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ABSTRACT

This study examined the experiences of six schools that used the process of data-based inquiry and decision making (DBDM) and the effects of this process on their schoolwide practices. The six schools, all in Massachusetts, were studied by the Center for Collaborative Education, an organization that promotes whole school change through collaborative partnerships with schools. DBDM is a process in which school personnel engage in ongoing analysis of data from multilevel sources to provide a comprehensive picture of the school's strengths and challenges and develop a plan to prioritize and address those challenges. Teams from the six schools were followed as they implemented all aspects of DBDM. The case study of one of these schools, which was successful in implementing DBDM, shows the effectiveness of this approach and the inquiry group process used in schools participating in Turning Points, a middle school education reform network. Two examples illustrate the work of the inquiry groups. The evaluation has resulted in some generalizable findings about the DBDM process. In successful DBDM schools, teachers become more reflective about their practices, and the school becomes a more professional culture. Students in these schools are directly and indirectly influenced by the process. DBDM success is facilitated by multiple levels of leadership, the relationship of DBDM to the school's goals, and support from an external source. Implications for the development of an inquiry based school are also discussed. (SLD)

WHOLE SCHOOL REFORM:

HOW SCHOOLS USE THE DATA-BASED INQUIRY AND DECISION MAKING PROCESS

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Whole School Reform: How schools use the data-based inquiry and decision-making process

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The Center for Collaborative Education

In the current culture of high-stakes tests, school accountability, and standards, schools are under increasing external pressure. Schools are inundated with a wide variety of data and are looking for ways to understand how to interpret the data that is provided to them, as well as how to use the process of inquiry to improve the quality of instruction offered by their school. Many schools are currently working with data in limited ways, often as a reactionary response to external pressure, with little thought given to what the process can do for the school. Few schools use a process of data-based inquiry and decision making (DBDM) which includes the whole faculty in looking at and thinking about data, with a goal of creating an inquiry-minded school. "Inquiry-minded schools recognize that improving teaching and learning is an intentional and ongoing process" (Rallis & MacMullen, 2000).

Much of our knowledge of how schools use data is of the "how-to" variety. Recent work in this area has been devoted to case studies of schools that have effectively implemented the process (e.g., Nichols and Singer, 2000; Rallis & MacMullen, 2000; Cushman, 1999). Further, many organizations which are promoting this process as essential to reform efforts have provided implementation guides for their member schools. For example, the Coalition of Essential Schools strongly encourages member schools to engage in this process; the New England Regional Alliance for Mathematics and Science Reform and Turning Points, a middle school whole school reform model, disseminate guidebooks to help schools engage in this process (Using Data—Getting Results and Guide to Data-Based Inquiry and Decision Making, respectively). A smaller body of literature describes case studies of this process in classrooms and individual schools (such as Cromey et al, 2000; Richards, 1994), but these studies do not involve systematic data collection. Finally, a number of articles describe the benefits of an inquiry-driven school (Rallis & MacMullen, 2000; Noyce, Perda, & Traver, 2000).

This paper examines the experiences of six schools that used the process of data-based inquiry and decision making and the effects of this process on their school-wide practice. While data-based inquiry and decision making is a process which is increasingly being used in schools, we must know more about its implementation and effectiveness. For this practice to be useful in whole school reform, it is critical that we understand ways in which schools understand,

engage in, and implement it. Through an in depth case study of one successfully implementing school and analysis of qualitative data across all six schools, we present findings on both process and impact which will guide other schools and intermediary organizations in DBDM.

AN ORGANIZATION WHICH USES DBDM IN ITS WORK WITH SCHOOLS

This study is based upon the work of the Center for Collaborative Education, a non-profit organization, with six affiliated public schools. CCE promotes whole school change in K-12 schools through collaborative partnerships with schools and facilitates networks of schools engaged in whole school reform efforts. Central to CCE's model of whole school reform is the work of the coach, a facilitator external to the school who supports the school in the whole school reform process.

CCE's theory of change is that in order to improve and sustain student learning, schools must 1) improve learning, teaching, and assessment, and 2) create the structures and supports that enable all students to learn at high levels and all faculty to engage in continuous professional development and purposeful collaboration. One method that CCE uses in each of its school networks to promote these outcomes is DBDM.

DESCRIPTION OF THE DBDM PROCESS

Data-based inquiry and decision making is a process in which school personnel (a) engage in ongoing analysis of data from multiple sources to provide a comprehensive picture of a school's strengths and challenges and (b) develop a plan to prioritize and address challenges. Most importantly, DBDM is a tool that provides an open, democratic process for schools to examine inequities in their practices and structures. School-wide participation in this inquiry process results in thoughtful decisions for improving practice. While many teachers have used data-based inquiry to inform their own classroom practice, when CCE refers to data-based inquiry and decision-making, we are not referring to a process that affects one (or a few) classrooms, but instead to a systemic process that encompasses whole school change.

As practiced by the Center for Collaborative Education, schools analyze data to generate challenge areas and then create inquiry groups of teachers who generate hypotheses, collect and analyze more data, and return to the full staff with an action plan to address their challenge. The cyclical nature of the process ensures flexibility and ongoing inquiry. (See Appendix A for a picture of this cycle.)

METHODS AND DATA SOURCES

Teams from six schools were followed as they implemented all aspects of DBDM, from discussing data to presenting recommendations for school-wide change to the faculty to the impact of the process on the school. Multiple methods of data collection were used to understand the perspectives of the participants involved in the process, the impact of the process on team member's practices and attitudes, and its implementation in and impact on the school, if any.

