

The Data-Informed District:
A District-Wide Evaluation of Data Use in the Natrona
County School District

Jeffrey C. Wayman
Vincent Cho
Mary T. Johnston

The University of Texas at Austin

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ABSTRACT

For years, educational entities have collected data on school process and student learning. Recent accountability policies have brought public attention to these data, increased the amount of data collected, and tied funding to certain characteristics of these data. Consequently, educators respond to reporting requirements while simultaneously struggling with better ways to understand these data internally to improve practice. To understand and improve district data use, individuals from the Natrona County School District (NCSD) commissioned a district-wide evaluation of data uses and procedures for data-based decision-making. In this report, we present findings from this evaluation. Results provided an in-depth description of data use at every level, showing the hardships of using data but also highlighting many positive structures upon which to build an effective initiative. As a result of this evaluation, the authors recommended the following: (a) a framework to guide NCSD in establishing itself as a *data-informed district* where data and practice are integrated throughout; (b) a plan for acquiring an efficient data system that can integrate data district-wide; (c) a blueprint for NCSD to use in establishing a healthy, district-wide data initiative; and (d) specific issues for NCSD to address in getting up to speed on data use, such as school dropouts, school differences, public perception, and areas for further study.

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EXECUTIVE SUMMARY

Introduction

Districts, schools, and educators have been given a difficult charge: take the abundance of school data generated each year and turn it into information that can lead to improvements in educational practice. While policy structures implicitly assume this happens as a consequence of sanctions, it is, in fact, a complex and difficult undertaking.

The general premise of school data use is easily supported—few would argue that gaining more information on student learning and the conduct of education is a detriment. Unfortunately, actually using data in effective ways is difficult for educators for a variety of reasons. For example, most educators are not adequately prepared to inform practice from data. Data access can be a problem because computer systems to access educational data are often not integrated, user friendly, or efficient. While the research base on educational data use is growing, best practices and processes are not yet fully understood. Yet, perhaps the most important difficulty is that school districts often are attempting to use data without first establishing clear understandings and processes for how data should be used throughout the district.

Recognizing the importance of these factors, the Natrona County School District (NCSD) commissioned our research team to conduct a thorough, district-wide evaluation of data use. All aspects of data use were covered: District and school culture, the types of data used, the way data were used, how varied roles used data, structures and supports for using data, and technology for accessing data. We interpreted these results in light of previous research and our own expertise, providing NCSD with a comprehensive set of recommendations that will help the district set a course for effective data use.

Summary of Results

We employed a mixed-method design, interviewing individuals, conducting focus groups, and administering a district-wide online survey that assessed uses of data, attitudes toward data, and school culture. We interviewed 128 participants and obtained survey responses from 435 participants. We were able to include all district schools but three in interviews or the survey.

Our results show that NCSD is an interesting and complex mix of facilitators and barriers to effective data use, many occurring in close proximity to each other. We found that data use in NCSD is generally a difficult and inefficient process, but we observed many facilitators in place that will support a data initiative.

Our results revealed an environment and culture in NCSD that is conducive to building a healthy data initiative. Attitudes toward data use are generally positive, and we observed many forms of data use district-wide. Still, there are cultural issues to be addressed. As an example, we uncovered large differences due to schooling level: High school teachers scored substantially lower on culture and data use scales than did middle school teachers, who scored lower than elementary school teachers.

While the environment and culture are strong, the district vision for teaching, learning, and data use is not. We found that common understandings had not been established about what learning was, how it should be conducted, and how data should be used to support teaching and learning. Our data indicate support throughout the district for establishing such vision.

We observed computer systems to be a major barrier to NCSD data use: There are a large number of different systems in use across the district that are not connected for any efficient data

sharing, and many educators find their systems difficult to use. Individuals are enthusiastic about the prospect of an integrated system.

Data accuracy may also be a problem in NCSD. We heard many instances of groups that did not trust student demographic data provided by the district, sometimes to the point of maintaining their own databases. Further, we observed many points of data entry in NCSD, but no clear definitions, protocols, or uniform procedures for data entry.

Partially as a consequence of nonintegrated data systems, NCSD educators are often dependent on other individuals for access to data. At the Central Office level, dependence is seen in terms of “bottlenecks,” where individuals or groups of individuals control access to data. At the building level, many educators are dependent on Instructional Facilitators or other support staff to print reports for them.

We found that educators in NCSD need more professional development on effective data use techniques. There are good opportunities for training in NCSD, but these are being accessed only by those who ask for it. Individuals who receive training find it useful and are particularly complimentary of the Office of Assessment and Research. Parents also wanted more understanding of what data mean.

Instructional Facilitators were also cited as strong supports for data use. However, the data indicate a wide range of implementation of these positions, due in part to an undefined job description and the newness of the position.

At the building level, we saw a few impressive data initiatives and uses, but there is ample room for improvement throughout NCSD. Although many principals are supportive of data use and some are already personally invested in it, the principalship in NCSD is generally not a strong facilitator of data use. Through no fault of their own, principals were unprepared for data use, both in terms of their own skills and in terms of leading faculty. Similarly, teachers have not been adequately prepared to use data. Our results found that whereas many teachers were engaged in data use, many more were not, and few were able to articulate how data helped them change their practice.

Finally, we found the sometimes uncomfortable balance of facilitators and barriers was affecting the work of education throughout NCSD. While some educators were using data in ways that make their day more efficient and more productive, others were using data as a process separate and parallel to their old ways of doing business. For these latter educators, data use represented an unenviable burden. Little was being done to help educators efficiently incorporate data use into their natural workday.

Summary of Recommendations

By combining these results with previous research and our own expertise, we were able to forward a set of recommendations that will help NCSD establish a plan for useful, effective data use. There were four main categories of our recommendations: (a) establish NCSD as a data-informed district, (b) acquire an integrated computer data system, (c) implement a district-wide data initiative, and (d) pursue a specific list of issues beyond implementation.

The data showed that NCSD was constrained in using data due to a lack of district vision—not just for data use, but also for education as a whole. Consequently, we recommended that NCSD establish itself as a *data-informed district*, where clear understandings exist regarding how education will be conducted, what is meant by *learning*, and how data will be used to understand and support these. We recommended processes for district-wide involvement of all roles in this process. We further recommended that NCSD produce clear, written documentation of these visions and establish protocols, processes, and goals for using data.

A clear need for NCSd is an integrated computer system that would link all district data. We recommended NCSd purchase a commercially available data warehouse and presentation system. Such a system would integrate all data systems district-wide and would serve as a single access point to district data for most users. Recommendations were made regarding usability, features, interoperability, and necessary infrastructure. Processes and points to consider were also outlined regarding the actual acquisition of a system. Recommendations were also made regarding specific data systems currently used.

Recommendations were also made regarding implementation of a district-wide data initiative. While we recommended the initiative engage all NCSd educators in the effective use of data, we noted that teachers and principals were particularly critical to involve. In implementing the data initiative, NCSd first will need to build awareness, including promoting involvement in the visioning process. Noting the critical support provided by a data system, we suggested making this system the centerpiece of the initiative. Both the system and the initiative should be “rolled out” slowly, in small, workable pieces that provide immediate value and function for educators.

In describing the data initiative, we also recommended a number of supports indicated by the data as particularly important to NCSd. For instance, we recommended that NCSd mandate professional development in the data system and data use. We also recommended building on the strong positions of Instructional Facilitator and the Office of Assessment and Research for support. In addition, we suggested immediately creating ways that Central Office departments could collaborate on data use.

Beyond these aspects, our findings suggested other issues in data use: We recommended the district significantly address the school dropout problem by implementing a student-specific definition of dropping out and by closely monitoring dropout activity. The district’s long-serving superintendent is retiring at the end of the 2007-2008 school year, so we recommended that the new superintendent be qualified to lead this initiative (however, we further cautioned that structures should be in place to support the data initiative, regardless of whom is hired). Observing that much of NCSd data use was counter to the way educators did their jobs, we recommended the district pay particular attention to the way data use fits with the flow of educational work. We also recommended that the district endeavor to provide transparency to the public about district data and take control of the information process. We noted that individuals outside the district are informally evaluating the district anyway and recommended the district address this issue—as the old adage goes, “tell your story or someone else will.” Lastly, we recommended that NCSd engage in ongoing evaluation of this process that will continue to inform effective data use.

INTRODUCTION TO THE EVALUATION

Introduction

For years, districts, schools, and other educational entities have collected data on student learning and other school processes. Unfortunately, these data were rarely made available for public use by educators or other stakeholders, resulting in districts that were simultaneously data rich but information poor. This situation has changed, with the introduction of various accountability initiatives such as the No Child Left Behind Act of 2001 (NCLB, 2002).

Through NCLB and similar policies, districts and schools are required to collect and report data on student learning, with the implicit assumption that educators will use these data for educational improvement. Unfortunately, educators have not traditionally been prepared to use these data effectively, and policies typically do not provide for supports to help educators use data. Consequently, many districts struggle with ways to most effectively to use these data to improve educational practice.

The Natrona County School District (NCS D) shares this struggle with many districts. Uniquely, however, district leaders have taken a visionary, proactive step toward making better use of data by enlisting the services of an evaluation team from The University of Texas at Austin that is expert in effective uses of data. The team was asked to conduct a thorough evaluation and audit of all aspects of data use throughout NCS D—from the boardroom to the classroom—and to make recommendations about how NCS D could engage in more effective, data-based decision making. In this report, we provide full details of this evaluation and resulting recommendations.

In the remainder of this section, we provide a brief review of literature, an overview of NCS D, a description of the evaluation, and a discussion of the importance of the evaluation. Sections entitled Methods, Results, and Recommendations provide detail about how the evaluation was conducted, what results were found, and the resulting recommendations.

Review of Literature

School data have been shown to be useful in improving overall educational practice. For instance, Chrispeels, Brown, and Castillo (2000) demonstrated that data use can be a strong predictor of the efficacy of school improvement teams. Streifer and Schumann (2005) reported precise predictions of student achievement using complex data-mining models. Additionally, studies have examined effective data use in support of whole-school models (Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006; Supovitz & Klein, 2003).

Data have been investigated as effective supports at a variety of district levels (Coburn & Talbert, 2006; Datnow, Park, & Wohlstetter, 2007; Wayman & Stringfield, 2006) and for a variety of roles (Lachat & Smith 2005; Wayman & Stringfield, 2006; Young, 2006). Research also suggests that data use has a positive effect on individuals and educational processes. For instance, collaboration has been promoted as both a facilitator and byproduct of data use (Chen, Heritage, & Lee, 2005; Wayman, Midgley, & Stringfield, 2006). Earl and Katz (2002) noted that school leaders involved in data use often consider themselves in charge of their own destiny, increasingly able to find and use information to inform their school's improvement. Data use can be helpful in changing educator views and attitudes toward educational practice and students (Armstrong & Anthes, 2001; Massell, 2001).

Teachers should be an integral component of effective data use because of the consistent contact they have with students and student learning. Studies from Ingram, Louis, and Schroeder

(2004) and Massell (2001) showed that while teachers expressed concerns about the appropriateness and importance assigned to assessments, they also recognized the new information afforded by assessments, along with the stimulus for new ideas brought about by inquiry. Other research has shown a variety of ways that teachers can realize improvement through involvement in a data initiative (Chen et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006). Wayman and Stringfield reported on schools that were involving many more teachers than previously thought possible.

Finally, computer systems are becoming recognized as integral components of educational data use. Educational data traditionally have been stored in ways that were inaccessible to most practitioners, but the advent of user-friendly data systems has made it possible to provide rapid, efficient data access to every educator (Mieles & Foley, 2006; Wayman, 2007; Wayman, Stringfield, & Yakimowski, 2004). Studies are beginning to emerge that describe the utility of these systems at a variety of district levels (Chen et al., 2005; Lachat & Smith, 2005; Streifer & Schumann, 2005; Wayman & Stringfield, 2006).

The Natrona County School District

NCS D is located in Casper, Wyoming. The city of Casper has about 50,000 residents and is located in central Wyoming. Casper is isolated from any major metropolitan areas, but there are many small, unincorporated towns in close proximity. Traditionally, the energy industry has been an important part of Casper's economy, due to development of coal, oil, and mineral resources.

The district serves approximately 11,500 students from Casper and eight small towns nearby. Schools include 4 senior high schools, 7 middle or junior high schools, and 27 elementary schools. The district context is characterized by local control, as NCS D traditionally has allowed parents and students to choose which school they attend. Some schools are subject to enrollment limits; waiting lists and other criteria are used to manage enrollment in these schools.

In terms of data use, NCS D is similar to most other districts we observe nationwide: There are pockets of effective use, pockets of no use, and a lack of consistency and vision throughout the district. Similar to many other districts, there are a number of different computer data systems in use, but data use is severely hampered by a lack of integration of these systems. On the other hand, there is a district-wide sense that data can be an important resource in conducting education and that NCS D needs to improve resources and capacity to use data at every level. This awareness led district personnel to seek a third-party evaluation of district-wide data use, intending that such an evaluation would help chart an effective course for NCS D data use in the coming years.

