly beyond the classroom and attempting to think about the school and district as a whole. This is a new role for many teachers. Teachers have historically focused on their own classroom and administrators have focused on the school. The movement towards creating 'evidence-based decision makers' in schools will require everyone to think more broadly about roles and to consider factors outside the classroom that may affect student achievement and ultimately the schools' Annual Yearly Progress (AYP).

THE COLLABORATIVE EVALUATION COMMUNITIES PROJECT

We received funding from the NSF to develop the Collaborative Evaluation Communities Project (CEC). The purpose of the project was to help teachers in urban schools build assessment and evaluation capacity by engaging in long-term, collaborative inquiry related to mathematics and science education. Stockdill, Baizerman, and Compton (2002) defined evaluation capacity building (ECB) as "the intentional work to continuously create and sustain overall organizational processes that make quality evaluation and its use routine" (p. 14). With the current trend of organizations moving toward internal evaluations to improve practices (Torres & Preskill, 2001), finding ways to help schools build evaluation capacity is important. The CEC project provided a unique structure for immersing teachers in a continual evaluation process in an attempt to improve teachers' capacity to use data and engage in continuous improvement through data-based decision making.

The CEC project provided long-term collaborative experiences for school administrators and teachers as a means of developing the evaluation capacity of K-8 schools. The collaborative experiences occurred through the formation of collaborative evaluation communities (CEC teams) consisting of teachers, school administrators and university faculty who had expertise in both evaluation and mathematics and science education. The key concept behind the CEC project was that by immersing teachers in the evaluation process we could help build evaluation capacity and bridge the gap between school district evaluation efforts and the teaching and learning of science and mathematics.

The Collaborative Evaluation Communities Process

The CEC project used an inquiry cycle developed by the National Research Council (NRC, 1999) to engage the CEC teams in the ongoing process of evaluation (see Figure 1). The professional development program developed by NRC is called "Global Decision Making Through Local Action: Using TIMSS to Make Data-based Decision." It was developed to help school personnel examine student achievement data and to make decisions based on data. The model utilizes a cycle that begins with an examination of student achievement data at the national, state, and local levels. At this stage, the CEC teams explored data and considered how those data might inform the evaluation of mathematics and science programs in the school. The CEC teams then proceeded through an iterative process of evaluation. By the end of the project, the process established a continuous improvement cycle (see Figure 1) that helped the collaborative

evaluation communities use evaluation as a tool to create change in their schools and empowered the teachers to become leaders in their schools (Huffman and Thomas, 2009).

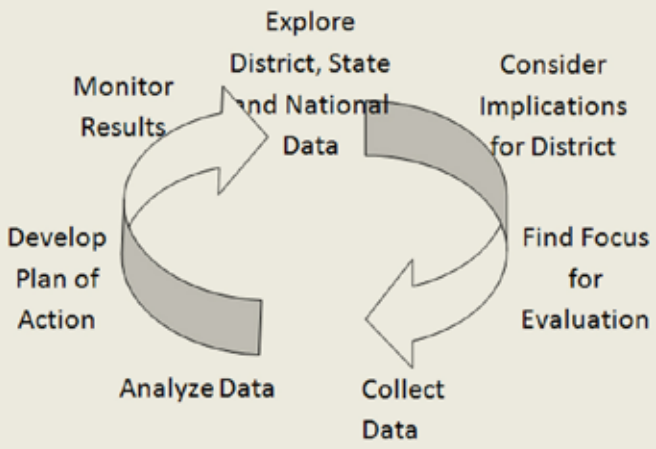

Figure 1. Inquiry Cycle

The following description of one school's work illustrates how the process can be implemented. The first meetings of the CEC team at the school were dedicated to exploring national, state, and district student achievement data in mathematics. Next, the team related those data to the context of the school by considering the characteristics of their students, the curriculum, and their own instructional strengths and weaknesses. The team generated several areas that could provide a focus for evaluation. The broad spectrum of issues was condensed by the team into the following four categories and subcategories:

1. Professional Development
    a. Teacher training related to district adopted curriculum
    b. Curriculum implementation
    c. Creating lessons to motivate students to be active participants in their own learning and encourage them to value mathematics
2. Curriculum Alignment
    a. Curriculum alignment with standards and assessments
    b. Transference of knowledge
        i. from curriculum—state assessments
        ii. from Reading—Math (ex. Venn Diagrams)
        iii. Problem solving ability between subjects
3. Instruction
    a. Instructional practices to include higher level thinking strategies for students and to examine teachers' current practices
    b. Accommodating English as a second language learners and learners who struggle to learn mathematics

c. Creating lessons to motivate students to be active participants in their own learning and encourage them to value mathematics

4. Assessment

a. How to measure student progress

b. Develop alternative assessments to the formative assessments offered by the state and to pencil and paper assessments

Although several evaluation questions were generated related to the categories, the team selected one question to guide the group's first evaluation activities. The team decided to focus on addressing the question, "How is student learning affected when teachers study the lessons and complete the investigations in the curriculum themselves before teaching?" All CEC team members agreed that this question would emphasize instruction and be more focused than the broad categories mentioned above. The team also believed this question addressed both student learning and professional development.