Participating schools: The six participating schools, all Massachusetts public schools, were chosen for this study because they were engaged in the DBDM process during the 1999-2000 or 2000-2001 school year. One participating school was K-8, three were middle schools (grades 6-8) and two were high schools (grades 9-12). Five of the six schools in this study are members of the Coalition of Essential Schools; the sixth school is a member of the Turning Points middle school reform network. Three of the CES schools are also involved in a systemic initiative in math and science education (SIMSE) run by CCE, and were first exposed to this process through SIMSE activities. These schools were also useful to study because they represented participation in a range of CCE activities around DBDM. They received different levels of support from CCE coaches. Two schools were coached by a 'content' coach, an external facilitator who worked with the math and science faculty to improve student achievement. Two schools received support from a 'whole school change' coach, whose role was to work with the school around every area of whole school change. Two other schools attended a two-day Data-Based inquiry and Decision Making summer institute; these schools also receive support from CCE coaches, one from a content coach, the other from a whole school change coach.

Interviews: At least one faculty-leader from each school was interviewed during the DBDM process. The CCE coach from each school was also interviewed. The purpose of these interviews was to understand why each school was involved in the process, what the participants hoped to gain from it, what they learned about

the DBDM process (strengths, weaknesses, challenges), and what they learned about their school from being engaged with the process. Further, the interview assessed how participants used this process with their school and their perceptions of the effectiveness of their plan.

Observations: In addition to assessing teacher perceptions and attitudes through interviews, researchers attended meetings at schools during the year in which the DBDM process was discussed. These observations allowed researchers access to the process by which the school team engaged other staff, by which data collection instruments were developed, by which data was analyzed, and in which decisions regarding the impact of DBDM were discussed,.

Workshop: Two of the schools attended a two-day Data-Based Inquiry and Decision Making Institute, which was observed by the authors and facilitated by CCE staff. At this Institute, attendees learned about the inquiry process, examined data from their own schools, and developed action plans based on questions emerging from their data. Action plans were documented and followed up during the school year. Further, DBDM Institute attendees participated in school-based focus groups to allow researchers to assess their perceptions of how the Institute related to their schools' goals and helped them develop a plan to attain them.

CASE STUDY OF ONE SCHOOL SUCCESSFULLY IMPLEMENTING DBDM

This case study focuses on one of the successfully implementing schools in our study, a regional middle school with a student population of over 700 students in grades 7 and 8. Seventy-five percent of the students are white, and the rest are equally distributed among Black, Hispanic, and Asian students, with a few Native American students. Seventeen percent of students receive free or reduced price lunch, an indication of socioeconomic status.

The school is a member of the National Turning Points Network, a whole school reform model endorsed by New American Schools (www.nasdc.org). The model calls for schools to implement several core practices, including building a professional collaborative culture through teaming and looking at student work; instituting school-wide structures such as block scheduling and common planning time; and using data-based inquiry decision making.

The current principal came to the school three and a half years ago with a background in whole school reform in Turning Points principles and practices, as well as experience with the Coalition of Essential Schools philosophy. She arrived with a vision of turning a traditional junior high school into a middle school. Some changes she made early in her tenure stemmed from the creation of study groups among faculty to develop a belief statement, create advisories, restructure the faculty into teams, incorporate community service learning, and develop a schedule with longer learning blocks. The study group model was already in place when the school formally entered the process of school-wide data-based inquiry and decision making.

INQUIRY GROUP PROCESS

In Turning Points schools, a central source of data used in data-based decision making is the Self Study Survey, administered by the Center for Prevention Research and Development at the University of Illinois. This extensive survey collects information every other year from faculty, administration, and students about school/teacher practices and climate. Schools receive the results in chart form, describing the attitudes of those surveyed around school climate and culture and levels of implementation of various practices. The results give the school a snapshot of their school and, over time, of change in their school.

In the fall of 1999, in an effort to build capacity in the school to implement data-based decision making, the school's Turning Points coach trained the school leadership team of eighteen faculty members on how to implement data-based decision making, using the Self Study Survey results as an important source of data. Teachers examined the charts, identified challenge areas that emerged from the data, and prioritized those challenges.

Two years later, there are six inquiry groups, as many of the original study groups have completed their initial charge. Examples of current inquiry groups are:

- Meeting the needs of needy students
- Equitable achievement and the schedule
- Assessment and evaluation
- Common planning time

Each inquiry group has one teacher leader and about 10-15 faculty members, a mix that crosses grades, disciplines, teams, and specialties. Faculty are expected to join one inquiry group and can choose which one to join. They meet once a

month on an early release day, which means students leave the building by 1:30, giving teachers school time to meet without cutting into their after school time. Inquiry groups read, plan, and meet during this time. Every effort is made to ensure inquiry groups do not feel like an "add on" with extra work.

INQUIRY GROUP EXAMPLES

GROUP A: COMMON PLANNING TIME

History

This inquiry group examined the Self Study Survey data that related to teams and classroom practices. While the school had already restructured in order to create more common planning time for teams, the data showed this inquiry group that the use of the time was not optimal for improving teaching and learning.