The Present Evaluation

In Fall 2006, NCS D issued a Request for Proposals (RFP) to evaluate data use district wide. District personnel recognized that the effective use of data would be important to the future of NCS D. District personnel also recognized that effective data use is a complex undertaking and saw limitations in their ability to identify a comprehensive suite of effective practices. Additionally, district data systems were seen as a barrier to data transfer and use.

Consequently, the RFP specified that data use should be evaluated throughout the district. Components of the requested evaluation included culture and attitudes about data use, information management policies, data use structures and practices, and current capacity to respond to data needs. Special attention was to be paid to technological issues, including data system functions, redundancies and gaps in data systems, and security issues.

The RFP specified that recommendations would be provided about policies and structures that could create a culture of data use and promote efficient, integrated use district wide. Recommendations were also sought about best practices for promoting and conducting data use, implementing an effective district-wide data initiative, and conducting ongoing feedback and evaluation. Additionally, recommendations were sought about acquiring and implementing state-of-the-art technology that would integrate NCSD data and provide efficient, user-friendly access for all district personnel.

In line with these specifications, the foundation for our evaluation was that NCSD should look to become a *data-informed district*, one where the conduct of education is integrated, supported, aligned, and understood at every level of the district and where effective, sensible uses of data inform educational practice throughout. We viewed the terms *data* and *data use* broadly. *Data* were any artifacts that helped educators better understand student learning, teaching practices, educational workflow, and other aspects of how districts are run and education is conducted. *Data use* was any practice that brought meaning, information, and knowledge out of data and used this learning to inform educational practice.

In conducting this evaluation, we employed a mixed-method design to assess data use at every level and by every role in the district. Interviews were conducted that helped us learn about data use throughout the district, encompassing a range of roles: the superintendent, bus drivers, board members, teachers, principals, and support staff, just to name a few. A district-wide online survey provided anonymous response to a variety of school-culture and data-use items. District documents were reviewed to help us understand the NCSD context.

A variety of analytic methods were used to synthesize and examine our data. We then drew upon prior research and our expertise in data use to forward a comprehensive set of recommendations that offer a blueprint for how NCSD may achieve district goals toward data use for educational improvement.

The Importance of this Evaluation

Conducting this evaluation presented an exciting opportunity for our research team. We viewed NCSD's request as proactive and visionary—we are unaware of any work that looks so deeply and broadly at district data use, and we were impressed that NCSD would take such an approach. Consequently, this evaluation is unique and important for a number of different reasons.

First and foremost, this evaluation will provide NCSD personnel with the information and recommendations they need to implement an effective, district-wide data initiative. Soliciting outside experts not only offers expertise, but also offers NCSD a critical, impartial view that is difficult to gain internally. This evaluation provides the district an effective, coherent, and research-supported plan for how to implement a data initiative relevant to the district's unique context.

Second, this work will provide districts and researchers an example of how a thorough evaluation efficiently can inform district planning for data use. Few districts thoroughly evaluate their data use before implementing practice, which presents an unfortunate irony: In effective data use, decisions are made through a process where data are collected, meaning is drawn, and plans are made based on this information. Unfortunately, few districts actually plan their data use *practices* using this process.

Third, this evaluation will provide important research on data use by providing broad and deep detail about district-wide data use and how these uses integrate with one another. Most data use studies have provided information on specific areas of the district (e.g., Chen et al., 2005;

Coburn & Talbert, 2006; Datnow et al., 2007; Ingram et al., 2004; Lachat & Smith, 2005; Wayman et al., 2006; Wayman & Stringfield, 2006; Young, 2006) or broad overviews of varied district functions (e.g., Kerr et al., 2006; Massell, 2001; Supovitz & Klein, 2003). While some of these studies have provided comparable depth to the present evaluation, none has provided such depth over an entire district spectrum. Also, while some of these studies have provided comparable breadth, they have not combined breadth with such detail. Further, we are unaware of any study that has provided such empirical detail about how various data and uses interact among levels, individuals, and roles.

Last, despite burgeoning knowledge about data use, much is still unknown. The present evaluation confirms some extant research but also provides important new details and insights about how educators use data—and how that use may be improved.

METHOD

We employed a mixed-method design in conducting this evaluation; qualitative data were collected through interviews and focus groups, and quantitative data were collected through a district-wide survey of data use and general school climate. Participants were selected to provide a broad coverage of perspectives on NCSd data use. In this section, we describe our methods and procedures for collecting and analyzing data.

Procedure

Data collection for this evaluation began in April 2007 with a series of individual phone interviews conducted by the research team. In early May 2007, an online survey was conducted to evaluate data use and school climate. In mid-May 2007, the research team visited NCSd to conduct focus groups and individual interviews. Following this site visit, analyses were conducted and follow-up information collected as needed. The following sections describe the resulting sample, along with qualitative and quantitative data collection procedures.

Participants. In conducting the online survey and in selecting participants for interviews and focus groups, we endeavored to include every role and context in NCSd that might be supported and affected by efficient data use. The combined sample of quantitative and qualitative data is comprehensive, representing every NCSd school but three; every Central Office department; each individual in the administrative cabinet; and groups outside the district structure such as parents, students, the board of trustees, and employee groups (e.g., the Natrona County Education Association). This sample is possibly even broader than indicated by the explicitly identified affiliations—while affiliations of individuals who were interviewed were known, individuals from a school, department, or group might not have identified their affiliation on the online survey.¹

The qualitative sample consisted of 128 participants who were interviewed either individually or in focus groups (see Qualitative Data Collection section below). Table 1 provides a description of the various roles and affiliations held by these individuals. Table 2 gives a breakdown of the number of individuals interviewed at each school, representing 22 schools.

The quantitative sample consisted of 435 individuals who responded to an online survey regarding district data use and school climate (see Quantitative Data Collection section below). Eight educational roles were represented: (a) Central Office staff, (b) principals, (c) assistant principals, (d) school counselors, (e) Instructional Facilitators, (f) teachers, (g) school support staff, and (h) other district roles. Table 3 provides a description of the quantitative sample, disaggregated by educational role and district experience. Table 4 provides a description of the teachers who took the online survey, by school affiliation (for anonymity reasons, only teachers were asked to identify in which school they worked).

Qualitative Data Collection

Qualitative data were collected through individual interviews and focus groups. Individual interviews were conducted using a semistructured protocol that focused discussion on

¹ For anonymity purposes, many roles on the online survey were identified only by general terms (e.g., “Central Office,” “counselor,” “other”) and the survey asked that only teachers respond to the question, “In which school do you teach?” It is possible that administrators, support staff, or counselors from the three unrepresented schools responded and were not required to self-identify. The same is true for any other group that is not explicitly identified in our data.

exciting district initiatives, ways data were used and accessed, specific data systems employed, and wishes for future data use. Focus groups were conducted using a semistructured protocol similar to that used in individual interviews.

At the Central Office level, employees were identified through a review of Central Office positions and interviewed by telephone or in person. This list was then discussed with our primary district contacts to ensure proper coverage. Additionally, many interviewees were asked to suggest other individuals to interview.

Data from nonteaching groups outside the Central Office (e.g., parents, students, and employee organizations) were collected through focus groups conducted during a four-day site visit to NCSD. These individuals were recruited with the help of NCSD administration.

Many teachers and principals participated through focus groups conducted during a four-day site visit to NCSD. School site visits consisted of two focus groups. In each school, the first focus group consisted of the principal, assistant principals, or other individuals designated by the principal. Immediately following the principal focus group, a teacher focus group was conducted. Teacher focus groups included 3–5 teachers that were selected by the principal from a randomly generated list of 7–9 teachers.

Schools selected for participation in focus groups were chosen to be representative of NCSD, in terms of level (elementary, junior high, high school), socioeconomic status (Title I status), and magnet curriculum as determined by the Office of Assessment and Research. To gain individual perspectives, teachers and principals were identified for individual interviews by random selection from a district-wide list stratified by elementary, middle, or high school.

All qualitative interviews were recorded. Each participant was offered the opportunity to decline having their response recorded; none chose this option.

Quantitative Data Collection

Quantitative data were collected through an online survey offered to all NCSD educators to assess data use, data use culture, and general school culture. The survey consisted of three parts: (a) a demographic section, (b) the Use and Perceptions of Educational Data Survey (Wayman & Supovitz, 2007), and (c) the School Culture Quality Survey (Borman et al., 2005). Teachers were asked to identify their school, but to protect anonymity, other building educators were not. Participants were not allowed to leave any items blank.

The Use and Perceptions of Educational Data Survey (Wayman & Supovitz, 2007) is a 45-item survey that provides evaluation of attitudes toward data use, perceptions of district data quality, computer systems for accessing data, district plans for linking data and learning, district supports for using data, and specific ways that data are used. Additionally, an open-ended question was included that asked educators what additional data would be helpful to them, as was an item that asked about use of NCSD-specific data systems. Psychometric characteristics of this instrument have not been reported previously.

The School Culture Quality Survey is a 36-item survey that assesses the cultural dimensions of shared vision, facilitative leadership, teamwork, and learning community. The School Culture Quality Survey has been shown to be reliable and valid in a number of district settings (Borman et al., 2005).

Measures

Items from the online survey were used to provide quantitative measures. Categories for comparison were drawn from the demographic portion, scales and individual items measuring data use were drawn from the Use and Perceptions of Educational Data Survey, and school

culture scales were drawn from the School Culture Quality Survey. The following paragraphs describe these measures.

Comparison Categories

Educational role and district experience were each used to compare educators on aspects of data use and school culture. Low cell sizes made quantitative comparisons by role difficult in some cases, so the roles of counselor, principal, assistant principal, and Instructional Facilitator were collapsed into one category called “administrative teams.”² Resulting categories for comparison included teachers ($n = 278$), administrative teams ($n = 38$), Central Office ($n = 13$), school support staff ($n = 61$), and other ($n = 45$). Although Central Office had only 13 participants, there was no similar role with which to combine, so analyses involving this role were conducted but viewed with caution.

District experience was evaluated by five possible responses to the survey question, “How long have you been employed in the district?” Preliminary analyses indicated that district experience could be equivalently represented by collapsing to three categories: (a) 5 years or less, (b) 6–10 years, and (d) 11 or more years.

Data Use Measures

Individual items on the Use and Perceptions of Educational Data were set on a 4-point Likert scale with response categories appropriate to the nature of the question (e.g., *strongly disagree*, *somewhat disagree*, *somewhat agree*, *strongly agree*). In the following paragraphs, we first describe the data use scales used for analysis and then describe the individual items used for analysis.

Five scales measuring different areas of data use were formed from survey items. In creating each scale, responses for all the items were added and then divided by the number of items in the scale to yield an average response per item. In this narrative, we offer a brief description of each scale and the alpha reliabilities; Table 5 lists the items used for each scale.

The District Vision scale was comprised of two items that assessed the participant’s perception of district goals and vision for learning and data use. The alpha reliability of this scale was 0.831.

The Instructional Uses of Data scale consisted of six items that asked how often the participant used data for varied instructional purposes (e.g., setting learning goals for individual students and tailoring instruction). The alpha reliability for this scale was 0.918.

The Professional Data Practices scale was a four-item scale assessing varied data uses as they applied to professional practice, such as adjusting practice with data and collaboration about data. The alpha reliability of this scale was 0.758.

The Supportive Computer Systems scale described aspects of computer systems that support data use. It consisted of three items, such as whether these systems were appropriate and user friendly. The alpha reliability of this scale was 0.833.

The Supports for Using Data scale evaluated the presence of varied supports. This five-item scale included supports such as professional development and knowledgeable individuals. The alpha reliability for this scale was 0.834.

² We recognize that these roles are distinct and different. While distinct in many aspects, they share a similarity in the way they relate to and support the craft of teaching. Preliminary analyses showed no consistent differences in the way these roles related to data use.

Additionally, individual items were singled out to help describe NCSD educator attitudes toward data use. One block of 12 items asked the degree to which participants engaged in specific data uses, such as identifying individual students who need remedial assistance, setting school improvement goals, and evaluating district achievement trends and performance. Other items examined were the following: “Improving my ability to use data will help me become a better educational professional,” “I think it is important to use data to inform educational practice,” and “I would like my entire district to become a ‘data-informed district,’ where data are used effectively to inform educational decisions at every level.”

Individual items also were used to assess educator use of specific data systems. The online survey contained items that asked participants to describe their use of five specific data systems: (a) AIMSweb for administering and managing formative assessments, (b) ENCORE! for managing special education data, (c) Northwest Evaluation Association (NWEA) reports for managing NWEA assessment data, (d) Pinnacle for managing grades and other student information, and (e) SASI for managing student information such as absences and schedules. A question asking about use of other systems was also included, along with a field to write in “other” systems.

School Culture Measures

Items on the School Culture Quality Survey were set on a 5-point Likert scale with response categories of *never*, *rarely*, *sometimes*, *often*, and *always*. In evaluating general school culture, four subscales were used; these scales have been demonstrated to be reliable and valid in norming groups (Borman et al., 2005). As with the data use scales, each scale was created by adding the responses for all items and then dividing by the number of items in the scale.

The Facilitative Leadership scale is a nine-item scale that describes the participant’s sense that leadership is actively facilitating the work of the school or district. Scale items include statements such as “teachers know that they will be supported if they want to try some promising new alternative” and “administrators at my school do all they can do to facilitate the work of faculty and staff.” The alpha reliability for this scale was 0.937.

