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DATA-DRIVEN TEACHERS

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What is Data-Driven Decision-Making?

Data-driven decision-making (DDDM) is a system of teaching and management practices that gets better information about students into the hands of classroom teachers. Many teachers reject the idea of DDDM because of its association with the federal No Child Left Behind Act (NCLB). This is unfortunate, because a multitude of schools and districts across the country are seeing substantial improvements in student learning and achievement as they incorporate data-driven practices. Teachers in these schools are finding that intelligent and pervasive uses of data can improve their instructional interventions for students, re-energize their enthusiasm for teaching, and increase their feelings of professional fulfillment and job satisfaction.

Data-driven decision-making requires an important paradigm shift for teachers – a shift from day-to-day instruction that emphasizes process and delivery in the classroom to pedagogy that is dedicated to the achievement of results. Educational practices are evaluated in light of their direct impacts on student learning. School organizations that are new to the focused, intentional analysis of student and school outcome data quickly find that most teachers and other instructional support staff are unprepared to adopt data-driven approaches without extensive professional development and training.

This white paper outlines many of the basic competencies that teachers need to be effective data-driven classroom instructors. These competencies were developed in conjunction with the International Society for Technology in Education as part of a comprehensive professional development initiative for the Chicago Public Schools Office of Technology Services eLearning and are shared with permission. Other school systems are invited to use this competency framework (also available in table form) to structure their own training initiatives for instructional staff.

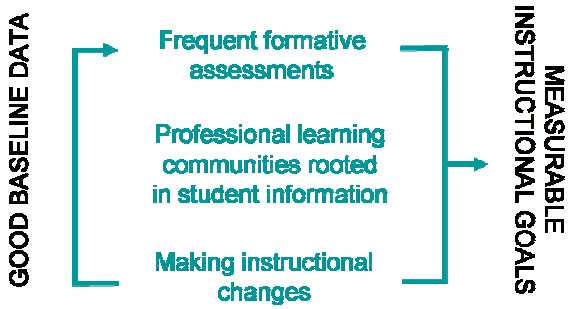
Essential Concepts

One of the most important tasks for educators is to understand the differences between DDDM and NCLB. Data-driven decision-making is about getting better information into the hands of classroom instructors; NCLB is about accountability to the federal government for the education money it sends to the states. Educators should be careful not to reject DDDM principles and practices, which have been shown to have positive impacts on student learning and achievement gaps, because they are angry about federal and state NCLB implementation decisions. Data-driven activities existed in some schools long before NCLB was passed and will continue in many schools regardless of what happens with the federal legislation.

Data-driven educators should be able to articulate the essential elements of effective data-driven education outlined in the diagram below. The five major elements of data-driven instruction are:

- good baseline data,
- measurable instructional goals,
- frequent formative assessment,
- professional learning communities, and
- focused instructional interventions.

These elements interact to enhance student learning and to inform teacher practice.



Teachers

Data-driven teachers understand the importance of utilizing multiple measures, and multiple indicators within measures, when assessing school and student success (Bernhardt, 2004). For example, data from a single administration of a statewide reading test do not give teachers the information they need to improve student learning. Information from other assessments, measures of student engagement, previous programmatic interventions, and other data are needed for teachers to design appropriate instructional interventions. Similarly, use of a single formative assessment to measure students' reading progress is not as reliable as using multiple, different assessments to triangulate on the complex concept of student reading. Data-driven teachers need to be savvy consumers of summative assessment data, such as those from yearly state tests, who understand when and how the data can, or can't, inform teacher practice.

Principals

Principals can support this phase of the DDDM process by helping teachers understand the five essential elements and by helping staff envision what good data-driven education looks like in practice. As with any other school reform initiative, building staff and organizational DDDM capacity takes time. Principals should work with district personnel to create and implement a comprehensive, long-term professional development plan that is designed to ground teachers in the skills they need to be effective data-driven instructors.

Collecting and Analyzing Summative Data

Educators in data-driven school organizations are expected to utilize data from yearly summative assessments to improve student learning. For example, teachers already help administer those tests; they also should be able to get relevant summative test data out of district data management and analysis systems (e.g., student information systems, data warehouses) for baseline analytical and reporting purposes. In other words, educators need to be able to get their hands on the data from yearly summative assessments that will help them improve instructional practice. Access to the raw data is crucial, because educators invariably want more detailed data, or want data presented in different ways, than paper reports typically provide.