> And the first year that we were in teams, I was on a team, and we struggled as to what we were supposed to get accomplished, how we were supposed to use our planning time, and that first year, we didn't really have any structure. And it just seemed like we were spending all our time talking about the kids, and everything was kind of haphazard. Teachers were feeling frazzled. There wasn't enough time to do everything. It was just completely disorganized...We needed structures. And so that's kind of how it came about. How are we spending our time? If we don't feel like we're making any moves forward in curriculum, and some of these teaching and learning areas, what are we doing when we're supposedly doing that?... How are we using this time?

The challenge they started with was "why are teams not organized well enough to efficiently prioritize tasks and effectively communicate with the school community?"

The group developed a survey of the school's eight academic teams (four per grade) that asked them to document their common planning time tasks daily for two consecutive weeks by minutes (without identifying their team). In order of time spent in March 2000, tasks were: Parent meetings, student needs, curriculum, communication with the school community, administrative issues, field trips, special education, team "maintenance," socializing, guidance, advisory, fundraising, emergencies, and English as a second language (ESL).

The team reported the findings to the school community and listed nine recommendations for improved use of common planning time. Their action plan

prioritized a few of the recommendations for the school year 2000-01. They wanted to make the use of the time more efficient. The group proposed the following action plan in May 2000:

1. Designate a team leader who prepares the agenda for every meeting.
2. Have a focus for every meeting (e.g., curriculum day, student day, parent meeting day).
3. Communicate with the school community, including specialists who rotate among teams, could be done outside of common planning time. Use an academic check-in form to communicate weekly with integrated studies, languages, special education, ESL, advisors, and the after school program.

The plan was implemented beginning in fall 2000, and after seven months, the group collected more data to determine whether the action plan was implemented and which effective uses of time and strategies were being employed.

Preliminary data from the spring survey (using the same format) showed a change in the use of common planning time, a good indication that the action plan helped teams focus on use of time. While four of the top five tasks by time remained the same, their order changed:

Survey results on use of common planning time:

March 2000	March 2001
1. parent meetings	1. *curriculum*
2. student needs	2. student needs
3. *curriculum*	3. parent meetings
4. communication with the school community	4. administrative issues
5. administrative issues	5. team maintenance

Curriculum moved to become the top topic of common planning time, consistent with the goal of having an increased focus on teaching and learning. In addition, communication with the school community took less common planning time this school year, probably due to the new procedure the action plan put in place of

having teams fill out quarterly curriculum forms to keep all specialists (who can't attend all eight team meetings) informed about curriculum planning.

Lessons

This inquiry group developed and implemented an action plan that resulted in changed practice in one year. The relative speed with which they saw change was encouraging. The teacher leader attributed their success to having started with a very concrete question.

GROUP B: EQUITABLE ACHIEVEMENT AND THE SCHEDULE

History

This inquiry group started by examining Self Study Survey data focused on student academic performance, grades, and expectations. Their inquiry question evolved through several iterations, demonstrating the cyclical use of the process to collect and analyze data. The three iterations were:

1) Does the way students are grouped into teams, particularly with regard to performing music and world language choices, contribute to inequities by ethnicity and perceived social class?

2) Does the schedule foster high achievement for all students?

3) What is the best way to use students' time to encourage high achievement?

Importantly, between the first and second iterations, the group discovered that their original assumptions about schedule and achievement were not founded in the data. Therefore, they redirected their question:

> In this school, we have eight different schedules, and they don't mesh at all. They are totally separate schedules, so pretty much they're with the same group of kids almost all day long...And the general feeling by teachers in different teams was that the teams that had students-- the students who were in critical languages were generally also in performing music, and those teams tended to have fewer problems, and it felt like they were achieving at a higher rate, to teachers. So what we wanted to do was to look at the data to see if indeed that was the case, and then we figured if it was the case, we would figure out what to do with it...Now, what happened is, when we did the data analysis, we found out there was no correlatio

Upon reexamining the data in the fall through disaggregation of the Self Study data, grades, and grade level performance by race, socioeconomic status, and

scheduling, the group made the observation noted previously that "almost every single kid on that D/F list is in study hall." This use of data helped the group progress from question 2 to question 3. The group decided to focus on how study hall time is spent. Their new round of data collection will include compiling outside research studies, polling study hall students, and analyzing the D/F list. Their goal is to come up with alternatives to the current study hall system.

Lessons

The teacher leader learned a valuable lesson in this process: do not assume the answer before looking at the data. She entered the inquiry cycle convinced that her hypothesis was correct. She reframed her question once she saw that the data did not support her hypothesis.

This inquiry leader also discussed the need for the leader to be clear about the most effective use of data. At times, she noticed frustration in her group, which she attributed to:

> ...we were looking at too much. Part of that was because I was afraid of leaving anything out. So the barrier [was] my inability to try to put things in manageable chunks for people.

Another useful lesson to take from this inquiry group's experience is the cross-fertilization that can occur between inquiry groups. Although each inquiry group has its own challenge(s), much of the data collected has begun to overlap in content. This inquiry group will use data collected by another inquiry group (authentic assessment and evaluation) to inform their analysis of the relationship between study hall time and student failure.

GENERALIZABLE FINDINGS FROM THE SIX SCHOOLS' EXPERIENCE WITH DBDM

This section presents results to the following three questions:

1. What impact does the process have on schools and school culture?
2. What kinds of support facilitate the DBDM process?
3. What barriers do schools face when implementing DBDM?

WHAT IMPACT DOES THE PROCESS HAVE ON SCHOOLS AND SCHOOL CULTURE?

There were varying degrees of levels of implementation by each of the schools engaged in data-based inquiry and decision making. This section focuses on the two schools that experienced successful implementation, while the next sections, which describes participants' experience of the process, examines all six schools.