The Learning Community scale consists of 11 items that describe the participant’s sense that the school or district is working together to gain skills and knowledge important to the school or district’s future. Items include statements such as “at my school, we plan what we want to do, then we do it and look carefully at the results before we plan the next step” and “at my school we share everything we learn so the whole school can learn.” The alpha reliability of this scale was 0.938.

The seven-item Shared Vision scale describes the extent to which educators see themselves as sharing a collective awareness of the school or district’s future. Scale items include statements such as “at my school, administrators and teachers work together to develop goals and values that guide us,” and “members of the faculty and staff at my school understand how the work that they do fits in with what others do.” The alpha reliability for this scale was 0.935.

The nine-item Teamwork scale describes the participant’s sense that the faculty is working together toward common goals in a mutually respectful and caring atmosphere. Items include statements such as “faculty and staff at my school work together very well” and “there is a feeling of mutual respect and caring among faculty, staff, and students at my school.” The alpha reliability for this scale was 0.942.

Analyses

Emergent themes from data analysis suggested the results were best understood when grouped into five general categories: (a) a summary picture of NCSD, (b) uses of data, (c) computer systems for using data, (d) district supports for using data, and (e) data effects on the work of education. Quantitative and qualitative analyses for this evaluation were conducted in support of each other in describing these categories.

Qualitative analyses followed methodology suggested by Miles and Huberman (1984). Drawing upon prior research on educational data use, an a priori list of potential analytic themes was generated, and as qualitative data collection progressed, these themes were updated and refined during research team meetings. This collaborative and inductive process resulted in a conceptually coherent set of themes that was used for coding interviews and focus groups. The research team used this set of themes to code participant responses. Themes were examined by role (e.g., district role, parent, or student) and by school level to identify emergent patterns and explanations regarding NCSD data use.

Quantitative analyses were often conducted using descriptive statistics. In addition, school-to-school variation was assessed using hierarchical linear modeling (HLM). In the following paragraphs, we describe qualitative and quantitative analyses used for each section.

A Picture of NCSD

Quantitative data from the online survey were used to provide an overall picture of NCSD. Three types of analyses were used.

First, descriptive analyses were conducted that presented averages of data use scales and culture scales by role and district experience. In addition, culture scales were presented for NCSD as a whole and compared to responses from a group outside NCSD that was used to provide baseline norms for the School Culture Quality Survey (Borman et al., 2005).

Second, three items were selected for examination that help describe NCSD educator attitudes toward data use: “Improving my ability to use data will help me become a better educational professional,” “I think it is important to use data to inform educational practice,” and “I would like my entire district to become a ‘data-informed district,’ where data are used effectively to inform educational decisions at every level.” These items were also disaggregated by role and district experience; percentage response in each category was observed.

Third, between-school differences were quantified by applying HLM for the data use and cultural scales (for anonymity reasons, only teachers were asked to identify their school, so HLMs were estimated only for the teacher subsample). Separate analyses were conducted for each of the five scales from the Use and Perceptions of Educational Data Survey and for each of the four scales from the School Culture Quality Survey.

Hierarchical linear modeling is an appropriate method because it properly accounts for the fact that teachers are nested within schools. Besides accounting for between-school variance, HLM accounts for the fact that individual teacher responses within schools have some dependence on each other. Thus, HLM gives a more accurate representation of school-to-school variance and is a more powerful method than merely modeling schools as the unit of analysis (Raudenbush & Bryk, 2002).

Estimation of the HLMs proceeded in two stages. To assess random variance between schools, models were first estimated with no school-level factors. For scales that displayed significant between-school variance at the 0.05 level, school-level explanatory variables were

included that identified school level and Title I status, resulting in the following model³ for teacher i in school j :

Teacher level (Level 1):

$$Y_{ij} = \beta_{0j} + r_{ij}$$

School level (Level 2):

$$\beta_{0j} = \gamma_0 + \gamma_1(\text{High School})_j + \gamma_2(\text{Middle School})_j + \gamma_3(\text{Title I})_j + u_j$$

In this model, *High School* and *Middle School* are dummy coded such that elementary school is the reference group and 1 denotes either high school or middle school. *Title I* was also dummy coded, with 1 denoting schools that receive Title I funding. Models were estimated for 278 teachers within 31 schools.

Uses of Data

Quantitative analyses examined 12 survey items that asked the degree to which participants engaged in specific data uses (e.g., identifying individual students who need remedial assistance, setting school improvement goals, and evaluating district achievement trends and performance). For selected roles (teachers, administrative teams, and Central Office staff), these 12 items were ranked by mean response. Rankings and means were compared descriptively to compare and contrast data uses by role.

Qualitative data for this section were synthesized from comments educators, parents, and students made about their own specific uses of data. Additionally, the data initiatives of three elementary schools (Mills, Paradise Valley, and Westwood) were described.

Computer Systems for Using Data

A list of all computer data systems mentioned in interviews was compiled, and counts of the number of participants who mentioned each system were provided. In addition, this list was combined with a list of systems cited on the online survey to provide a comprehensive list of systems used in NCSD.

Survey items asking about use of six specific computer systems (AIMSweb, ENCORE!, NWEA, Pinnacle, SASI, and “other”) were examined. For this analysis, system “frequent use” was measured by combining the percent of users who reported using a system “moderately” or “extensively.” Frequent use of each system was examined and compared for teachers, administrative teams, and Central Office staff.

Interview responses added description and depth to the system use items. Interviews provided insight about how data systems are used, how they are supported, and what educators want in a system.

District Supports for Using Data

Interview data were analyzed to determine the nature and availability for varied supports for effective data use. Comments about district vision, professional development, and the roles of specific district support positions were examined and identified by role when appropriate. In

³ Number of students enrolled was also considered, but this variable was confounded with school level and made model estimation difficult.

addition, the ranks of the District Vision and Supports for Using Data scales were observed relative to the other scales.

Data Use and the Work of Education

Data from qualitative interviews were examined to provide insight regarding how data use was affecting the way educators do their jobs. No quantitative data were drawn upon for these analyses.

Terms

Some readers may find the terms and acronyms used throughout this report to be new or esoteric. In this section, we provide a few informal definitions that might prove helpful in understanding results and recommendations.

- *AIMSweb* – a computer-based formative assessment system, used by some schools in NCSD to evaluate elementary reading levels.
- *DIBELS* – an acronym for Dynamic Indicators of Basic Early Literacy Skills, a set of short, individually administered measures used to regularly monitor prereading and early reading skills.
- *ENCORE!* – a computer system for managing special education information, offered by Spectrum K-12 School Solutions, Inc.
- *Formative assessments* – assessments given frequently to provide instant information on student learning and suggest teaching adjustments. Formative assessments are given on a teacher-set schedule and changes in teaching practice typically occur within one or two class periods.
- *Growth assessments* – periodic learning assessments provided by NWEA (see below).
- *NWEA* – an acronym for Northwest Evaluation Association, a nonprofit organization that researches periodic learning assessments. NWEA provides growth assessments that monitor learning over the course of a school year. These assessments are managed through a computer system provided by NWEA. In this report, *NWEA* may refer to the organization, the assessments, or the computer system, depending on the context.
- *PAWS* – an acronym for Proficiency Assessments for Wyoming Students, the state assessment required to be taken by K–12 students. Educators may access PAWS data through a Web site.
- *Pinnacle* – a computer system by Excelsior Software. The Pinnacle Suite provides various data functionalities such as grade books and assessment management.
- *SASI* – a student information system provided by Pearson Education that stores day-to-day student data such as enrollment, attendance, and scheduling.
- *SRI* – an acronym for Scholastic Reading Inventory, a periodic assessment of reading skills. Many NCSD schools also use the SRI computer system to manage SRI reading data.
- *Summative assessments* – assessments given to identify knowledge gained over a period of time. PAWS is one example of a summative test, designed to measure learning over the course of an entire school year. Summative assessments are not designed to affect instruction in the short term (formatively), although they are often used this way.

RESULTS

In this section, we present the results of our analyses. Results are divided into the following sections: an overall picture of the district, uses of data, computer systems for using data, district supports for using data, and data effects on the work of education.

A Picture of NCSD

Data from the online survey provide an overall picture of the ways that NCSD educators use data, how they feel about various aspects of using data, and the general climate of the district. The following sections provide results of these analyses. School culture scales are outlined first, followed by data use scales, individual data use items, and analyses describing school-to-school variation on both data use and school culture.

School Culture Scales

Table 6 shows means from the four scales of the School Culture Quality Survey for the full sample of NCSD educators and the norm group used to validate this survey (Borman et al., 2005); NCSD educators scored almost a half point lower on the Shared Vision scale than the norm group and scored slightly lower on the other culture scales than the norm group. Means on these scales disaggregated by educator role are shown in Table 7 for NCSD and Table 8 for the norm group. The five NCSD roles were similar in the way they viewed the presence of a shared vision, facilitative leadership, teamwork, and learning community in their schools and district. One exception was Central Office staff, who averaged about a half point less on each scale than staff in other roles.⁴

Table 9 shows the means of these four scales disaggregated by district experience for NCSD (similar data were not available for the School Culture Quality Survey). Perceptions of various dimensions of school culture did not vary appreciably by district experience.

Data Use Scales

Table 10 shows means from five scales from the Use and Perceptions of Educational Data Survey, broken down by district role. NCSD educators generally scored higher on scales pertaining to using data in practice. Each role scored highest on the Professional Practice scale, and, for teachers and administrative teams, the second-highest ranking scale was the Instructional Uses of Data scale. Consistent with their roles, teachers and administrative teams scored higher on this scale than did Central Office staff, school support staff, or other district roles.

Educators in NCSD generally responded lower on scales pertaining to support issues. Most roles scored lowest on either the Supports for Using Data or the District Vision scales; employees in administrative roles (administrative teams and Central Office employees) rated the district lower on District Vision than did other roles. Scores on the Supportive Computer Systems scale were similar across roles, with teachers scoring slightly lower than other roles.

Table 11 shows that, with the exception of the Instructional Uses of Data scale, there was a slight downward trend in data use scales when disaggregated by district experience. Educators with 5 or fewer years of experience scored slightly higher on these scales than those with 6–10

⁴ Note that the School Culture Quality Survey is focused more on building climate than district climate—it is possible that Central Office staff responded lower on these items because the items did not adequately reflect their roles.

years of experience; educators with 6–10 years of experience scored slightly higher than educators with 11 or more years.

Data Use Items

In addition to items used in data use scales, three survey questions helped describe NCSDE educator attitudes toward data use: “Improving my ability to use data will help me become a better educational professional,” “I think it is important to use data to inform educational practice,” and “I would like my entire district to become a ‘data-informed district,’ where data are used effectively to inform educational decisions at every level.”

Table 12 gives breakdowns of responses to these three items by educational role. There was a positive response to all three items, with 86% of the sample answering “agree” or “strongly agree” that improving their ability to use data will help them become better educational professionals. Additionally, 93% agreed that data help professionalism and practice, and 79% agreed that their district should become a data-informed district. On all three items, administrative teams were the group that responded most positively. More specifically, the percentage of administrative teams who strongly agreed was approximately twice as high as that of teachers for all three items.

Table 13 shows responses to these three items disaggregated by district experience. Overall, there appear to be small but consistent trends that individuals with less experience have more positive attitudes toward data use.

First, a slight downward trend can be seen on the item “improving my ability to use data will help me become a better educational professional,” with “agree” or “strongly agree” being marked by 93% of educators with 5 or fewer years of experience, 88% of educators with 6–10 years, and 83% of educators with more than 10 years. Second, although a downward trend was not evident in individuals agreeing or strongly agreeing that it is important to use data to inform educational practice, the “strongly agree” category alone showed a downward trend: Table 13 shows educators with 5 or fewer years of experience as 10% higher than those with 11 or more years of experience. Finally, individuals with less experience were more favorable to becoming a data-informed district; 88% of those with 5 or fewer years of experience marked “agree” or “strongly agree,” as opposed to 78% of those with 6–10 years and 75% of those with 11 or more years.

School-to-School Variation

Our data indicated considerable variation between schools in terms of culture, use of data, and the way teachers felt about data use.⁵ Between-school variation was first assessed by constructing HLMs with no predictor variables. Significant between-school variation was revealed at the 0.05 level for all scales except the Professional Data Practices scale ($p = .213$).

We then attempted to explain significant between-school variation by accounting for school level (elementary, middle, and high school) and Title I status. Table 14 shows that similar models were estimated for all four culture scales. On each scale, high school teachers reported the lowest climate scores, followed by junior high teachers and elementary teachers. On all four scales, high school teachers rated their school climate a full response point lower than did elementary teachers, and junior high teachers scored between 0.45 and 0.70 points lower than elementary teachers.

⁵ Recall that only teachers were asked to identify the school in which they worked.

Teachers from Title I schools reported significantly lower climate ratings on all scales except Learning Community. Even with most explanatory variables registering significant, a significant amount of unexplained between-school variance remained in all four scales.