Teachers

Once classroom teachers have access to good baseline information, they should work with their administrators to select key indicators of success for their classrooms. In order to do this, teachers need to be well-grounded in assessment literacy concepts so that they can appropriately interpret summative baseline data. Teachers also need to give ongoing feedback to building- and district-level administrators about the usefulness of the data and/or reports that they are receiving.

Principals

Principals should ensure that the data teachers receive is accurate, timely, and in a format that can inform classroom instruction. Principals also should work with district personnel to design and implement data systems that allow for exploration and reporting of raw data. Preformatted data reports, while useful, cannot be cross-analyzed or connected with other data. Principals also play a key advocacy role in enabling teacher and counselor access to that data. Most importantly, building-level administrators must actively help teachers identify key indicators of classroom success, appropriately analyze their data, and then turn those data into strategic pedagogical interventions.

Setting Measurable Goals

Once armed with key summative indicators of classroom success, educators can use those baseline data to identify mastery levels and learning needs of classes, demographic subgroups, and individual students. Data-driven educators then use that information to set measurable year-end instructional goals, which serve as meaningful targets to guide their pedagogical strategies. These goals are often referred to as *SMART goals*. The acronym stands for Specific, Measurable, Attainable, Results-Oriented, and Time-Bound. An example SMART goal might look something like the following:

> The percentage of third grade students scoring at Level 3 or higher on the state mathematics test will increase from 64% in Spring 2004 to 82% in Spring 2005.
>
> Focus areas for improvement
> 1. Number sense
> 2. Computation
> 3. Measurement

Data-driven educators recognize that formalized goal-setting can lead to improved student learning outcomes. All SMART goals created by teachers and administrators should have the following six components (with example language from the SMART goal above):

1. A measurable baseline (64%);
2. A measurable target (82%);
3. A specific time frame (Spring 2004 to Spring 2005);

4. Specificity about what is being assessed (percentage of third grade students scoring at Level 3 or higher);
5. Specificity about the method of assessment (the state mathematics test); and
6. Focus areas that guide future action needed to reach the learning target (number sense, computation, and measurement).

Inclusion of these six components ensures that SMART goals meet the criteria represented by the acronym. SMART goals can be used with common assessments, teacher-made rubrics, and other types of assessments as well as with standardized tests from publishing companies and state departments.

Teachers

Data-driven teachers identify and work toward only a few key instructional goal areas each year. Teachers often are overwhelmed by the multitude of learning needs present in their classrooms and must combat natural tendencies to either create too many goals or to become discouraged and shun goal-setting altogether. Teacher goal-setting should address instructional areas that are both important and strategic. Remembering the Pareto Principle that 20% of activity causes 80% of results is critical at this stage of the DDDM process. Evidence from successful data-driven schools shows that strategic focus and success in a couple of key areas commonly carries over and alleviates other instructional and behavioral concerns as well.

Principals

Principals should visibly model the goal-setting process. Administrators' goal statements might focus on factors such as discipline, attendance, or students' level of engagement with the teaching-learning process in addition to student learning objectives but should always include all of the essential components outlined above. Organizational goals should be focused on critical school needs and should be referenced frequently and noticeably with faculty, students, and parents. Administrators also should actively assist teachers as they work to create appropriate, targeted goals for their classrooms and students.

Collecting and Analyzing Formative Data

As noted above, data-driven schools have a good sense of where their students are at the beginning of the year and have measurable goals for where they want their students to be at the end of the year. The next step for educators is to implement a system of frequent formative assessments in order to benchmark the progress of their students *during the school year* toward those year-end goals. Simply using baseline data to set measurable year-end goals, without also implementing a system that allows for frequent analysis and adjustment of instructional and organizational practice, is not likely to result in significant improvements in student learning.

Effective formative assessment practices, implemented during the school year, have been shown to be a powerful mechanism for improving student learning. Research meta-analyses have shown that good formative assessment has a greater impact on student learning, and on achievement gaps, than any other instructional practice (see, e.g., Black & Wiliam, 1998).

To realize the instructional power of formative assessment practices, educators also need the opportunity to meet regularly and frequently to have collaborative, data-based discussions about student progress. During these meetings, educators identify emergent patterns from the formative data and discuss what the data tell them about students' progress toward year-end learning goals. Teachers can then collaboratively identify appropriate instructional interventions that can be implemented during the next instructional cycle and collectively commit to implementing those interventions. These types of *professional learning communities* have been shown to have major impacts on student achievement and teacher satisfaction.