An evaluation process was established to help the group gather data related to the question, through which the CEC team

- participated in collaborative study of mathematics lessons;
- measured student achievement Pre/Post and at intervals during the school year;
- collected student-derived lesson data: observations, interviews, journals, and work samples;
- collected teacher derived lesson data: observations, teacher reflections; and
- used quantitative and qualitative methods for analysis.

The CEC team created a protocol for collaborative study of mathematics lessons for each unit in the curriculum. To facilitate data collection, the group modified/produced instruments to gather student data, lesson observation data, teachers' lesson analysis data, and student lesson reflection data.

There were several outcomes of the team's collaborative evaluation efforts. The team decided to analyze student needs based on student assessment data from the state mathematics assessment and the Northwest Evaluation Association, Measures of Academic Progress (MAP) Test. The results of those analyses informed decisions about mathematics teaching and learning in the classroom. While this may seem like professional work that teachers should already have been engaged in together, it was not common practice at the school. The group also worked to generate common pre/post tests that could be used for all units to measure student progress. The need for pre/post test agreement was highlighted by the teachers. Establishing common tests helped the teachers make observations about student learning which lead to instructional decisions that were connected to student data. The team used assessment data to conduct a curriculum alignment study. Analyzing student assessment results and expectations from the state mathematics standards, the team aligned mathematics units/lessons with the standards and student needs. These types of collaborative professional activities were not part of teachers' work prior to participation in the CEC project. Through these activities the teachers were not only using external data to make decisions, they were also gathering their own data.

METHODS

The emergent and cyclical nature of qualitative research often leads to new insights and questions (Ridenour & Newman, 2008). This was the case throughout our work on the CEC project. After engaging as participant observers during the four years of the project and analyzing the data in pursuit of other research questions, we began to notice that the challenges administrators face when involving teachers in data-based decision making sometimes extended

beyond the school. From this observation two questions guided this study:

- First, what external challenges do school administrators face when helping teachers engage in data-based decision making?
- Second, how does a collaborative evaluation model help administrators confront the external challenges identified?

To address these two questions we reviewed data from the project log gathered throughout the CEC project. Our notion of the project log is aligned with Ely's and colleagues' (1991) view of the log functioning as "the repository for all the data that have been gathered" that represents a "cohesive history" of the project (Ely, Anzul, Friedman, Garner, Steinmetz, p. 69). First, we conducted a critical incidence analysis of the data from the project log to extract evidence that characterized challenges faced by the participants. Next, data related to the incidences that were classified as representing external challenges were analyzed to develop codes that captured the essence of each incidence. Theses codes were then analyzed as we considered ways to collapse and integrate ideas that were in turn organized into common themes, which depicted the hurdles administrators needed to overcome. When we systematically reanalyzed the data using this thematic approach our analysis of field notes, focus group transcripts, and interviews lead us to identify three hurdles schools may face when interested in data-based decision making. We also identified how the collaborative evaluation process helped the CEC teams move beyond those challenges.

Data Sources

The project log included participant observer field notes, focus group transcripts and interviews with CEC participants during and after participation in the project. The field notes were recorded at monthly CEC work sessions during the school year (9 per year) and a CEC team summer workday for each team across four years of the project. Transcripts from two focus group sessions with a CEC team (one each at two of the three elementary schools) were also used in this study. The focus group sessions were conducted to gain an overall sense of the collaborative evaluation process from two schools that were at the end of their formal participation in the project. The interviews analyzed for this paper included six semi-structured interviews with CEC team teachers and one unstructured interview conducted jointly with a CEC team principal and a CEC team instructional coach. The teacher interviews were recorded and transcribed. At the request of the principal and instructional coach, the educational leader interview was not recorded, but the interviewer wrote detailed notes of the interview, including direct quotes when possible. All interview transcripts or notes were reviewed and approved by the participants.

Participants

The CEC project included collaborative teams at three urban elementary schools that served students in Kindergarten through 5th grade. The first school involved in the project was located in an industrial section of a large mid-west city. The neighborhood was depressed economically, with housing that had not been well maintained. The school was crowded, with several grades taught in auxiliary buildings off to the side of the main building. Altogether there were approximately 300 students in the school. Of those, 40% of the students were of Hispanic origin and 50% were black. Large numbers of the students were learning English as a Second Language (ESL), and the teachers indicated that reading proficiency generally was at a low level. The CEC team consisted of 6 teachers, the instructional coach, and the principal. Five of the participants were Caucasian females and one (a teacher) was a Hispanic female.