Table 15 shows that the general school-level pattern was similar for the data use scales: Teachers from high schools averaged the lowest data use scores, teachers from junior high schools were next lowest, and teachers from elementary schools scored highest. However, school-level differences were not significant for the Supports for Using Data and the District Vision scales. The largest effects occurred on the Instructional Uses of Data scale, where high school teachers scored 0.68 points lower than elementary teachers and junior high teachers averaged 0.41 points less.

Title I schools scored higher on the data use scales than did non-Title I schools. This effect was significant at the 0.05 level for the Supportive Computer Systems and Professional Data Practice scales and at the 0.10 level for the Supports for Using Data scale. Significant effects ranged from 0.24 to 0.34 points.

After including the explanatory variables of school level and Title I status, no significant between-school variation remained for the Supportive Computer Systems and Professional Data Practices scales ($p > .50$ for each). However, these variables may not account for all of the school-to-school variation on the Instructional Uses of Data and Supports for Using Data scales; both p -values were near 0.05.

Uses of Data

In order to effectively examine data use in NCSD, it is important to describe ways that data are being used to improve education. In this section, we draw upon quantitative and qualitative data to provide a variety of descriptions of how data are used in NCSD. Not surprisingly, data uses varied depending on district role, evidenced in interviews and by 12 survey questions that asked about specific uses of data for educational improvement.

In presenting these results, we first describe data use by principals and administrative teams, then by teachers, by Central Office staff, and by parents and students. Finally, we highlight three schools, describing the diverse ways data were used in those schools.

Principals and Administrative Teams

Table 16 presents the mean response to 12 items from the online survey for teachers, administrative teams,⁶ and Central Office administrators. Table 16 shows that administrative teams reported themselves to be most frequently using data to set school improvement goals. While this may be true, our interviews with building administrators and administrative teams yielded only occasional comments about using data for goal-setting. Of these comments, most dealt with how data inform school improvement plans or how data yield information on programs. Further, these comments rarely were accompanied with any specific details or examples regarding how data informed these purposes.

Far more common in the administrator interviews were comments about how they used data to respond to the individual needs of students. These comments were in line with responses from the online survey—Table 16 shows that developing tutoring recommendations and identifying students for remedial assistance were the second- and third-most cited data uses by administrative teams. In our interviews, administrators were able to cite many specific details of

⁶ Recall that the category of *administrative teams* includes principals, assistant principals, counselors, and Instructional Facilitators.

how data were used to help individual students. Commonly cited data for this purpose were assessments that informed instruction, such as SRI reading assessments and NWEA growth assessments in various subjects. Activities to explore these data commonly involved working with individual teachers to identify specific interventions for individual students and periodic meetings that focused on individual students. In some cases, principals served on a committee that met with every student in the school to review academic progress.

Instructional Facilitators shouldered much of the data responsibilities in many schools, and we observed many ways they used data. For instance, some were examining data and advising principals and teachers about decisions based on these data. Some were using data to help teachers learn how to use data themselves. Many were performing clerical duties regarding data, such as printing off reports and distributing them to faculty.

Notably, Table 16 shows that administrative teams were less commonly using data to identify curriculum gaps or to identify areas for teacher improvement, and in our interviews, we heard very little about curriculum decisions that were being made with data. We did hear frequent instances of administrators working with teachers to identify student needs, but these comments were nearly all student focused. Rarely was the focus on how the teacher could improve practice and become a better teacher.

Additionally, we note that much of the actual use of data cited in our interviews came from members of administrative teams who were not principals (e.g., Instructional Facilitators). While we interviewed a few principals who were themselves involved in the practice of using data, our qualitative data suggest that most NCSD principals are using educational data only on a cursory basis. Comments and descriptions from principals about their data use lead us to believe that most NCSD principals lack the preparation to effectively use data as an everyday part of their jobs. We view this as no fault of principals; their current realities make it hard for them to gain the skills critical to effective data use. Instead, principals are more likely to delegate this responsibility to others on their team, such as a tutor or Instructional Facilitator whose job has afforded them the professional development for data use.

Teachers

Table 16 shows that teachers were most frequently using data to respond to individual student learning needs, often for lower-achieving students: The top three teacher uses of data were (a) identifying individual students for remediation, (b) developing recommendations for tutoring, and (c) tailoring instruction to individual needs. Additionally, qualitative interview data agreed that teacher data use was almost exclusively devoted to identifying student learning needs. Still, we observed teacher use of data was less common than self-reported on the survey.

Of those teachers using data, we commonly heard specific data cited for general instructional use, through comments such as the following: “Growth assessments help me know where my students are,” “I rely on growth assessments quite a bit,” and “I look at class size to figure out what’s best for student’s needs.” For general instructional use, most data cited were learning assessments. Growth assessments provided by NWEA were far more frequently cited than other assessments because teachers felt these growth assessments gave the best picture of student learning. Teachers also felt that students related to growth assessments better than the state test (PAWS) because students could chart progress and set more immediately attainable goals. Growth assessments were seen as a good tool for at-risk and special education students because these assessments were considered “at their level” and thus less discouraging than PAWS.

Some teachers were also able to describe in detail the ways they used data specifically to identify learning needs. Nearly all of these uses involved commercial learning assessments such as NWEA growth assessments, SRI reading lexile scores, DIBELS reading assessments, and PAWS state achievement tests. Elementary teachers were much more involved in specific data use than middle-level teachers, who were more involved than high school teachers.⁷

Reading and language arts were the subjects most commonly addressed in our interviews; we heard far fewer comments regarding data supporting other subjects. Reading evaluations using the DIBELS inventory were cited as useful to teachers in identifying needs for further support. Some of these needs were identified through meetings by groups of teachers about DIBELS scores. Teachers cited use of PAWS scores on reading and writing to help identify students for differentiation and supplemental materials. Teachers also cited uses of reading classifications (in lexile scores) provided by SRI to identify student reading levels and recommend books to parents. Some teachers were using a triangulation of assessments (e.g., NWEA, DIBELS, and PAWS) to form ability groupings.

Less common data uses included varied assessments for special education; practice tests for the PAWS; and nonassessment data such as extracurricular involvement, attendance, student attitudes, and free-lunch status. Consistent with survey data (see Table 16), we heard few comments indicating that teachers are using data to identify curriculum gaps or to work with parents.

Most of the comments we heard about data uses were positive, but it was also clear that teachers want more knowledge about student learning than they feel these data provide them. Some comments were explicit criticisms of the data—for instance, one elementary teacher described buying books based on student reading lexile scores, but the books turned out to be too easy for the students. Another teacher referred to reading assessments as “extra effort” in which she did not often engage. Other attitudes toward all assessments were characterized by one teacher’s comment about the DIBELS: “It’s a good snapshot, but it’s not the end-all.”

Interestingly, although teachers clearly demonstrated uses of data, they were consistently vague about actions taken from using these data. Actions resulting from data use were often stated in general terms such as “identifying students for support” or “grouping students.”

Finally, these data suggest that teacher data use in NCSD is not widespread or deep. Teachers reported themselves to be using data in the moderate range on the Instructional Uses of Data scale (see Table 10), but we did not hear this level of data use consistently described in our interviews. Instead, we heard that access to data is difficult in NCSD and that teachers often feel unsupported or uncomfortable with data—results that are more in line with the lower levels of support suggested by the Supports for Using Data, Supportive Computer Systems, and the District Vision scales (see Table 10). One bright spot in this finding is that while the data do not reveal widespread teacher use, the data also do not reveal widespread resistance to data use.

Central Office Administrators

Data use by Central Office administrators showed more variety than did use by teachers or administrative teams. Survey data showed that Central Office administrators were most likely to be using data for evaluation of district and building achievement trends. Similar to teachers and administrative teams, however, Central Office administrators were also involved in

⁷ It should be noted that there are a greater variety of commercial assessments available for younger students than older students.

identifying individual students for remedial assistance (see Table 16). In our interviews, we heard varied uses, depending on the particular group or office interviewed.

One primary Central Office use of data was in providing support to schools and to the teachers, administrators, and other professional positions in these schools. This type of support was most commonly cited by individuals in the Special Education, Curriculum and Instruction, and Assessment and Research areas. Central Office staff reported examining individual and aggregated student trends to help make recommendations to building staff, most commonly citing formal learning assessments and special education data (e.g., screening tests and individualized education plans). They used these data to help educators with building-level issues such as informing school and district improvement plans, school achievement reports, and help with special education progress and compliance. They also used these data to help individual practice, such as providing one-on-one support for teachers or Instructional Facilitators. It is interesting to note that Central Office staff cited working with teachers or administrators more than teachers or administrators cited working with Central Office staff. It is unclear whether these data merely reflect the focus teachers may have on their own classrooms, or whether these data indicate an imbalance of perception between the two roles.

Other uses of data were specific to the office or group using the data. Although we heard from many groups, we use the transportation, human resources, and community relations groups to provide diverse illustration.

The transportation group made extensive use of student demographic data such as student pictures, addresses, and phone numbers. These data are used to safely deliver students and respond to changes in living situations. Special situations also demand data access by this group, such as foster situations and parental contact limitations. While these data are important for safety and security, transportation employees expressed concern about the accuracy and timeliness of the data they access, making the data difficult to use properly.

Human resources personnel reported using data to identify personnel trends, many of which impact business and financial decisions in the district. Data were used to track and forecast employee absences, substitute teacher uses, leave time, and enrollment trends to plan for staffing models. One employee noted the necessity of data use for these purposes by saying, “We are trying to make smart business decisions in human resources by using as much data as we can.” Employees in human resources were also engaged in maintaining data for purposes such as employee complaints and litigation, and maintaining protocols for teacher leave.

The community relations group uses data both to help educate the public and to improve public opinion of the district. One interesting initiative was a documentary including interviews with successful students and former dropouts.⁸ The documentary will be shown in movie theaters and to potential funders. It is also possible that these data may be combined with student engagement data from other departments to better inform the design of future school facilities. The community relations group is also attempting to educate parents and the public in order to help them choose schools. In doing so, community relations is trying to provide data they believe will help parents make choices, and in the process, educate parents as to what these data mean.

It is interesting to note that survey data indicated Central Office personnel were using data less to determine professional development topics than they were for other uses. Also, similar to teachers and administrative teams, Central Office educators were using data less to identify curriculum gaps than for other purposes (see Table 16).

⁸ Such interviews are considered “student data” in the broad approach taken for this report

Additionally, some Central Office educators expressed frustration with data management for the state's "Body of Evidence" program. While Central Office personnel are engaged in helping building personnel on this program, the data requirements can make this charge sometimes difficult. Examples of data barriers include data flow, data access, student mobility, and variation in data entry practices by teachers and other personnel.

Parents and Students

In the interest of gaining every possible perspective, we conducted a focus group involving parents and a focus group involving students. While we do not presume these groups to be representative of the entire parent and student populations, the perspectives gained in these meetings offer insight into the use of data by parents and students.

Parent use of data was mostly reported to be individually conducted and in terms of their own children's learning data. For instance, each parent was sent a packet of data with their children's assessment information at the end of the school year. Some parents were also accessing grades, attendance, and other data online through Pinnacle. Additionally, data were sometimes discussed at parent-teacher conferences. Unfortunately, educators are not commonly engaging parents in data use, as evidenced by the low rank of this item for every school role (see Table 16).

Members of our focus group agreed that they had difficulty interpreting the data they were given, particularly the assessment information. One parent said, "Sitting down and processing these scores is hard because we're not statisticians." The group was clear that they would like more understanding about what assessment results mean. Access to the Pinnacle system was considered very helpful by some parents, but some also expressed reservations because some families do not have consistent Internet access.

Parents were also accessing general school information through the district Web site and other local Web sites, but concern was expressed about these data stores. Some parents were concerned about the transparency of these data, that these data might only offer partial information. One parent noted that parents everywhere evaluate schools and teachers informally, so providing more information would be beneficial to all: "We're talking about schools and teachers at the basketball games anyway, so we need this data."

The 2006–2007 NCSD Improvement Plan (NCSD, 2006) submitted to the Wyoming Department of Education mandates that all students be involved in using their learning assessment data in a process of academic goal setting. Students cited evidence of this, with most reporting working with their teachers about grades, assessments, and goals.⁹ Students also accessed their own data through Pinnacle; some in this group stated that many students did not know they had such access.

Three Schools

In this section, we highlight the specific data uses in Mills Elementary, Paradise Valley Elementary, and Westwood¹⁰ Elementary schools. In these schools, we heard a variety of excellent and interesting data uses that provide diverse illustrations for this report.¹¹

⁹ In our school interviews, we observed that some schools were far more invested in this process than others.

¹⁰ Westwood and McKinley elementary schools recently merged. District records refer to this school as "Westwood."

¹¹ While educators in these schools use data effectively, their illustration does not imply an endorsement of these schools as "the best" in NCSD.

Some commonalities were seen among these schools: Each used data in focus meetings addressing individual student needs through meetings involving varied roles such as classroom teachers, the Instructional Facilitators, social workers, nurses, tutors, counselors, and principals. At each school, triangulation (the use of multiple data sources) was commonly used to give a full picture of educational needs. Many individuals at each school reported years of involvement in some form of data. Lastly, we observed data use in these schools to be very person dependent—we did not commonly see structures in place that would sustain these data initiatives if the individuals most invested in these initiatives left. Following are brief discussions of data use in each school.