Teachers

Data-driven teachers utilize their instructional expertise to identify key formative indicators of success that can be used to measure student progress during the school year. They also use appropriate technologies to collect, organize, analyze, and report that data to students, parents, administrators, and other teachers. Other key skills of data-driven teachers include knowledge of relevant assessment literacy concepts (in order to appropriately interpret formative assessment data), the ability to engage in root cause analysis to identify appropriate instructional interventions, and the capacity and willingness to work effectively with other staff on shared instructional problems and solutions.

Principals

Administrators must recognize that the driving engine behind substantial improvements in student learning outcomes is a strong system of formative assessment, coupled with the opportunity for teachers to collaboratively make sense and act upon the formative data they receive. Too many school systems are focusing on summative baseline data because of NCLB and are realizing only later that a primary reason they are not obtaining desired results is because they lack a feedback loop that allows teachers to receive information, before the end of the school year, about the success or failure of their instructional interventions.

Principals must work with district administrators and local communities to implement creative solutions that give teachers the necessary time to collaboratively analyze and act upon data. They also must explicitly train teachers in effective teaming and communication strategies.

Making Changes

Data analysis is meaningless if it does not result in meaningful instructional change. Data-driven educators are able to use summative and formative assessment data together to implement strategic, targeted, focused instructional interventions to improve student learning. These interventions should be aligned with state standards and district curricula as well as content-specific, developmentally-appropriate best practices. Teachers should work with curriculum specialists in their districts and states to identify effective, grade-level instructional practices for their subject areas.

Many K-12 teachers feel disempowered and fatalistic about their ability to significantly impact student learning outcomes. Many teachers feel that the academic success of their students and schools is dependent upon the input characteristics of their students and families. Other educators, however, believe that collaboratively they can have powerful impacts on student learning. These latter schools, which are recognizing that they can make a difference and are strategically and intelligently redesigning instructional and organizational practices to support student learning, are the ones that are closing achievement gaps and succeeding in this new era of accountability. Schools that continue to struggle are those that place the bulk of the responsibility for student learning, and the blame for the lack thereof, on students and families rather than accept the fact that many classroom practices and school structures could be changed to better facilitate student achievement.

Teachers

Confucius noted that a journey of a thousand miles starts with a single step. While teachers may not be able to address the often-overwhelming problem of low student achievement all at once, they can take small steps that together add up to big improvements over time. One of the key legacies of NCLB will be the emphasis on implementation of pedagogical practices that have been proven successful through high-quality research. Teachers can work with administrators and content-area instructional experts to implement effective teaching practices and to design and implement teacher-driven action research projects that investigate the effectiveness of specific pedagogical strategies.

Principals

Teachers will need help identifying and implementing new research-based curricula and teaching practices. Principals can effectively support teachers by connecting them with appropriate training opportunities and instructional experts. Continual attention to teachers' motivational and pedagogical concerns is another key role for building-level administrators during this stage. Teachers, like most professionals, can be highly resistant to changes in their daily practice. Principals must help teachers recognize what is working (and what is not) in their classrooms and vigorously support their faculty as they transform ineffective instructional practices into those that result in desired outcomes.

Data Transparency and Safety

Information transparency is a necessary condition for successful data-driven education. Data-driven decision-making practices are only possible in school climates where data are valued and visible. In many data-driven schools, graphs, tables, and other indicators of data usage permeate the school environment. Discussions about data are frequent and analysis of student data is considered to be integral to the teaching and learning process.

Students and parents can be important allies in this process. Rather than serving as gatekeepers, and hindering access to student learning data, educators should strive to ensure that relevant data are accessible to parents and students in order to enlist their buy-in and support. Many times data will need to be anonymized in order to comply with data confidentiality requirements. In some

schools, teachers are finding that having students track their own learning progress increases their buy-in and motivation and illustrates that significant learning growth can be achieved regardless of students' initial starting points.

Educators can use print publications such as newsletters, notes home, flyers, and other mechanisms to disseminate status and progress information on key summative and formative assessment indicators to parents and students. Electronic communication channels such as web sites, listservs, and e-mail newsletters also are useful tools to communicate with local communities. Teachers and administrators should utilize data to celebrate instructional progress and successes as well as to address continuing gaps or needs.

Teachers

Like others, educators are naturally hesitant to have negative results exposed publicly. One of the key lessons from successful data-driven organizations, however, is that teachers and administrators must confront the often-brutal truths about their performance, and the reasons underlying lack of progress, if substantial progress is to occur. Educators can't address student needs if they don't know what, how significant, or how extensive those needs are. Another lasting legacy of NCLB will be the emphasis on greater public exposure of student learning outcomes data to parents, community members, and policy makers.