TEACHER BECOME MORE REFLECTIVE ABOUT THEIR PRACTICE

Participants in the effective DBDM implementation schools noted four changes in teacher practice as a result of this process: (1) a deeper understanding of inquiry, including using and creating data in different ways, (2) becoming less reactive and less willing to accept the first answer, (3) an increase in the use of related reflective practices, and (4) use of data outside of their school experiences.

Teachers developed deeper understandings of the inquiry process as they were engaged in DBDM. They came to understand more deeply the importance of questions: questions cannot be too broad, they cannot be based on assumptions, and they can be changed. The following two examples come from inquiry groups examining Common Planning Time and Assessment and Evaluation, respectively. As discussed in the case study, in the Common Planning Time group, a narrowly focused question made the task of inquiry concrete.

> A: Well, if I can go back and look at what we came up with for our questions-- I mean, we came up with a problem. Why are teams not organized well enough to efficiently prioritize tasks, and effectively communicate with the school community? We were able to survey teams, and survey people that were off teams to find out what they did and didn't know about the kids that they had in their classrooms, or what was going on with teams that would affect their day. So I think we really had something to really go after, where if you look at [the inquiry group examining] assessment, oh my gosh. Where do you want to begin?
> Q: So you think that it being concrete helped you develop your survey?
> A: [It] helped us develop an action plan and a way to assess that action plan a lot more easily. We are only one of the two inquiry groups, so far, that have been able to develop an action plan.

In an inquiry group called Assessment and Evaluation, the teacher leader used her understanding of DBDM to craft an open-ended question that would allow analysis of data without assuming an answer.

> A: From the leadership team, who began discussing the homework issue, which then led to kids flunking. They began talking, and came up with a question, which was to investigate homework as a cause for failure. And I went to the leadership team and had them reword it to, "Why are kids failing?" and not to assume that it's homework as the [cause].

Q: Why did you make that change?
A: Because it was already answering our question, and if it were truly data based, then we need to ask the question and then gather the data, rather than answering the question.

Another teacher talks about having a wider perspective on what data is and how she has used data in new ways to inform her practice. Collecting more data on her students has helped her to personalize her instruction because she has more detailed knowledge of each student's place in his or her learning.

A: Before, I used to just always think of the grade on the test, or the grade on the writing assignment. That was my assessment, instead of recording who's having trouble focusing in class, or who spent the time writing...-- And keeping track of on-task time, strategies that they're employing, and that kind of stuff, which I'm doing a lot more of this year.
Q: So now that you have more data around your kids, how does that affect your teaching?
A: It makes it easier to individualize. I think that if you're just looking at grades, I mean, you can see trends. You can see huge trends like "Uh-oh, they all failed this." Well, some teachers would say, "Obviously, they didn't study." I used to say, when I was in that situation, "I somehow missed something with these guys," and I would go back over it. If you spend more time looking at what individual kids are doing, I mean ... when they don't do well, they all don't do well for a lot of different reasons. And so if I were back in the English classroom, I could see strategically helping individual kids with individual issues. And with reading, it's a reading and study skills position, and I work with individual kids. So with that kind of observation, it's much easier to pinpoint how I'm going to work individually with them.

Teachers also believed that they became less reactive and more reflective because of their experiences with the DBDM process. For example, rather than attribute failure to causes external to their control, teachers began to collect data on the problem. They slowed their reaction down and allowed themselves to be open-minded about the issue.

Well, I think it's one of the things that we haven't done in the past, that's really important to do. We've always kind of gone about things like, oh, it feels like these kids aren't performing as well, so then we kind of run off and do stuff about it, without ever really checking to see if there's any data to back it up. We go mostly by gut feelings. That's the tendency, I think, in education generally. So yes, it has been valuable.

Not so long ago, I may have looked at the behavior of a kid in class and blamed not feeling successful with this particular student on the student... Elementary schools aren't teaching them anything. Jumping to those kinds of conclusions. Or, I'm not a good teacher. Now, I'm looking at all kinds of things. Well, wait a minute. I can see this kid does this well. It's a more thoughtful approach to students, to what I'm teaching, and how I'm teaching it. And it's because I've been able to be part of these processes that enable you to-- All right, wait a minute. What's our first step? To really think out, instead of feeling that teacher

> rush all the time, rushing from one brush fire to the other. This gives you that opportunity to sit back and say, "It doesn't have to be a brush fire."

Further, the process of reflecting on data influenced other school practices. At the two implementing schools, teachers engaged in the process of looking at student and teacher work, a practice that helps teachers reflect on their practice. Teachers related their new understanding of data to student work. The coach noticed that this practice became more common for teachers at the school, because teachers realized that "we can't just guess at what kids are doing," they need to look deeply at their work.

Finally, one teacher discussed how participating in data-based inquiry has helped her, not just in her teaching, but to use her new way of thinking in many different situations. She now uses this approach outside of school.

> Probably with my husband, relationships at home. It's like, "Why did you do that? What's that all about? You shouldn't have done that. You should have done X, Y, and Z." Well, I wait for the explanations now. I don't just assume that it was done improperly, and the wrong way. It's like, "If you let me explain, I will tell you." So it slowed me down. And I think as teachers, we all need that, because we feel such a rush to cover this, and we have all these balls up in the air, and you just feel like you're going from bing, bang, boom, one thing to the other. And having processes like this, and a way to look at things more objectively, gives you time to slow down.