Mills Elementary. Educators at Mills Elementary used a variety of data for a variety of purposes. They supported a balanced literacy program with a triangulation of data: SRI lexile scores were used for grouping students; PAWS data and NWEA growth assessment data were used in different ways to monitor progress and establish benchmarks. More formatively, “running reading records” (a teacher observation protocol) were used to gather data almost weekly and to inform instruction. Also, as a school employing the response to intervention (RTI) model,¹² data from AIMSweb and NWEA growth assessments were used to identify targeted interventions for students.

No fewer than five forms of data (the above, plus STAR Math) were cited as used in various combinations for purposes such as student grouping, tutoring identification, and special education monitoring. These data, along with less formal data such as behavior, attendance, and health data, were used to give a whole picture of each child at focus meetings that occurred three times a year. At these meetings, student progress was discussed and interventions were tailored.

These uses certainly suggest Mills is an advanced, data-using school. However, our data also raised the possibility that many teachers in Mills Elementary were not involved in data use. While we heard frequent instances of professional staff leading interactions with teachers about data use, it was unclear whether teachers were deeply invested in these interactions and whether these interactions were widespread throughout the faculty.

Paradise Valley Elementary. Data use at Paradise Valley Elementary was also characterized by multiple and frequent uses. Additionally, it was characterized by the involvement of teachers. Teachers collaborated weekly and then met for 1½ days quarterly to discuss student issues. We heard many examples of how PAWS, NWEA, SRI reading tests, and Advantage (a mathematics screening program) data have been a focal point of these collaborations. Teacher-written assessments were also being explored and used for these purposes. Paradise Valley teachers were clear in their individual uses of data. For example, one teacher described focusing instruction based on NWEA growth assessment results, and another described the utility of examining PAWS results with each of her students.

The principal at Paradise Valley described how varying the context has been helpful at their school, citing examples of looking at “large-scale pictures” with PAWS data and “small-scale pictures” with NWEA data. She also described working with teachers on their data use, noting that since teachers are each in a different point in their careers, they likewise need differentiation for developing data skills.

At Paradise Valley, hard-copy reports contained a variety of student data that gave an overall description of student progress and facilitated data triangulation. Teachers and other

¹² RTI is a whole-school model that uses scientifically based assessment to encourage early identification of learning difficulties.

personnel were expected to keep these reports updated by hand and bring updated copies to collaborative meetings about students (e.g., focus meetings).

While the data work at Paradise Valley was excellent, it was also difficult and time consuming. Personnel reported most of their data were analyzed by hand-entering data on paper reports or charts; in some cases, spreadsheets were used. Certainly, integrated data systems greatly would improve and facilitate the work currently happening at Paradise Valley.

Westwood Elementary. Westwood Elementary educators described a fairly mature data initiative, marked by individual teacher use and programmatic decisions. One teacher commented that, as a Success for All¹³ school, they were accustomed to collecting and charting student data for reading decisions and that this practice had begun to spill over into other subjects.

The principal at Westwood reported that data were used in an assessment cycle designed to “reassess and regroup” every 8–9 weeks. In this process, triangulation occurred using data from SRI, Success for All, and Literacy First for reading and Saxon Math for mathematics, to help make decisions about instruction and groupings for the next 8 weeks.

Westwood teachers found formative uses of data to be most useful; as one teacher put it, “Stuff that’s applicable to what we do every day.” While the principal and teachers described varied formative uses of formal assessments such as those described above, teachers additionally described “daily monitoring data” that were important. Examples were given of “checklists, sticky notes...or what a student is understanding or even wearing.”

Examples were also cited where specific programmatic decisions were informed by data. For instance, Westwood educators used data to support the need for and acquisition of a new mathematics program. Writing curriculum and expectations were increased based on data. Also, data were used to identify reasons for not making Adequate Yearly Progress (AYP) one year—these reasons were addressed and AYP was attained the following year.

While their data uses were exemplary, Westwood personnel also appeared to be charged with managing a great amount of data. District computer systems used to manage data from disparate sources do not communicate well, and it was unclear to us how teachers could manage their informal data in any fashion other than anecdotally.

Computer Systems for Using Data

Throughout NCSD, a variety of computer systems are used to sort, store, and examine data. Many of these systems serve specialized functions, such as grading, disaggregating student test data, or handling employee records. Our data revealed that a large majority of NCSD educators are using these systems in various ways, but the lack of integration of these systems severely hampers efficient use. In describing NCSD computer data systems, we discuss the systems currently in use, how they are used, and what NCSD educators want from their systems.

Computer Systems Used by NCSD Educators

Through interviews and the online survey, NCSD educators reported using 73 separate systems to examine data. Table 17 provides a comprehensive list of all data systems that were mentioned either in the online survey or participant interviews as being used for data purposes.¹⁴

¹³ Success for All is an established, commercially available reading program. One component is that data are used to chart student reading progress.

¹⁴ In some cases, we were not able to verify that these systems are actually data systems.

The length of this list underscores the diversity of systems being used district-wide for student data.

The online survey contained questions that asked participants to describe their use of five specific data systems: (a) AIMSweb for administering and managing formative assessments, (b) ENCORE! for managing special education data, (c) NWEA reports for managing NWEA assessment data, (d) Pinnacle for managing grades and other student information, and (e) SASI for managing student information such as absences and schedules (a question asking about use of other systems was also included). Of these systems, ENCORE!, NWEA, Pinnacle, and SASI are provided by the district, but the AIMSweb system is bought by individual schools.

Table 18 shows the percent of users who reported that they frequently used a system (by noting “moderate” or “extensive” use). The Pinnacle, NWEA, and SASI systems were used the most overall, but use varied by group. Teachers were using the Pinnacle system most extensively (60% reported moderate or extensive use), followed by NWEA (47%). For administrative teams, NWEA (76%) and SASI (71%) were the heaviest used systems. Central office staff used SASI considerably more (77%) than the other systems but still reported high use of NWEA (54%) and Pinnacle (46%). School support staff were primarily using SASI (59%).

The “other systems” survey question provided individuals an opportunity to note systems used other than the five explicitly asked. Table 18 shows that in every role, more than 15% of participants reported regular use of other systems. The other systems most commonly cited as regularly used were the Orchard system for administering student assessment (13 users) and online access to PAWS data (10 users).

Qualitative interviews provide another aspect of system use; systems mentioned in each interview were counted and tabulated. Table 19 shows data systems mentioned in more than five qualitative interviews for each role. Most systems frequently mentioned were the same as those asked on the survey. Exceptions were the PAWS online system and SRI system frequently used in schools, the IFAS system that tracks personnel data (referred to in NCSD as the “Links” system), and the stand-alone Filemaker Pro and Excel databases used by Central Office staff. Similar to the survey data, systems frequently mentioned by school-level personnel were almost entirely devoted to instructional data, whereas systems frequently mentioned by Central Office personnel served varied functions.

How Computer Systems Are Used by NCSD Educators

While the data presented above offered important information on the quantity and intensity of system use, data also offered information about the utility of these systems in NCSD. In conducting our interviews, we found that data systems were being used for specific and diverse purposes. Because these systems were not integrated, we saw many instances where individuals were using homemade data systems that served very specific needs, typically to augment other systems or to integrate disparate data sources. We first describe system uses and then discuss structural influences on these uses.

System uses. The three primary uses of data systems were (a) accessing demographic and background information about students, (b) accessing student state test scores, and (c) examining periodic learning assessments. Student demographic data were accessed by many people through SASI. Since many educators do not have access to SASI, and SASI feeds data into other systems, we also heard individuals speak of accessing student demographic data through a variety of systems intended for other purposes (e.g., Pinnacle and ENCORE!). In addition, some groups had become skeptical of the data accuracy in SASI and had created or purchased their own student information systems, maintained parallel to SASI. Educators found it useful to

access demographic data through a diversity of systems; diverse access also caused problems because many users were also enabled to change the data in some systems. Consequently, we observed many different—and often conflicting—versions of static data such as gender, ethnicity, and home contact information.

State test data (PAWS) were often accessed through an online system available from the state. There were other, less common ways to access PAWS data through locally built databases such as the Assessment Management System (AMS) maintained by the Office of Assessment and Research. Most educators had (or chose) limited access to these systems. In fact, we observed many educators accessing PAWS data not from the online system, but through printed reports given to them by someone else.

Periodic learning assessments were administered, organized, and accessed through a variety of systems. By far, the most commonly mentioned system was NWEA. The growth assessments provided by this system were popular among teachers and other educators. While this might suggest system use was common, we frequently heard of educators accessing the NWEA computer system sporadically or receiving printed paper reports from someone else in support or administration roles. In the survey results, nearly 50% of teachers reported accessing the NWEA system frequently (see Table 18), but in interviews, we only occasionally heard teachers reporting frequent use of this computer system. It is possible that teachers were including paper reports provided by others as “system use” for the survey.

Other data systems were used by pockets of individuals. For instance, many educators used the Pinnacle system for entering grades, but this system was typically not available to elementary teachers. Other examples included SRI for periodic reading assessment, AIMSweb for tutoring and periodic assessment, and ENCORE! for special education data. Additionally, there were a myriad of systems designed for very specific uses and therefore not used by many individuals.

Structural influences on system use. The ways in which NCSD computer systems are used to examine data are affected to a large degree by structures that are in place for the systems themselves and the ways they can be used. Perhaps the largest such influence is the fact that most NCSD data systems serve stand-alone functions. Data systems are not typically integrated to share information, so users must access different systems for different forms of data.

We observed many effects created by system disconnection. Not surprisingly, we observed system use (and data use) to be haphazard throughout the district. Because it was nearly impossible to connect varied stores of information, we saw educators at every level examining the data they could easily access rather than the data they needed. Access to partial stores of data also meant that educators—particularly at the building level—were typically unable to examine student learning in terms of a “whole picture.” For example, we observed schools that leaned heavily upon the NWEA growth assessments for the current year. While this information was useful, it would have been much more useful if a data system existed that allowed access to growth assessments over a student’s entire career; connected these assessments with a student’s PAWS scores; and connected both types of assessments to, say, disciplinary data and data from the Career Information System.¹⁵ Recognizing the value of integration, some entities had created homemade databases to provide integration, the most visible example being AMS, maintained in Filemaker Pro by the Office of Assessment and Research. District-wide, however, educators

¹⁵ The Career Information System (CIS) is a program we heard about that provides career information and helps students maintain career portfolios.

agreed that these locally built databases provided inadequate function and power to serve the needs of all district educators.

Problems with the systems themselves were also affecting use. In addition to gradebook functionality, the Pinnacle system offers a degree of capacity to integrate varied forms of data to provide the analyses described above. Still, learning the Pinnacle system takes a large amount of training, and complaints we heard suggested the learning curve may be a permanent barrier. Although Pinnacle offers some integration capacity, it was not designed for such and may present limitations as more data are offered for integration. Additionally, not all schools have access to the Pinnacle system.

Problems with other systems were leading entities to maintain parallel systems. For example, problems with the SASI system had caused at least one school to buy its own student information system. This school maintained parallel systems; staff maintained the SASI system to meet district needs and maintained their new system to meet their own needs. Problems with the SASI system had also led the transportation group to maintain in parallel their own database of student information. Additionally, we saw a number of homemade databases built by different individuals because they felt SASI data were inaccurate or did not meet their needs.

Many of the problems with SASI are due to the lack of structure for data entry. Our data show that many individuals serving many roles may enter data into SASI, and some individuals reported receiving little or no training on how to enter data. Additionally, we did not see any rubrics or structures as to how data are defined or how they are to be entered, nor did we see structures for how they are to be maintained or who is ultimately responsible for maintenance. As the main data store for NCSD, SASI is the most prominent example of data entry problems, but these problems apply to nearly every data system and are rampant throughout NCSD. We often heard complaints of data “changing” overnight in different systems. We were not able to determine the root of these complaints, but we suspect that the variety of operators and indiscriminate structure and maintenance may be to blame.

Data system support for educators. We observed a variety of ways that data systems supported educators in their work, not all of which were efficient. We provide brief description specific to data systems here; more detail relating to the work of education is provided in the Data Use and the Work of Education section below.

In some cases, we observed educators who were adept at data use and knew how to use data systems to access the data they needed. For these educators, data systems were a great support.

Some educators were dependent on others for support in using systems. One example of such support was a large number of educators who were receiving paper printouts from Instructional Facilitators, other teachers, or other support staff. We also saw dependence in terms of “bottlenecks” and “go-to” individuals; system use was expected only of one or more individuals who were expert in that system, and those individuals provided data in response to requests. We interpreted these dependences as a support in some cases, such as the Office of Assessment and Research providing request-specific reports. We interpreted these dependences as a barrier in other cases, such as teachers waiting on data from an overworked support staff or a district office unable to access needed data maintained by another office.

Other educators were completely overburdened by system use. These educators typically lacked training in technology, the data system, or data use and thus were overwhelmed by district or school mandates to use data systems. Some of these educators were maintaining their previous

paper-based systems in addition to working with the data system. Data system work merely represented an additional task for these educators.