The second school was located on the western edge of the urban area. It was a small school, serving approximately 200 students in Kindergarten through grade 5. The school slowly decreased in size in the aftermath of school busing (racial balance actions). Class sizes were relatively small (e.g., 18 to 20 students). About half of the students were minorities (50% Caucasian, 45% black and 5% other). The CEC team at the school initially consisted of all teachers (11) and the principal, although the number of participants dropped between the first and third years to approximately 6 teachers due to attrition. Ten of the participants were Caucasian (9 females and 1 male) and the principal was an African American female.

The third participating school was a Title I school located on the edge of the urban core area. The school served approximately 285 students of which 31% were of Hispanic descent and 40% were of African American descent. Additionally, 80% of the students came from economically disadvantaged households. The school was designated by the district as an English as a Second Language focus school. The CEC team at the school consisted of all the 4th grade teachers (3 total) and all of the 5th grade teachers (3 total), as well as the district appointed instructional coach for the school and the principal. All of the teachers and the instructional coach were Caucasian females. The principal was an African American female.

RESULTS

Making Sense of Test Data

One hurdle is the challenge of making sense of test data. Data from the project log support the notion that test data are often considered primarily as scores to be categorized into groups, such as exceeds standards, meets standards, approaches standards, and academic warning. While this categorization may be helpful for identifying students who need additional instruction, teachers need more information to effectively modify the learning opportunities for students. As one principal noted, "The assessment practices of [the teachers] have changed but now we need to focus on item analysis and how to better use the results to change instruction, then teachers can see the benefits of using test data." It is critical to understand what a test is actually designed to measure and to understand the extent to which a test actually measures what it purports to measure. One needs to think about such issues as the proportion of items on various subjects, the cognitive level of the items, and the content that is measured by a test.

Tests typically include a variety of items designed to measure basic knowledge, problem solving skills, etc. To interpret test results and make sound instructional decisions based on results one must first understand the test. What makes the process so difficult when using outside tests, such as state accountability tests, is that changes are made every few years. This highlights the need for a continuous long-term data-based decision making process. Just when teachers think they understand the test system, it changes, and teachers need to adjust and re-interpret the results of a new test.

In our schools, we spent a significant amount of time learning about the tests, the formats, the type of items, and what is claimed to be measured by the test. The school administrators played a key role in this work because test specification information was available to them and emphasized during school district meetings. Without leadership from the administrators, the teachers would not have had access to necessary, specific information about the tests. Shortly after our thorough review, the structure of the state mathematics test was changed. The proportion of geometry items on the state test was modified and the proportion of items at different cognitive levels was changed. At first this made the teachers in the CEC project feel frustrated because they had spent so much time understanding the test. The group lost some momentum because of the test changes, but eventually the teachers began to understand that change was inevitable. It actually helped them realize that the CEC process we were using needs to be viewed as a long-term continuous process because school environments are dynamic organizations whose context changes based on complex internal and external factors.

Policy Changes

Another external force for schools that came into play related to policy changes from the district evaluation and assessment office. The district was under increasing public pressure to help students achieve at higher and higher levels. In response, schools in the district were moving toward test preparation time periods to help students get ready for state testing. In many schools this translated to intense test preparation from January until the test date in April. During this preparation period students learned about item types, and teachers practiced basic skills with them in an effort to help students perform better on the test.

In the schools we worked with, the CEC process was utilized to facilitate examining the alignment between test content, content standards, curriculum, and instruction. CEC teams studied the types of knowledge (procedural, conceptual,

factual, etc.), concepts, and skills students needed to successfully meet state content standards as measured through the state test. These studies were followed by an evaluation of the extent to which the curriculum and instructional practices teachers used aligned with the expectations of the standards. The focus on collaborative evaluation helped the administrators and teachers from our project conceptualize test preparation from a broader perspective. They were doing important work to align instruction with assessment rather than merely having students take repeated practice tests or complete targeted skill-based worksheets.

When our teams finally felt comfortable with using test data, the district leadership mandated that schools stop test preparation for fear it would be viewed as "teaching towards the test." Concerns were raised about using assessment items in the classroom that were too similar to the items on the state test. The district leadership directed schools not to teach directly to the test but to focus on concepts related to the test. This was frustrating to the group because our CEC teams felt like we were finally making progress toward aligning instruction with assessment, but when the district sent a letter warning teachers about teaching to the test, the teams began to wonder about the extent to which we should align instruction with assessment.