THE SCHOOL BECOMES A MORE PROFESSIONAL CULTURE

Teachers in the effectively implementing DBDM schools believed that school culture had changed through (1) deprivatization of practice and (2) building a more professional culture.

> Have I seen teaching change? I think that working together collaboratively in inquiry groups, in teams, in leadership council, has deprivatized our work, and enabled us to have ways to talk to each other about stuff that before we might have been defensive about. So what's changed is the defensiveness around whether I'm doing it right or not, and it's become more an inquiry. What am I doing well? What do I need to grow in? Through the whole school.

These two themes are related to one another, as creating a professional culture requires that teachers share with one another important questions and ideas related to teaching and learning. The level of their conversations increased not only among team members, but also between teachers across departments and grade levels.

> One thing I know I noted on earlier occasions is you hear conversation in the hall between teachers, or people will say, "Remember that study? When you were doing this, what about--" There's a little problem-solving going on from within the committee, the group. And then people outside the group, from other inquiry groups, making connections or comments. And people beginning to talk about using data, and joking about data. But it's become part of the culture, rather than being so quick to come up with an answer. I think people are more willing to dig a little bit deeper.

> But when you sit down and start having conversation, everybody is really into it. Because you're talking about things that we're all affected by, that we all know something about, and we're able to talk. So you have that structured time to talk. You try not to go off task, but sometimes the conversation will, and it's a helpful conversation. So I think teachers have appreciated being able to touch base with one anther, across age levels, seventh and eighth grade, and then across the disciplines. And we found out a lot. We have a lot more common ground than we may have thought.

In addition to having deeper conversations, other changes in school professional culture emerged as a result of DBDM. Teacher leaders believed that they had new ways of talking about and understanding their practice, and that the school culture was more civil, with teachers more willing to cooperate with one another on many levels.

> The civility of the meeting. Not that we weren't civil before. But everybody knows that there's a way to talk to one another, and a way to get what we need to get accomplished, to get it accomplished. There's an orderly way to do it. Everybody is willing to do something, to go off and have a task. "What can I do? What do you want me to do?" I can talk to this person. I can gather that data. Whatever it is. I think there's just been a new level of cooperation, an appreciation for what the data can tell you, too.

Those schools that have effectively implemented DBDM are also closer to building a culture of inquiry throughout their school. Teachers are more reflective about their practice, basing their comments and questions in data rather than assumptions, and are more willing to push and probe deeper to find answers.

> It's metacognitive, which means that we're doing the practice and looking at it at the same time. It's based in information, not in hearsay. There is so much that has changed in teaching because somebody has a new fad and they try it out. And I listened to [one] group last week. Somebody would go off on an assumption, and somebody else would quietly say, out of the peer group-- not [the leader of the group]-- "But we don't know that. And until we know that, I'm not willing to jump to that conclusion." And it is just amazing to hear teachers thinking about changing their whole school, and talking about it ... not just in their own classrooms, but for the whole school.

> I think people are beginning to look at the [failing] list in a different way. There was another group meeting in the other room who were looking at the list. I don't think anybody's ever sat down to look at kids across the curriculum. Very few people have done that, to see, "oh, these are real kids" -- And to see the multiple Fs puts it in a different light, and I think people begin to question, "what is an F?" "What does that really represent?" "Why these kids?" So I think there's a bit more questioning going on by the teachers, which might then result in a bit more empathy for these kids.

STUDENT ARE DIRECTLY AND INDIRECTLY INFLUENCED BY THE PROCESS

There are two ways that schools believed that the DBDM process has helped students. First, changes made as a result of the DBDM process have helped improve student achievement. One school that noticed a high failure rate among students, specifically in math classes. The school has created ways to identify at-risk students and has created a number of supports for these students, including focused study time and a specially designed math course. After their first year of implementation, the school has found the failure rate among students is much lower and that the self-esteem of students is much higher. Students in the newly created math class say, "I've never had a hundred on a math test before!" Students who had never had a passing grade are now receiving B's and C's.

Second, teachers stated, as described earlier, that they hoped that by conducting inquiry themselves, they would model the kinds of behavior they wanted students to be engaged in. In one school, this is exactly what happened. Students formed a number of inquiry groups because they saw teachers engaged in inquiry groups:

> We have a student leadership group that is doing the same kind of inquiry, and is dividing into subcommittees, and they're doing research. One of the subcommittees requested a meeting with the superintendent of schools, the head of maintenance, and me and another member of the building committee, because there is going to be renovation on this building. They have some very important ideas they wanted to share with us... These are groups that they determined were their needs. And they went about doing research on whether we could build an outdoor basketball court, and what it would take to redo the boys' locker room, and how the plans should be. They presented to us this plan of how the locker room could be reorganized so that it would give boys some privacy. Kids are doing this.... [and] The superintendent of schools was sitting there, just absolutely blown away. Here's this kid drawing an exact diagram of the boys' locker room, and what the problems are.... At this meeting, one of the young men, who was starting the conversation because he wants to promote us building an outdoor basketball court, pulls out this small edition of Turning Points, the original Turning Points, and has earmarked the pages that talk about health and fitness, and the need for students to have this. So he's pulling out Turning Points and quoting to the superintendent. I was blown away.

The students surveyed other students for priorities and then for other types of data. Another group conducted inquiries into community service opportunities, such as food and coat drives. Other groups are looking at ways to keep the bathrooms clean and to improve school planning.