What Educators Want in a Data System

We asked interviewees to describe what they want from their data systems. While this traditionally has been a difficult question for educators to answer directly, we found NCSDEducators direct and savvy in answering this question. The most common responses centered on integration of systems; easy access to quality data; access to data at the student level; and “other needs,” such as nonassessment information and personal access to data. In the following paragraphs, we provide more detail on these dimensions.

System integration. Currently, data systems in NCSDEducators operate as stand-alone entities and do not share data with other systems. An overwhelming number of personnel—including almost everyone from the Central Office—told us in varying ways that there was a need to integrate data systems. Some stated this in general terms, such as one teacher’s comment, “I would like to see one system that maintains all the data.” Others stated it in terms of their work, for example, “I wish you could build one big query with all the data you need, instead of having to run it over and over in many little bits.” Many offered comments that were more specific about the reasons they needed integrated systems.

Many of the reasons for system integration involved connecting specific systems that allowed users to connect the system they used most often with data from another type of system. As an example, many users wanted systems to integrate with student information held in SASI. While some stated this in terms of the system, others stated it in terms of the data they wanted to connect (e.g., “I would like to access student test scores and discipline data on the same system.”).

Other reasons for integrating systems involved student data sharing. The capacity to exchange data electronically between schools was thought to be helpful when students transfer—participants noted that the traditional paper files on students are slow to transfer in NCSDEducators and are often incomplete because the data come from different stores. Some participants stated that such capacity would be particularly critical for data specific to at-risk students and potential dropouts.

Some participants believed that integration would help with data accuracy and person-hours spent on data. As stated above, duplicate data and systems are a recognized problem in NCSDEducators; some educators pointed out that system integration would reduce errors by creating one central input point. An educator working with many schools stated, “My work would be more valuable if I was working with buildings knowing that [the data] was clean.” Integration would also save time by reducing the need for individuals to maintain databases, helping individuals access data rapidly, and eliminating the need to sift through disparate stores. Dropout data provide an example that involves many of these issues: We were told that these data are so incomplete and inaccurate that it is difficult to gain a clear picture of the true magnitude of the dropout problem, let alone identify contexts and correlates. In addition, the number of person-hours required to examine dropout data was described as prohibitive.

Finally, we note that many participants were vociferous in stating the need for system integration. One participant described the benefits thusly: “If all of that [data] were together, oh my gosh, you’d get a really good picture of who that kid was.” Another participant closed a comment by saying to a research team member, “*Please* help us get the systems to talk to each other!”

Ease of access. Many participants stated that they would like systems to provide easy access to data. Some saw this as facilitated through integration, others through system features

such as a user-friendly interface, and others cited specific functions they wanted to see better facilitated.¹⁶

Information regarding ease of access was also found in listening to complaints users had about systems. Many complained of slow systems or lack of bandwidth—one person described the infrastructure as so decrepit in their building that everyone’s connection crashes when one person downloads a large file. Many found their system interfaces and functions cumbersome, particularly Pinnacle and SASI (described as “like Greek” by one person). Others complained in terms of their work; one person noted, “I shouldn’t be crunching the data; that work should be done by computers.”

Access to student-level data. Also cited as a data system need was the capacity to access data for individual students. Not surprisingly, this need was stated more by building-level educators than by educators at other levels. This sentiment was described clearly by one participant who said, “I wish I could type in the student’s name or number, and the information the district had on him would be there.” This capacity was also described by participants who wanted student histories that would give a summary of student data in one place.

To be fair, many data systems in NCSd allow access to data at the student level, and we found it unlikely that many educators in NCSd actually do not have some access to data at this level. We believe many of these comments are actually related to the problem of system integration. As evidenced by those who asked for student profiles, the problem is not that there is no access at this level, but that access is limited, disconnected, and consequently often impractical to educators.

Other needs. Many other needs were described in our interviews. While a comprehensive rundown of those less commonly cited is not practical, we list some to illustrate the variety of needs mentioned. For instance, a handful of educators were concerned that data systems were too focused on assessment information and not adept at providing anecdotal information (e.g., teacher notes, individual learning plans). Others wanted to be sure that every educator had individual access—both for practicality and to ensure that data control did not lie with select individuals. Also mentioned were better systems for producing report cards. In various forms, we heard it was important to link data to supportive resources such as standards, content, curriculum, lesson plans, and performance exemplars.

District Supports for Using Data

The previous results show the significance that computer support carries for NCSd data use. Besides technology, other supports and structures can be critical to the success of district data use. In this section, we discuss supports we observed, classifying them in terms of common district vision, professional development, the Office of Assessment and Research, Instructional Facilitators, and other support positions.

District Vision

The data suggest that NCSd suffers from a lack of clear, aligned, and supported vision for teaching and learning and for data use. This was evident in the survey data, where the District Vision scale was among the lowest ranking scales (see Table 10), particularly among administrative positions. This was also evident in our interviews at all levels of the district.

Data from our interviews suggested a strong district commitment to teaching and learning. Conversely, the data also revealed a lack of clarity, specificity, and alignment in terms

¹⁶ Specific functions cited were highly varied and none stood out as common enough to mention.

of what should be taught, what should be learned, and how teaching and learning should occur. Many NCSD educators expressed a desire for some consistency in student learning content. Some believed that consistency would make it easier to respond to learning needs of students who transfer within the district. Others noted the difficulty encountered by middle and high school teachers in teaching students from varied lower grade contexts.

A similar phenomenon was observed regarding data use. We observed many different examples indicating the district is committed to the effective use of data. Some building educators explicitly said so, but evidence of district commitment was also seen in the wide variety and large quantity of data offered by NCSD. Additionally, we observed near consensus among district administrators about the importance of improving data use in NCSD. Unfortunately, we observed no clear, specific strategies, structures, or vision for facilitating the effective use of data. Instead, we observed isolated pockets of data use that often lacked direction and focus.

It is not that elements of alignment, clarity, and vision for data use, teaching, and learning are absent in NCSD. For example, written school and district improvement plans exist, many of which refer to data use. At the individual level, some educators were using the common learning assessments currently in development for NCSD. These assessments communicate a common learning core expected by the district, and a few educators commented that these assessments provided a measure of consistency and transference in understanding their students.

On the other hand, these elements were not seen as sufficient. For instance, one group of educators from many schools unanimously agreed that the alignment between school and district improvement plans was poor. One educator was pessimistic about these plans, commenting, “Never the twain shall meet.” Several educators stated that their use of data would be more effective with a defined vision, evidenced by this comment from an educator trying to use data to understand student mathematics needs: “With math, it would help if all the schools had the same approach. Programs are so different throughout the district.”

Professional Development

The data are clear that NCSD educators want and need more development and training in effective data use methods. Many NCSD educators feel unsupported and unguided in their data use, as indicated by the low rank of the Supports for Using Data scale relative to the other scales (see Table 10). However, we talked to some educators who were accessing supports for using data both inside and outside of the district. In general, we observed that supports for improving data use are not lacking in NCSD, but these supports are typically accessed only by those who seek them out.

Our qualitative data indicate that NCSD is committed to offering quality, relevant professional development for educators. We heard several comments from individuals who spoke positively of the district’s commitment and offerings; few spoke negatively. We also heard examples of development opportunities, such as support for attending conferences and programs such as the Fabulous Recreational Enrichment Days (FRED) that offer professional release time.

We were struck by the variety of district-offered training opportunities for data use cited by the interviewees. Nearly every group at the Central Office described instances of specific training their group offered. New teachers are afforded professional development, some of which deals with data use. Instructional Facilitators and at-risk tutors are expected to use data in their jobs, so many of these individuals have taken training on data use. These individuals were also sometimes cited as offering development at the school level.

Unfortunately, we observed that these opportunities for learning effective data practices are not reaching most NCS D educators. Many educators reported no organized training in data use, instead relying upon individual relationships. Others cited awareness of data use trainings but reported only taking advantage of a few of these opportunities. By far, the majority of development opportunities cited were requested by the organization, school, or individual. Interviewees were very positive in describing the response to these requests and the quality of training. While effective, these training opportunities were only reaching district areas where individuals were independently interested in improving their data use skills.

Overwhelmingly, interviewees expressed that they needed more knowledge in effective data use. Specific needs we heard often centered around changing instruction based on data and interpretation of PAWS data. However, most educators only forwarded general statements that they need more training, perhaps because they do not know what to ask for. Consistent with these general statements is a finding that has appeared in different ways throughout our results: Most NCS D educators, particularly teachers and principals, are critically unprepared to interpret the mass of data they are presented with and to change their practice based on these data.

Office of Assessment and Research

A large number of interviewees mentioned the Office of Assessment and Research as a provider of data use support in NCS D. This office is seen as a strength. Almost every comment regarding the Office of Assessment and Research fell into one of two categories: ways the office had provided support and compliments about the office personnel.

One of the ways that the office of Assessment and Research provides support is training. We heard cases of staff providing workshops centering on topics such as the meaning of data and how to interpret and apply information provided by data. A variety of different groups and roles reported attending these sessions. Staff also provided help to individual educators and individual schools, such as working with individuals on reports or specific forms of data. Although training and individual support opportunities were available for teachers, these opportunities were more frequently cited by nonteachers than by teachers. Additionally, staff from the Office of Assessment and Research sometimes attended meetings of other Central Office groups to provide data support.

Participants were effusive in their praise of the job done by the Office of Assessment and Research in support of their data use. Specific comments characterized Office of Assessment and Research staff as “the cream of the crop,” “doing a fabulous job,” and having “empowered” NCS D educators to make use of data. One interviewee stated, “When you go to conferences, you see that people don’t have assessment offices like ours.” Another said, “We need 10 more of them.” Staff from the Office of Assessment and Research were described as responsive to requests and willing to go to schools or offices to help with data use. We only heard minor criticism from one individual.

Instructional Facilitators

The Instructional Facilitator position was created recently in NCS D to provide practical support for teachers and other building educators. Much of this support has included data use. Instructional Facilitators have received training on data use and many have been actively involved in their own and others’ use of data.

We frequently heard that teachers and other building educators have worked with Instructional Facilitators on data use, but we talked to many others who reported little or no contact. A wide variety of supports were cited by individuals who have worked with

Instructional Facilitators and by the Facilitators themselves. Some examples involved time-saving data organization tasks such as running PAWS or NWEA reports. Other examples included more direct support for data use, such as working with teachers to interpret data and helping to improve practice based on data. Individuals were generally positive about the support provided by Instructional Facilitators. For instance, one person believed these individuals were responsible for a “dramatic increase” in data use; another believed Instructional Facilitators were an integral support in creating a culture of data use.

Because the position of Instructional Facilitator is in the early stages of development, certain aspects of the position need improvement. Many educators expressed confusion regarding the intended tasks and nature of the Instructional Facilitator position. Instructional Facilitators themselves noted this as a needed improvement—some Instructional Facilitators described a long, unfocused job description, and one individual reported “getting pulled in a lot of different directions.” Another Facilitator said their role with teachers was unclear, offering as an example that Facilitators were unsure whether they were supposed to work with every teacher or only a defined group (non-Facilitators also reported uncertainty about this). Additionally, Facilitators and non-Facilitators suggested that more training in data use is needed for the position. It was also clear that the expertise of Instructional Facilitators is not yet being tapped by entire faculties.

We heard optimism throughout the district about the future of the Instructional Facilitator role. Participants were generally positive about the work being done and of the individuals filling the position. We can infer from our data that awareness of the position is increasing; coupled with increased training, we believe our data suggest that increased use of Instructional Facilitator expertise will occur.

Other Positions

Besides Office of Assessment and Research staff and Instructional Facilitators, we heard mention of data use support provided by other positions. For instance, professional support positions, such as at-risk tutors and content coaches, sometimes were cited as helping with data use. District positions, such as technology personnel and dropout or at-risk coordinator, were also reported as supports. Also, principals were cited as performing support roles, but these supports were more commonly cited in terms of providing structural supports such as development opportunities than in terms of actual data use.

Data Use and the Work of Education

In collecting data for this study, we were able to observe how data use was influencing, improving, and in some cases hampering the ways that NCSD educators did their jobs. Some influences were common to all levels of the district. However, since teachers were the group whose jobs were most affected by data use, we observed additional factors distinct to the work of teaching. In the following paragraphs, we describe both the common effects at all levels and those specific to teaching.

Data and Educational Work: Common Effects

Some ways that data use influenced educational work were similar at various levels of NCSD. For one, the lack of data system integration typically meant that data use was disjoint and haphazard. Efforts to integrate data proved to be time consuming because the user was required to reach out to one or more outside individuals or data stores. As a result, we observed educators settling for whatever inference they could draw from their data. We heard many examples of this: We heard from teachers who wanted to examine NWEA and PAWS data concomitantly but

instead drew separate inferences and combined these inferences anecdotally. Educators described that some decisions for at-risk students were made with a scarcity of data because data were in too many places or forms. Various district office personnel described how their knowledge would be better if they could share data from other office stores. In terms of the work of education, the consequence is that many decisions in NCSD are being made based on *available* data rather than on *appropriate* data.