Data-driven teachers view data as feedback, not as indictments. They use data to inform pedagogical modifications and actively seek out more data to judge the success of those changes. Data-driven teachers also are willing to discuss their instructional strengths and weaknesses with peers in order to facilitate shared communities of practice that are focused on individual and organizational learning. By recognizing and acting upon the fact that all educators, like students, have areas in which they could improve, teachers can be models of life-long learning for the students that they serve.

Principals

One of the most important things administrators can do to foster data-driven educational practices is to facilitate school climates where it is professionally and emotionally safe to look at student data. Teachers will resist using data if they feel that the information will be used against them for evaluative or punitive purposes. This is especially true for teachers who are newcomers to data-driven education. Ultimately, teachers need to collaboratively examine classroom-level data so that they can identify and learn effective instructional techniques from each other. In a school where a climate of data safety exists, data are used to highlight faculty strengths and structure professional development opportunities rather than to identify weaknesses and blame teachers. Administrators bear the primary responsibility for fostering these kinds of climates. Principals should conduct a needs assessment of their staff's concerns and fears and then work diligently to address those needs in collaboration with their faculty.

Alignment for Results

One of the most difficult challenges for teachers and administrators is making the mental paradigm shift from existing practice, which commonly emphasizes process and delivery, to a mindset dedicated to the achievement of results. Successful data-driven educators recognize that accepting greater responsibility for student learning can result in improved student learning outcomes.

Results-driven educators assess all educational practices in light of their impacts on student learning. Any instructional practice, organizational structure, or school program that hinders student success is reexamined and redesigned. Even successful practices are examined to see if they can be improved. Results-driven educators understand the importance and impact on student learning of continuous and progressive improvement, and recognize that even small improvements add up over time to become large ones. This latter point is particularly important, because ambitious long-term goals like "achieving 100% proficiency" can be disabling rather than motivating. Turning desired outcomes into minute, concrete, short-term goals and then successfully achieving those goals is inherently motivating and can turn organizational inertia into desired progress.

Instead of teachers individually selecting the content and direction of their professional development plans, teachers and administrators should work together to ensure that professional development opportunities are aligned to student, school, and district learning needs. Similarly, curricular design and delivery also should be aligned to meet these needs. In results-driven school systems, all processes and programs are designed to facilitate maximal student learning: the guiding paradigm is "If it's not working, why are we doing it?"

Teachers

Teachers who have incorporated a results orientation into their instructional practice continually seek out evidence about the success or failure of their pedagogy. Ineffective strategies are discarded, and successful strategies are tweaked or modified to achieve even larger learning gains. Data-driven teachers exhibit a constant dissatisfaction with the status quo and continually strive for further improvement, even when already exhibiting high levels of success. These teachers also are willing risk-takers who understand that trying something new and different may be the only path to improved outcomes.

Principals

A results-oriented school system incessantly asks, at every level of the organization, two questions:

- *What evidence do we have that what we're doing is working?*, and
- *How will we respond when we find out that what we're doing is not working?* (see, e.g., DuFour, Eaker, & DuFour, 2005).

Principals in successful data-driven schools ensure that these questions continually guide classroom instruction and organizational decision-making. Data-driven principals also align, and help teachers connect with, necessary resources to facilitate effective educational interventions. Two other important roles of principals are helping teachers "chunk" ambitious long-term objectives into short-term SMART goals and facilitating teachers' understanding that taking greater responsibility for student learning can result in improved student achievement.

Conclusion

Mike Schmoker (1999) has said that if educators constantly analyze what they do and adjust to get better, student learning will improve. By focusing initially on small, rapid improvements and then building upon those toward an ongoing process of continuous reflection about classroom instruction and student learning outcomes, teachers across the country are significantly impacting student achievement. When these teachers also are able to participate in professional learning communities and collaboratively identify and implement effective, strategic instructional interventions, their schools are not only surviving this new wave of accountability but indeed thriving in it (see, e.g., Supovitz & Klein, 2003).

Additional Resources

The competencies and practices outlined in this white paper represent the essential skills that most educators and researchers have identified as necessary for teachers to be effective data-driven instructors. This white paper also identifies some ways in which principals can provide needed support and training for their faculty.

Additional resources are listed below. Please contact the author if you have further questions or comments about this white paper.