WHAT KINDS OF SUPPORT FACILITATE THE DBDM PROCESS?

MULTIPLE LEVELS OF LEADERSHIP

In the two schools in which the DBDM process was effectively implemented, leaders emerged both from administrators and from teachers. In both successful cases, a principal provided a vision for the school, an expectation that all teachers would participate, and support for the process. For example, one principal said,

> So as a faculty, we made the decision on what the groups would be. There was a scheduling group, a curriculum group for each grade, an advisory group, a group on the belief statement. There was a group on community service learning... I can't remember the others, but there were eight or nine study groups. And then teachers were given choices of what they would like to be on. And it was just assumed that everybody would join one. That was our work. Then as I put those together, it worked. The numbers worked out, and leaders emerged.

Both schools that effectively implemented the process also provided in-school support for DBDM; it was not another initiative for which teachers had to make time.

> But I think the strong point, again, about the process is that you've reserved this time in the day. It's not perceived as much as an add-on... However, when you look at moving anywhere beyond that confine, it's like, what do you really ask people to do? You notice, I spoke up and said I would tabulate. Why? Because I'm saving them the work. What do you really ask people to do? And that's a dilemma about moving forward.

In only two of the other schools did an administrator commit to the process. In one school, the administrator conducted the analysis by himself, decided upon a course of action, and then shared the results and his plan with the staff. In the other school, the administrator and coach were worried that teacher buy-in and the degree of inquiry was low, and so shifted teacher questions in another direction.

The development of teacher leadership is also vital to the process. For example, in one of the effective DBDM schools, they were balancing nine different inquiry groups, each looking at a different question and aspect of school life. Consequently, nine teachers were needed to provide leadership for these groups,

to facilitate meetings, push the thinking of others, and coordinate other aspects of the process.

In two of the four non-implementing schools (the two which sent teacher teams to the Institute), teachers were excited about their self-generated questions. In one case, the principal provided minimal support for the team, and teachers complained that they did not have time to work on their question because there were too many other initiatives at the school that they needed to focus on as well. In the second school, one of the teachers--the one who was most facile with data and most interested in the question--left the school before the academic year started. After losing this team member, the rest of the team did not believe they could complete the project without his motivation and expertise.

THE RELATIONSHIP OF DBDM TO THE SCHOOL'S GOALS

Each team--even those that were unable to implement DBDM--believed that the DBDM process was an important aspect of their school's mission and practice. The schools wanted to create a culture in which students learn by pursuing questions and answers that they themselves generate. Teachers believed that one important step was for teachers to be engaged in inquiry. They felt that by engaging in inquiry, they would then be modeling for students the kinds of behaviors in which they wanted to see students engaged. In addition, most teams believed that teachers have always looked at data in their own classrooms to improve their own practice, but not necessarily in a formal or systematic way. Requiring teachers to look at the whole school, which this process does, would give teachers a broad perspective of the school.

Second, the schools examined are members of school reform models, and many teachers related this process to Turning Point and Coalition principles. Teachers felt that DBDM was a tool that they could use to improve on model principles. Interestingly, five of the six teams hoped to use the DBDM process to address issues of equity of student achievement or access, an idea strongly supported by model principles (For example, CES Principle 10 states: The school should demonstrate non-discriminatory and inclusive policies, practices, and pedagogy.). A teacher articulated this idea:

> To me, data-based inquiry is a way we can inquire into what degree are we meeting our goal of equity, where are our inequities? Rather than an accusation or a general blanket statement, it helps us pinpoint where we do have inequities and data-based inquiry is a way of trying to democratize the solution planning so that everyone gets invested in a process of working to confront, face up to, and to figure out how to change both our practices and our structures to meet the needs of everybody in a democratic way.

THE MEANS ARE AS IMPORTANT AS THE END

While this idea is preliminary and based on the experience of one effective DBDM school, it raises an interesting challenge to our thinking of the uses of DBDM. Both of the two schools that had effective implementation have already seen the benefits of their analysis. One school began to use their common planning time more effectively through DBDM (described more fully below). The other school had become concerned that a large percentage of their students were failing two or more academic subjects. The coach recalled that:

> When I was working with them we decided we would look at first of all who was failing [i.e., by grades]... and what they were failing [i.e., science, math]... and then why are they were being given failing grades; is it test scores, is it attendance, is it homework? The whole school was involved.

After completing the process, the school found that most students were failing because they were not doing their homework, and through further research found that the homework was written at too high a reading level for students (using a simple analysis, they found that most homework required college-level reading abilities, a level beyond the present skill of many students at the school). The school created a five step action plan that included creating during- and after-school programs for students to do their homework with teacher supervision, helping teachers check the complexity of the homework assignments, adding an initial assessment program for new students to determine which students might need extra support, and creating a math class based on different learning styles. The school has since found that fewer students are failing and that the new math class has been very successful for students. The coach commented that, "Kids are very clear that this meets [their] needs more than any other [class they've] had."

The second school, which started with nine inquiry groups and now has six currently in process, has been engaged in the process for two years. Several of the groups have not completed their initial challenge. As described earlier, an inquiry group with the challenge of studying student equity and the schedule started with an assumption of inequity based on choice of critical language or performing music.

> The students who were in critical languages were generally also in performing music, and those teams tended to have fewer problems, and it felt like they were achieving at a higher rate, to teachers. So what we wanted to do was to look at the data to see if indeed that was the case, and then we figured if it was the case, we would figure out what to do with it.