We observed that many NCSD educators are dependent on other individuals for access to data, creating “bottlenecks” of data access. At the Central Office level, we found that data bottlenecks most often occurred because specific individuals or offices controlled specific data or possessed the ability to access the data. Bottlenecks took a different form at the building level: Over half of the building educators we spoke with were not accessing the data themselves but were receiving data from support staff in paper printouts from a data system. A contrast between these two levels may be drawn. Central Office bottlenecks were typically because of lack of access and integration. Building-level educators typically had access to the data they were receiving but found it less time-consuming to have data provided for them by a third party. Regardless of the cause, we observed that for educators at every level, the dependence on someone else for a critical job component was in contrast to the autonomy that traditionally has defined education.

We saw positives and negatives about how bottlenecks changed educator work. On the positive side, we observed varied forms of collaboration at the building level, partly because of the interaction caused by bottlenecks. Staff who provided data were often doing so in a larger charge of providing data use support, so conversations about data interpretation and use often ensued. Also, data were often passed out at collaborative meetings about students, facilitating a different form of collaboration. On the negative side, we heard many Central Office personnel speak of the collaboration that would be possible through system integration (i.e., *without* bottlenecks), describing specific instances where shared data would facilitate interoffice work. At both levels, we saw data use and decisions that were somewhat informed but were stiflingly limited, in contrast to what we know is possible with better access.

Data and Educational Work: Effects on Teachers

In interviewing teachers, we found a great degree of variation regarding the effects of increased data use on how they do their jobs. We observed that many of these effects had to do with the ways teachers integrated new data responsibilities into their previous ways of doing work.

For some teachers in NCSD, data use represented increased efficiency and knowledge. These teachers were typically able to take one or more aspects of data use and use them to replace previously performed tasks. For instance, some teachers reported improved differentiation or grouping skills based on formal assessments. Others were taking advantage of the efficiencies created by computer data systems. Despite the aforementioned integration problems, these teachers had found ways to use systems to improve day-to-day tasks such as grading and attendance.

For more NCSD educators, data use represented an increased burden. Rather than reinvent their workday to integrate these tasks and perhaps take advantage of increased efficiency, many teachers were maintaining parallel processes. These teachers continued to work using old processes and systems because these were safe and enabled them to do their jobs. These parallel processes created an unenviable burden. One educator comment was typical of the work faced by this group: “Not only are we doing grades the old fashioned way, then putting

them into computers, but we also deal with proficiencies and standards.” Further comments by this group attributed their burden to lack of training or other previously discussed hindrances (see Uses of Data section above). While these teachers were not particularly negative about data use, we observed that they were only dealing with data as mandated and showed little sign of increasing their skills on their own.

Additionally, we observed in our interviews that teachers were using all data formatively, whether the data were intended to be formative or not. The best illustration is seen in the use of PAWS data—a summative test—to inform groupings, or daily instruction. These uses were not necessarily inappropriate but sometimes represented a large struggle for teachers because summative data did not provide them the formative information they wanted. Not surprisingly, data that were designed to provide more timely information, such as NWEA growth assessments or SRI reading assessments, were more popular where available. More holistically, we observed that these uses spoke to a more deeply rooted ethic that teaching is a craft that deals with the daily progress of individual students.

As a consequence, we observed that many teachers have plunged immediately into more difficult forms of data use without proper training. In an understandable attempt to gain the most amount of formative information, many teachers we spoke to were trying to triangulate varied assessment forms (e.g., NWEA, SRI, PAWS) without a full understanding of exactly how these tests could inform their practice. While tempting, this is not an efficient way to gain information for practice. In advocating for more training on data use, one principal specifically noted this concern, saying, “I don’t know if teachers really understand the NWEA data and what it really means for teaching the classroom and curriculum.”

Finally, we saw that many teachers were entirely dependent on other individuals for data access and ways data are turned into information to inform practice. This type of dependence is counter to the autonomy that traditionally has marked the work of teaching. Most educators in this situation did not express displeasure at this dependence; in fact, many were relieved that this responsibility fell to someone else. Still, we observed these teachers to be far behind more independent teachers in terms of the quality of information they were able to draw for their practice.

RECOMMENDATIONS

Overview

Introduction

As a result of the knowledge gained from our study, we are able to make informed recommendations about how NCSD should proceed in establishing effective uses of data to inform educational improvement. In this chapter, we outline our recommendations, using the data, our professional experience, and prior research to support these recommendations.

After a summary of results, we will first describe our recommendation that NCSD establish itself as a data-informed district, one where clear visions for teaching and learning inform how data are used at every level to better inform educational decisions. Next, we describe the importance of integrating NCSD's data systems, providing a plan for NCSD to acquire a data warehouse that will integrate systems and provide educators one user-friendly access point for all data. We then describe in detail how NCSD should implement a data initiative that will start the district toward becoming a fully data-informed district. Finally, we discuss further issues that NCSD should address with data.

Summary of Results

The results from this study paint a comprehensive picture of data use in NCSD. Our results show that NCSD is an interesting and complex mix of facilitators and barriers to effective data use, many occurring in close proximity to each other. Overall, we are optimistic about the future of data use in NCSD. While we found that data use in NCSD is generally a difficult and inefficient process, we saw that the barriers identified in this process are ones that NCSD is well-positioned to overcome, and that many facilitators are in place to support a data initiative. In the following paragraphs, we summarize these interrelated phenomena.

Our results revealed an environment and culture in NCSD that is conducive to building a healthy data initiative. Individuals throughout the district seem committed to effective data use, and district documents frequently mention learning data. Survey and interview data suggest that individuals will engage in data use if properly supported. For instance, building-level educators were searching for ways to improve their understanding of students. At the Central Office level, we heard descriptions of ways offices and groups could interact if they were supported with the right data. Parents wanted to better understand student learning data. Although the general school culture measures were slightly below the norming benchmarks, they also indicated balance—NCSD culture was consistent across dimensions and roles. Thus, we believe environment and culture will be a strong base from which to grow the use of data in NCSD.

While the environment and culture are strong, the district vision for teaching, learning, and data use is not. We found little common understanding of what learning was, how it should be conducted, and how data should be used to support teaching and learning. Our data indicate support throughout the district for establishing such vision. Similarly, parents and others outside the district stated a desire for more transparency.

In addition, the data showed some aspects of culture that should be addressed, particularly differences due to schooling level. High school teachers scored substantially lower on culture and data use scales than did middle school teachers, who scored lower than elementary school teachers. Descriptions of data use given in interviews followed the same pattern.

The data indicated that day-to-day data use in NCSD is often difficult and not widespread, in large part due to the district's computer systems. We observed computer systems to be a major barrier: There are a large number of different systems in use across the district that are not connected for any efficient data sharing, and many educators find their systems difficult to use. While these barriers are substantial, better technology can be acquired to solve them. Additionally, individuals are enthusiastic about the prospect of an integrated system, and we are optimistic such a system will greatly facilitate data use.

Data accuracy also may be a problem in NCSD. We heard many instances of groups who did not trust student demographic data provided by the district, sometimes to the point of maintaining their own databases. Further, we observed many points of data entry in NCSD, but no clear definitions, protocols, or uniform procedures for data entry.

Partially as a consequence of nonintegrated data systems, NCSD educators are often dependent on other individuals for access to data. At the Central Office level, dependence is seen in terms of "bottlenecks," where individuals or groups of individuals control access to data. Despite a near-consensus on the utility of collaborative data use, Central Office data use was marked by isolation of groups and offices, largely due to data bottlenecks. At the building level, many educators are dependent on Instructional Facilitators or other support staff to print reports for them. Many building-level staff (e.g., teachers) seemed relieved or comfortable that someone else was accessing data for them.

The data show that educators in NCSD need more professional development on effective data use techniques. NCSD provides good opportunities for training, but these are being accessed only by those who ask. Individuals who receive training find it useful and are particularly complimentary of the Office of Assessment and Research. Instructional Facilitators were also cited as strong supports for data use. However, the data indicate a wide range of implementation of these positions, due in part to an undefined job description and the newness of the position. Similar to professional development needs within the district, parents and others outside the district desire better descriptions of what data mean.

At the building level, we saw some impressive data initiatives and uses. Generally, though, there is ample room for improvement at the building level throughout NCSD. Although many principals are supportive of data use and some are already personally invested in it, the principalship in NCSD is generally not a strong facilitator of data use. Principals were unprepared for data use, both in terms of their own skills and in terms of leading faculty. Similarly, teachers have not been adequately prepared to use data. Our qualitative interviews suggested that their data use was neither as frequent nor deep as reported on the survey, possibly indicating a misunderstanding of what data use can be. Further, while many teachers were engaged in data use, many more were not, and few were able to articulate how data helped them change their practice. These results should not incriminate the hard-working building staff of NCSD—the results only indicate that these educators have been given a charge for which they are neither prepared nor adequately supported. We are optimistic that through increased professional development, leadership training, and integrated data systems, data use at the building level can become a centerpiece of NCSD's data initiative.

The sometimes uncomfortable balance of facilitators and barriers is affecting the work of education throughout NCSD. While some educators are using data in ways that make their day more efficient and more productive, others are using data as a process separate and parallel to their old ways of doing business. For these latter educators, data use represents an unenviable

burden. Many educators are, for the first time, dependent on others for a job function (data use). This simultaneously has created collaboration opportunities and inefficient processes.

The results of this study have provided a substantial knowledge base from which to forward recommendations about how the NCSd may engage more efficiently in data use to improve education in every area of the district. The following sections outline specific recommendations, in terms of establishing NCSd as a data-informed district, acquiring an integrated computer system, implementing the data initiative, and considering further data issues for NCSd.

Establish NCSd as a Data-Informed District

The results of this study suggest that NCSd personnel throughout the district are interested in and committed to effective data use as a method of knowing more about student learning and the conduct and business of education. However, these results also suggest lack of alignment and synergy throughout the district about how to use data. Further, results suggest that clear, stated vision and process transparency may be lacking in NCSd.

Consequently, we recommend that NCSd establish itself as a data-informed district, one where clear understandings exist regarding how education will be conducted, what is meant by *learning*, and how data will be used to understand and support these. Since these understandings are different depending on level and role, individuals and entities in a data-informed district understand the different ways they connect and align to this vision, how their work affects and supports the district and each other, and how various forms of data support their work.

Further, strong leadership is important to a data-informed district, but such leadership should not be dependent on dynamic, heroic leaders—research has shown that data initiatives are unsustainable when they depend on the unusual effort of one or more individuals (Stringfield, Reynolds, & Schaffer, 2001). Consequently, while a data-informed district is characterized by strong leadership, it is also characterized by the establishment of structures, processes, and materials that enable the initiative to succeed independent of specific individuals or personalities.

These understandings and structures are particularly critical in a context characterized by local control, as evidenced by NCSd's commitment to school choice. Our data showed that school choice provided parents, students, and educators wonderful freedom to choose and conduct education in a manner they felt was best suited to a particular context. On the other hand, our data also showed that parents and educators strongly desire a common language about learning and assessments that will ensure comparability from one student, grade, or school to the next.

To be clear, balance can be struck through a visioning process establishing NCSd as a data-informed district. These understandings can be established through many methods, and NCSd should choose methods appropriate to district context and climate. In the following sections, we outline some components, methods, or activities that are pertinent to NCSd.

Calibration

The process of *calibration* (Wayman et al., 2006) is critical to establishing a data-informed district. Similar to how a mechanic might calibrate the numerous working parts of an engine to create synchronous efficiency, so must district personnel and entities commit to a calibration process to define education and how data support education. We suggest that NCSd uses calibration to guide the process of establishing the district as a data-informed district, involving every level of the district.

A district may engage in calibration in many ways. We suggest starting with a tight focus on teaching and learning, driven by the following four questions:

1. What do we mean by learning and achievement?
2. How will we conduct and support teaching and learning?
3. How will we know teaching and learning when we see it?
4. What action will we take based on our results?

Question 1 deals with a variety of goals and definitions surrounding student learning. Research has shown a wide variety of opinions are held by educators about what learning is and how data may support this (Coburn & Talbert, 2006; Ingram et al., 2004).

Question 2 deals with how education is conducted in NCSD and how various entities affect this educational process. The most obvious ways of conducting education are seen in classrooms, school buildings, and district policies, but many other groups affect the conduct of education: transportation, human resources, and facilities, to name a few. Data can play a large role in how education is conducted for every level and group.

Question 3 deals with the assessment of learning. Formal assessments (e.g., PAWS, NWEA) and informal assessments (e.g., grades, teacher judgment) are already entrenched in NCSD, but through the calibration process, educators at every level will judge the suitability of these measures and jointly explore appropriate changes.

Question 4 deals with varied aspects of the feedback cycle. Such aspects include how data should be interpreted (also undertaken in Question 3), what actions are appropriate based on data interpretations, and what resources can be drawn upon (e.g., content resources, district programs, or even systemic change processes), to name a few.

The calibration process must be undertaken by the district as a whole as well as separately at each level. For example, these discussions will be different at the building level than at the Central Office level, and since NCSD is a district of choice, each building's discussions will be different. True to the spirit of calibration and synergy, varied entities should establish answers that relate to their own context but align to the overall district context.

We suggest that in undertaking calibration, NCSD must produce written documents that clearly state district, building, and other entity positions on each aspect deemed important by district educators. Creating such documents helps to establish a permanent structure for learning and data use. The process of creating written documents will force each entity to be clear in stating its position and will provide transparency. This clarity will help keep learning and data initiatives on track over time and should be revisited frequently and amended as processes and understandings evolve.