With assistance from the school administrators, we had to help teachers understand the difference between aligning instruction with assessment and actually teaching to the test. The two are quite different, but the district leadership did not make a clear distinction between them. This was puzzling to the teachers. They were using assessment information to diagnose and identify student weaknesses and then work with students to develop needed skills and understandings. As one teacher lamented, "What should I teach to? If they are going to test XYZ skills and judge my performance and school performance according to how well my kids do on XYZ, well of course I'm going to teach XYZ." Furthermore, because the state test is designed to be aligned with the state mathematics standards, teachers are not only teaching what they know will be on the test, but are also teaching toward the state mathematics standards.

Fortunately, the CEC evaluation process teachers were using to engage in data-based decision making helped them deal with this issue. Schools try to help improve student achievement by working to align curriculum and instruction with state mathematics standards that are tested. Our teams focused on conceptual aspects of learning mathematics rather than having students learn how to answer specific test items. In some ways, the process helped teachers to focus on more comprehensive or global concepts students should know rather than on trivial details that are all too frequently included on a test. It also helped teachers think more about the state mathematics standards than the state mathematics test.

Curriculum Changes

A third factor that thwarted progress was when the mathematics curriculum was changed midstream in the process. Our CEC teams worked to understand how to use the curriculum to support instruction, what concepts and skills were measured through curriculum assessments, how to help student achieve, and then district policy mandated that the curriculum change. This change in curriculum was accompanied by a strict daily script of what should be taught each day. There was a district-wide pacing guide to tell teachers what they should be doing each day.

Once again, having the collaborative evaluation communities' process in place allowed the schools to implement a curriculum analysis in the summer prior to using the new curriculum. Our teams identified alignment problems between the new curriculum and the state standards. On the one hand, the district leaders directed teachers to follow the pacing guide and stay on track with coverage of material, but because of our work, teachers knew about concepts and skills missing in the curriculum and wanted to do something to address the gaps. As a teacher described, "because of the CEC team's work I am more aware of Investigations [the district mathematics curriculum], we all know that Investigations has gaps and in the past we didn't have time to think about them…. [the CEC evaluation process] definitely helped show areas for improvement. We could ask ourselves, was it in Investigations? Was it missing from Investigations, or did we miss it instructionally?"

The requirement to follow the pacing guide frustrated the teachers and school leaders on our teams. The CEC teams

had an understanding about the curriculum and teaching at a more specific school level than district administrators. They also knew their own students better than the district central office, and they knew what modifications needed to be made to the curriculum. The CEC evaluation process helped school leaders and teachers see the problems with the pacing guide.

The process also gave the teachers more confidence in making modifications to the curriculum. In response to the district pacing guide, our teachers gathered evidence regarding gaps in the curriculum. They used this evidence to make the case with the district mathematics coordinator that they needed more freedom to address the gaps and to address areas where students were having difficulties. They were able to make a logical argument based on data with district leadership and to make the case that they needed freedom to help students achieve. The CEC evaluation process helped the principals and teachers make a strong case with data and helped shift the focus back to improving the curriculum for students.

DISCUSSION

Overall, these three challenges highlight external factors that can thwart progress when one engages in data-based decision making. The changes we faced regarding the state achievement test, the district constraints on preparing students for state testing, and the changes in the mathematics curriculum all highlight the need for those engaged in data-based decision making to understand that external factors will come into play.

It is inevitable that change will occur because school systems are dynamic entities. The CEC data-based decision making process was a way to deal with and respond to changes. The data empowered school administrators and teachers to make professional and reasoned responses to the challenges they faced. The administrator's role was critical to this shift in approach. Not only was it necessary for the administrator to establish supportive conditions for the teachers to engage in the CEC process, but it was also important for the person in that role to share information that had typically been viewed as the purview of administrators rather than teachers. The focus on collaborative evaluation aided the data-based decision making of the CEC team by necessitating a shift in how collaborative work in the schools was viewed. The challenges helped administrators and teachers see the need for a continuous and collaborative evaluation process where teachers were actively involved in the analysis of data from a variety of sources.

When the process began, the school administrators believed internal challenges such as finding time, finding teachers who could do the work, and motivating teachers to engage in this process, would present the biggest challenges, but what was most surprising to administrators was that external factors became critical issues in the process. The CEC evaluation process became the most effective way for teachers to use data to make decisions and to overcome those external hurdles. The teachers became what Kowalski, Lasley, and Mahoney (2008) call "evidenced-based decision makers" (p. 256), and, as a result, they had a constructive way to deal with the challenge of helping students achieve. It is imperative that, as administrators engage teachers in data-based decision making, they also understand that outside barriers and hurdles are part of the process. Furthermore, the process itself is the vehicle for responding to external issues and for ultimately working to improve teaching and learning in such a way that all students have the opportunity to achieve.

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