In its second year, the group had found no correlation between schedule and grades, of students on the honor roll, or students on the D/F grade list. They found that their initial assumption was not supported by the data. However, the data illuminated a different challenge for them to pursue, that of the correlation between academic failure and enrollment in study hall.

> So then we said, "There are other things we're noticing about this data." And the thing that jumped out at all of us when we looked at it at the beginning of this year again, kind of with a fresh set of eyes, is that if you look at the D/F list, almost every single kid on that D/F list is in study hall. So it's like, well, if study halls are supposed to be a place to help people, why are these kids still failing? ... And that's the other question that kind of does go back to the schedule, because study halls are not a program. They're a lack of a program. If you don't take world language, you're in a study hall. If you don't take performing music, you're in a study hall. So it's not like they were created to fill a need. They're there as a holding tank for kids that are not in other programs. So we decided that we would narrow our search to look particularly at those kids. And we're at a point right now where I'm not exactly sure what direction we're going to go in.

While the group has not been able to make any suggestions based on their findings, the teacher-leader of the group believes that the process has already had an effect on teachers individually and on the school culture as a whole. She says,

> I can't talk about particular practice, but I think that there has been a change in conversational patterns, or whatever you want to call it, like at lunch and in the workroom or whatever. People don't talk as much, I don't think, about individual kids, and whine and complain about that. It seems to me that we spend more time talking about issues. Not all the time... We still whine and complain about kids. He didn't do his homework, and blah blah blah. But I think that there is more of those other kinds of conversations going on, where people are really stopping and saying, "Well, what is this information telling me about my practice, and where kids are?" I don't think that happened as much in the old days. I think it was more, "They didn't do their work, and so they flunked." And that was kind of the end of the story. It never went beyond that. It was always their fault. Now, people are really asking more questions. They're saying, "What if it's not their fault? What if it's something that I'm doing, or I could change or whatever". And I think that they're asking that question more frequently.

The process has highlighted for the teachers that their assumptions to answers are not always accurate. Using data to look for answers requires a different way of thinking than many teachers use in their classroom. It requires looking at the broader picture of the school, of being more reflective and less reactive, of basing one's ideas in a larger context—data—instead of using anecdotes, and of creating analytical arguments relating points of data to one another. In sum, the skills

teachers develop during the process are as important as finding the answers to the challenge they posed.

SUPPORT FROM AN EXTERNAL SOURCE

Teachers at the two schools that attended the workshop articulated the need to have an outside mediator to help them both with 'sticking' to a timeline as well as to aid in the data analysis process (Williams, 1997). They strongly believed that the process was important and necessary and that it would have an impact on their school practices.

> [DBDM] is an optimal way to deal with issues that have been a concern to the school for a long time. The administration of the school is quite brave and honest to take upon, I will say...a challenged question.

However, they worried about the school's institutional capacity to engage in DBDM school-wide in addition to all the other activities and programs in which the school was involved. Further, one team noted that the research process is complex and that it is difficult to conduct research that meets high standards. Often, different data than what was originally collected was later needed to inform the question. Collecting this data only added to the difficulties of schools involved in this process. Schools believed they needed support from an external source to get them going or keep them on track.

In the experience of the two schools with effective implementation of DBDM, the external support was advantageous in helping to build institutional capacity for the effort, as well as for helping the teachers stay on track. At one school, the coach trained 18 teachers on how to conduct DBDM and lead inquiry groups. After that, she was available if problems arose, but did not otherwise spend time with the groups. In fact, one teacher said,

> But I think that Turning Points [guide] gives you the template to work from. You have a structure there, and when you get lost, you can go to the structure.

In the other school effectively implementing DBDM, inquiry groups were in place, but these groups acted more as study groups of teachers who would read and discuss a topic of interest and sometimes share their ideas with the rest of the faculty. The creation of DBDM inquiry groups came from the realization that many of their students were failing and the need to find out how to address that challenge. Teachers had begun to do so, but the coach saw that most of the work was based on anecdotes. The coach offered an alternative and the teachers and administration began the DBDM process.

WHAT BARRIERS DO SCHOOLS FACE WHEN IMPLEMENTING DBDM?

We found three main barriers that most affected a school's ability to implement DBDM. Schools often face a lack of buy-in to the process. Many teachers and administrators are resistant to change their practice and many do not see the need to look critically at data. In the examples presented above, the most successful schools had the buy-in of a majority of the school

A second barrier is teacher and administrator lack of expertise in inquiry-based pedagogy, in looking at data, and in crafting good, answerable questions. While outside support and training can help prepare staff to engage in these activities, some schools felt they needed more internal capacity.

A third barrier to effective implementation of the DBDM cycle is lack of time. Schools are often in the midst of implementing multiple, seemingly unrelated initiatives. Data collection, survey development and administration, and data analysis requires time. The schools that were effective in the process made a commitment to the process and showed that to teachers by providing in-school time to engage in the process.