Bernhardt, V. L. (2004). *Data analysis for continuous school improvement* (2nd ed.). Larchmont, NY: Eye on Education. [available at http://www.eyeoneducation.com]

Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 80*(2), 139-148. [available at http://www.pdkintl.org/kappan/kbla9810.htm]

DuFour, R., Eaker, R., & DuFour, R. (Eds.). (2005). *On common ground: The power of professional learning communities*. Bloomington, IN: National Educational Service. [available at http://www.nesonline.com]

Reeves, D. B. (2004). *Accountability for learning: How teachers and school leaders can take charge.* Alexandria, VA: Association for Supervision and Curriculum Development. [available at http://shop.ascd.org]

Schmoker, M. (1999). *Results: The key to continuous school improvement* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development. [particularly pages 1-55; available at http://shop.ascd.org]

Supovitz, J. A., & Klein, V. (2003). *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*. Philadelphia, PA. [available at http://www.cpre.org/Publications/AC-08.pdf]

About the Author

Scott McLeod, J.D., Ph.D., is Co-Director of the University of Minnesota School Technology Leadership Initiative (STLI), the leading K-12 technology leadership preparation program in the country, and its Center for the Advanced Study of Technology Leadership in Education (CASTLE), a program center of the University Council for Educational Administration. The only academic program in the nation based on the National Educational Technology Standards for Administrators (NETS-A), the STLI has been shown to have statistically-significant impacts on its participants' technology leadership knowledge, skills, and abilities. More information on the STLI, its technology leadership courses, and other resources for educators is available at *www.schooltechleadership.org*. Dr. McLeod gratefully acknowledges the tremendous influence of the cited authors' work on this white paper, as well as the opportunities provided him by Minnesota and Chicago educators to help implement these concepts and practices in their schools.

Coming in June

Microsoft and Dr. McLeod will be publishing a second white paper outlining technology solutions available for data-driven decision-making in K-12 schools. Data-driven decision-making practices are nearly impossible without appropriate supporting technologies. The white paper will provide an overview of data management and analysis systems for both summative and formative data. The white paper also will include links to tools and templates that educators can immediately use for data collection and analysis.

Essential Competencies for Data-Driven Teachers

http://www.microsoft.com/Education/ThoughtLeaders.aspx

Essential Concepts	Collecting and Analyzing Summative Data	Setting Measurable Goals	Collecting and Analyzing Formative Data	Making Changes	Data Transparency and Safety	Alignment for Results
Understand the conceptual differences between data-driven decision-making and federal / state accountability	Understand the importance and impact on student learning of summative assessment practices	Understand the importance of establishing SMART goals for instructional success	Understand the importance and impact on student learning of frequent formative assessment practices	Implement focused interventions in instruction to improve student learning	Facilitate the creation of school climates where data visibility is frequent and important	Understand the importance of results-driven practice and how that is different than previous practice
Articulate what effective data-driven instruction looks like	Get relevant summative data out of district DMA systems for analytical and reporting purposes	Understand the six key characteristics of SMART goals	Select key formative indicators of success to measure school and student progress during the school year	Ensure that instructional interventions are aligned with state standards and district curricula	Ensure that relevant data are accessible to parents and students (i.e., no gate keeping)	Understand the importance and impact on student learning of continuous and progressive SMART goal-setting
Understand how the following elements interact to improve student learning: (1) summative baseline data, (2) measurable goals, (3) frequent formative assessment, (4) professional learning communities, and (5) making instructional and organizational changes based on formative and summative data	Select key summative indicators of success for their classrooms	Utilize summative data to set SMART goals for their classrooms	Use appropriate technologies to collect, organize, analyze, and report student formative assessment data	Ensure that instructional interventions are aligned with content-specific instructional best practices	Facilitate the creation of school climates of data safety (i.e., data are used for feedback and/or information, not for evaluation)	Ensure that personal professional development is aligned to student, school, and district needs
Understand the importance of utilizing multiple measures, and multiple indicators within measures, when assessing school and student success	Are familiar with relevant assessment literacy concepts and can appropriately interpret summative data		Meet regularly and frequently for collaborative, data-based discussion of student progress and identification of appropriate instructional interventions		Utilize print and electronic communication channels to disseminate status and progress information on key summative and formative assessment indicators to parents and students	Ensure that curricular design and delivery are aligned to student, school, and district needs
			Are familiar with relevant assessment literacy concepts and can appropriately interpret formative assessment data		Utilize data to celebrate instructional progress and successes, not just to identify continuing needs	
			Identify emergent patterns from formative assessment data			
			Engage in root cause analysis to identify appropriate interventions			