IMPLICATIONS

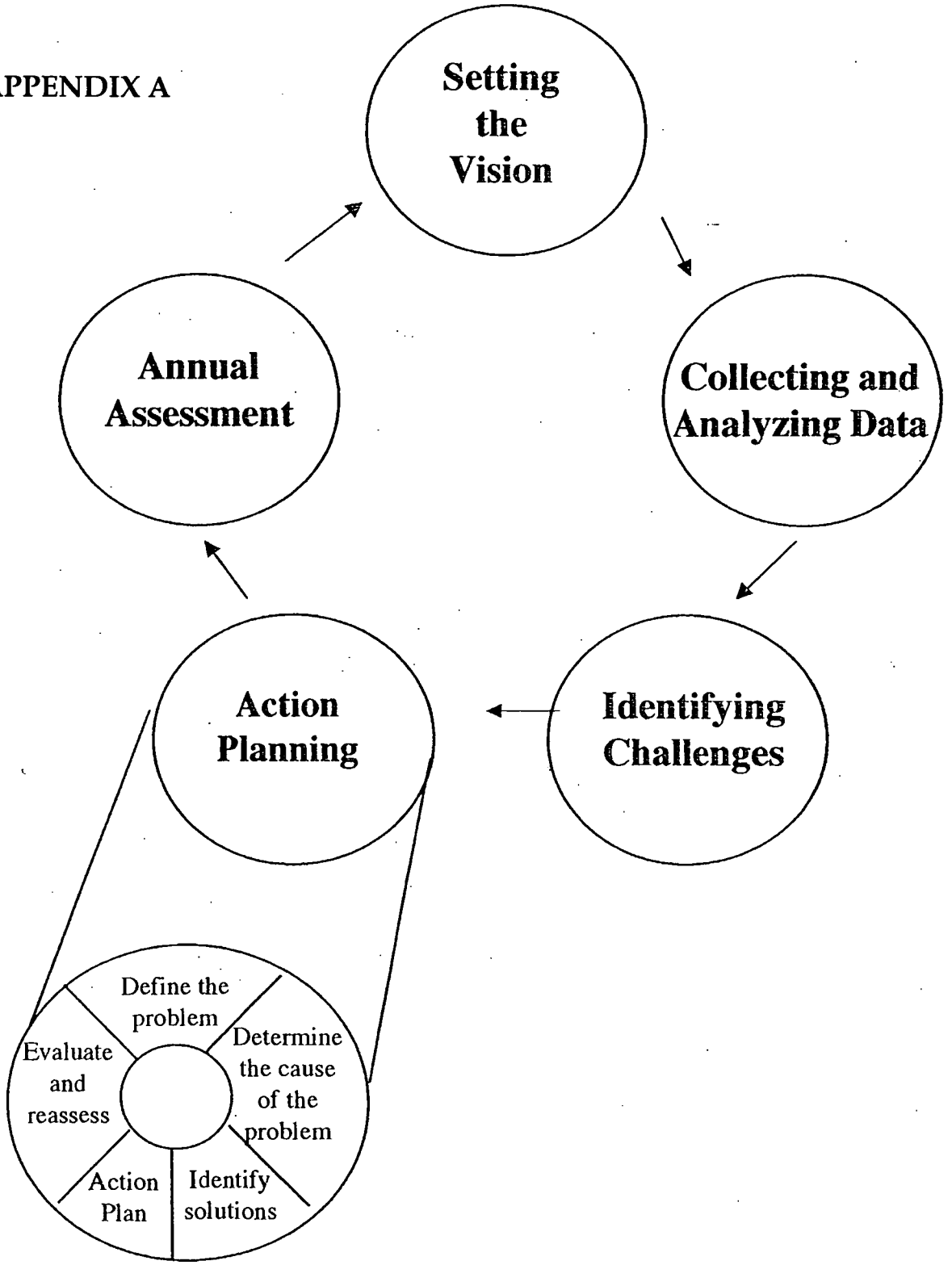
DEVELOPING AN INQUIRY-BASED SCHOOL

As Rallis and MacMullen (2000) write, "Inquiry-minded schools recognize that improving teaching and learning is an intentional and ongoing process." Data-based inquiry and decision making helps schools develop into inquiry-minded schools. DBDM involves the full faculty, and engages them in asking questions and seeking answers. We have found that DBDM creates a culture in schools that facilitates more professional dialogue, breaks down walls between teachers and deprivatizes their work, helps teachers to reflect on their work, and provides teachers with a different, and necessary, lens through which to view their practice. Certain conditions are necessary to support this process, however. First, administrators must support the process by allocating time with the day for teachers to meet. Second, the development of teacher leadership is also vital to the process. Teachers must own the process, provide leadership for inquiry groups, facilitate meetings, push the thinking of others, and coordinate other aspects of the process.

ENSURING EQUITY IN PRACTICE

We were interested to note that five of the six schools in this study hoped to use the DBDM process to explicitly address issues of equity of student access or achievement in their school. This suggest that there might be something inherent in the DBDM process that lends itself to promoting a discussion of these issues. Issues regarding student equity are often difficult to discuss, both in schools and other institutions. We believe that the DBDM process can be particularly useful to schools in addressing issues of equity because it can scaffold a conversation by embedding the discussion in multiple sources of data. In this study, teachers stated that they believed that DBDM (1) is necessary because hypotheses generated without looking at data are not always right, (2) highlights inequities which stand out more through data than through random anecdotal information and stories, and (3) slows teachers' initial defensive reactions, and forces teachers to reflect upon hard information and not just provide an easy answer. Each of these reasons helps ground the DBDM process in practice and so compels teachers to address these issues. Just because issues of equity might be made easier to discuss with his process does not mean that the conversation of the issue is deep enough for teachers to make meaningful change. Consequently, it is important that schools use multiple sources of data. Doing so broadens the debate about any topic and provides many places where teachers can join the conversation.

APPENDIX A



The Data-Based Inquiry and Decision Making Model

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