We observed ways that NCSD already has established calibration elements. The establishment of a District Improvement Plan (NCSD, 2006) is one such step, as are separate school improvement plans. Common assessments are being established to measure learning in a consistent way throughout the district. Also, the state-established Body of Evidence standards provide some learning guidance; NCSD's approach to these standards provides evidence of how the district as a whole views learning. While these examples will all be part of calibration conversations and products, much more detail and integration should be undertaken and established.

Highlighted Elements of Becoming a Data-Informed District

In establishing NCSD as a data-informed district, many elements must be addressed. In the following paragraphs, we highlight three for discussion.

First, we recommend that NCS D provide an explicit, public statement of the intent and process of becoming a data-informed district. A public statement of intent will provide understanding of the reasoning and process, along with providing transparency and direction. The statement also will offer support for data use as an efficient, knowledge-gathering process to support more effective education. Results of this evaluation showed pockets of suspicion inside and outside of NCS D about data and how they were used; these suspicions almost certainly will be a hindrance to building a healthy data initiative. In addition, a public statement may serve as a marketing campaign of sorts from which to build enthusiasm and support.

Second, we recommend the district take care to involve every stakeholder group. This includes reaching out to all groups within NCS D and carefully identifying groups outside of NCS D that have a stake in education. One way this has been undertaken is the establishment of a steering committee and subcommittees (Wayman & Conoly, 2006). However groups are formed, it will be important that individuals are charged with regular progress reports to other groups and to the entire district.

Third, we recommend establishment of a discussion protocol to guide these meetings, keep discussion safe, and keep discussion focused on the data-informed district process. This is not our area of expertise, but we can offer areas from which to begin exploration. For instance, the interest-based agreement process (IBAP) is used in some areas of NCS D to guide discussion. Many organizations follow strict protocols such as parliamentary procedure. Wellman and Lipton (2004) offered guidelines for collaborative inquiry that also may be applicable.

Fourth, we advise that NCS D educators pay close attention to data forms and uses throughout this process. For instance, what are the various data forms and elements required by each role? How do these change based on role? How have traditional roles (and thus, data needs) changed based on the data-informed district establishment? What data and processes best can reflect and support the work of various educational parties? How should the district define data needs in the short term and visioning for data in the long term?

Acquire an Integrated Computer Data System

Overwhelmingly, the data indicate the need for integrated, efficient data systems in NCS D. Individuals and groups are limited and frustrated by the inability to access disparate stores of data. Research has shown ways that user-friendly, efficient data systems can support data use at all levels, including the classroom level (Lachat & Smith, 2005; Streifer & Schumann, 2005; Wayman & Stringfield, 2006).

Such data systems do not come cheaply. Acquiring one will require a significant investment of time and money by the district, but we believe efficient data systems represent an efficient expenditure of time and money. Cast in terms of dollars, an efficient data system should reduce indiscriminate purchases of stand-alone data software; will completely eliminate the need for some systems; and by supporting educators in more efficient ways of delivering education, may mitigate the need for costly add-on educational programs that deal with underachievement. Cast in terms of time, efficient data systems can save already overburdened educators and support staff countless, inefficient hours spent examining data to improve practice or to respond to reporting mandates. Most importantly, efficient data systems represent rapid and thorough ways to diagnose the learning needs of children.

The process of acquiring such a system will involve careful planning. In the following sections, we outline factors that NCS D personnel will need to consider in order to acquire the system that best supports NCS D data use.

What Type of System?

Before acquiring a data system, it is absolutely critical that NCSD establish clear purposes and functions required by the system; this demands a comprehensive understanding of data use goals as described in the previous section. Consequently, exploration of data system acquisition should not begin in earnest until the district is well down the road to establishing a strategy for becoming a data-driven district.

The district carefully should assess internal capacity to manage or build such a system. Most districts are better off buying than building a system (Wayman, 2007; Wayman et al., 2004), and we strongly believe NCSD is better off buying data technology than building it. This does not reflect negatively on NCSD personnel; it merely reflects the efficiencies, quality, and speed that commercial vendors bring to the process. Many affordable commercial systems are available that can be tailored to meet NCSD's particular context—these will be discussed in more depths in the System Acquisition section below. Our recommendations will be outlined assuming NCSD will buy commercial products.

In the following sections, we first outline our recommendations that NCSD acquire a *data warehouse*, a system that integrates other systems and serves as a single access point for all district data. Following the data warehouse discussion, we discuss how assessment systems, the student information system, a gradebook system, a curriculum management system, and other systems are integrated into the data warehouse and ultimately form one integrated data system. Finally, we offer a set of features that are needed in any data system.

System integration: Data warehouse. First, and most critical, NCSD must buy a data warehouse. Data warehouses serve as a “one-stop shop” for all data needs, integrating disparate data systems to provide the user seamless access to all data in one place (Mieles & Foley, 2005; Wayman, 2007; Wayman et al., 2004). Results from our study clearly outline the problems that lack of data integration is causing: Across the district, educators described frustration with disparate data access and we witnessed the limitations this placed on their ability to turn data into information. A data warehouse will link systems across NCSD, providing access to previously disconnected data. Systems such as NWEA, SASI, Pinnacle, or ENCORE! would still be maintained, but their data would be fed into the data warehouse. Users then would be able access any data in the warehouse, regardless of the system from which it originated (for privacy reasons, users access only data for which they have permission; this is discussed more fully in the Security section below). When integrated seamlessly, most users would think of their interface to the data warehouse as “the system” and may not even recognize that the warehouse is actually integrating a number of different systems.

Such integration creates infinite new possibilities: For the first time, a teacher could examine NWEA growth assessments, PAWS data, and SRI reading assessments side-by-side with free-lunch status and disciplinary referrals. In one minute, an Instructional Facilitator could personally build a report that currently must be run by district personnel and rapidly could create many more reports based on what is revealed in the first one. With one click, a Central Office employee could compare PAWS performance of schools by socioeconomic makeup or easily access the data to evaluate a particular program.

Data warehouses also will help solve two problems shown in our findings: Data redundancy and data inaccuracy. While all systems feed into the data warehouse, data common to each system (e.g., student identifier, gender, and ethnicity) are entered into one central repository, thus eliminating the need for multiple entries of common data. Single-entry protocols eliminate redundancies and, with fewer hands entering data, greatly reduce errors.

Data warehouses also offer the capacity to examine data over time, enabling educators to gain a whole picture of student performance. For instance, student history reports easily can be produced that show a child's test scores and other pertinent information over the child's school career. Graphs, charts, and other analyses can be created of assessment performance over time for individual students or cohorts of students. Many other possibilities exist.

A particular function that will be important in a data warehouse is the capacity to link students with teachers, throughout their respective careers. Although this function is not always available through the standard set of data warehouse functions and has not been commonly described in the literature, we feel it is important for NCSd to be proactive on this front. Anecdotally, we see two issues looming on the horizon that will be addressed more easily with this capacity:

Our informal dealings with educators, researchers, and policymakers lead us to believe that student growth models will soon be part of most accountability systems. Student growth analyses chart student progress over time to reveal significant factors that predict achievement growth, teachers being one factor of increasing emphasis. Should these models become a standard in assessing and understanding student learning, NCSd would be prepared to be one of the first districts to respond in this way.

Linking students and teachers over time can provide great assistance in deeper, more informative teacher evaluation that helps teachers and students alike by targeting professional development, identifying areas of strength and weakness, and improving pedagogy. While this represents effective education, we also sense political movement toward more formal, accountable teacher evaluations, including incentive pay. Should this become policy, it is critical to school culture that these evaluations be conducted in a manner that is fair and nonthreatening to teachers. Schools that are prepared in terms of data structure and data use culture will be able to react positively to these mandates, if they occur.

Assessment systems. Another type of data system is an assessment system. Assessment systems are built to rapidly return periodic learning assessments but are not built to integrate data across systems or over time, like a data warehouse does (Wayman, 2007). Consequently, an assessment system would be maintained separately and could be accessed separately for data unique to this system. It also would feed data into the data warehouse so data could be examined simultaneously with data from other systems. Many assessment systems are currently used in NCSd, most prominently AIMSweb, NWEA, Orchard, and SRI.

Our data showed little discontent with these systems; the NWEA system in particular was very popular. However, different schools use different systems, so decisions should be made about which systems to keep. There are many possibilities: For example, the district could offer a menu of systems that schools could choose from, or the district could mandate one assessment system be used district-wide. Assessment systems must integrate well with any data warehouse¹⁷ under consideration, so we do not believe it will serve anyone well to allow entities to use any system without district approval. Regardless, the district should consider the systems in use, consider how they are being used, and review the market to evaluate new systems for possible purchase. In doing so, the district should take advantage of the expertise held by users familiar with these systems, and, as with all data system decisions, the calibration and goal-setting process will inform choices made regarding assessment decisions.

The student information system, SASI. Student information systems serve day-to-day transactional functions of a district, such as attendance and grade storage. These systems are built

¹⁷ Most worthwhile assessment systems interact well with many data warehouses.

for immediate access but are not built to integrate systems or to access prior years' data (Wayman, 2007). Consequently, the student information system would be maintained separately and could be accessed separately for data unique to this system. It also would feed data into the data warehouse so data could be examined simultaneously with data from other systems. The student information system currently in use district-wide is SASI; some schools also maintain separate student information systems.

Our data suggest that SASI is an unpopular system. Users find it difficult to navigate, and we heard reports that it did not serve the functions some users needed. Our anecdotal experience with other systems indicates friendlier student information systems than SASI are currently available. However, we were unable to determine if the reported problems were because users were trying to make SASI perform functions commonly found in other types of systems, or because problems were attributable to actual flaws in the system.

Our immediate recommendation is that NCSd wait to replace SASI until the data warehouse is in place and then evaluate SASI. We believe that implementing a data warehouse and changing the student information system may be too difficult to do at once. Further, we believe that while difficult to use, the district probably will find the functions of SASI adequate, once other systems are efficiently integrated and less analytic burden is placed on SASI. Still, as the system acquisition process is conducted, the SASI issue should be kept in mind—market changes or other occurrences may suggest a different avenue.

Gradebook. Many NCSd educators (primarily at the middle and high school levels) access the Pinnacle system from Excelsior Software for its gradebook functionality. Pinnacle also serves other functions, providing a degree of integration of data from other systems.

We recommend that NCSd take a critical look at the Pinnacle system with an eye toward replacing it. We believe the Pinnacle system is a solid system that provides powerful functions. However, we found the system hard to use, and our data suggest that this steep learning curve will prevent some educators from ever using it. Other systems that are more user friendly offer equal capacity to the Pinnacle system, and many of its functions will be served by the data warehouse's presentation interface.

To replace the Pinnacle system, we believe the district should look for a product that only provides gradebook capacity. We also believe that NCSd should take specific advantage of the expertise held by the Applications Specialist in charge of Pinnacle; the expertise and experience of this person will provide valuable information in assessing the potential of another product. As with the other data systems, the calibration process should inform selection of new gradebook software.

Curriculum and resources management. We believe NCSd will be well served by buying a system that also offers the ability to link student data to curriculum materials and other resources. While NCSd educators were not clamoring for such a system, our data did indicate a certain degree of support for such a system. We believe other educators may have found it hard to imagine such a system—in fact, we encountered little resistance to a curriculum system, and other research has suggested it is hard for educators to envision a system with which they are not familiar (Wayman & Stringfield, 2006).

Our anecdotal experience indicates that most districts gravitate toward providing resources as they improve their data use. Therefore, we believe NCSd should plan to acquire such a system, if not right away, then in the near future.

Other systems. Many other systems serve other important functions in NCSd, too numerous to discuss in detail. Each of these systems should be considered as to how it will

integrate with the various data warehouses under consideration. We strongly advise against allowing stand-alone data systems that do not interact with the warehouse. In these cases, the product should be replaced, or a different data warehouse should be considered.

District personnel already have audited the primary systems in use; this audit, when combined with the list of data system we encountered, should provide a thorough and comprehensive list of all data systems in use throughout the district.

A final note about other data systems: We recommend that NCS D establish a data system that will enable the district to respond easily to state or federal reporting mandates and to interface with state or national databases that will serve the district. We also recommend that NCS D establish a data system that is fully independent of any systems outside of NCS D—such systems are eternally in a state of flux and often undependable.

System Features

In order to gain the most value from a data system, there are usability features that NCS D must look for in evaluating current systems or buying new ones. In this section, we highlight a few of these features; Wayman et al. (2004) has provided detailed discussion of such features.

First and foremost, the system must be user friendly. The interface should be intuitive and easy to use, providing formats familiar to users accustomed to accessing the Internet. Research has shown that user-friendly features are important elements in promoting and sustaining use (Chen et al., 2005; Wayman & Conoly, 2006; Wayman & Stringfield, 2006); data from the present study suggest this will be true for NCS D.

Clear, understandable student history reports are also important. Such reports resemble a “cumulative folder”¹⁸ and commonly contain a summary of a student’s learning history and background, such as a complete test history, current picture, contact information, or grades.

Features that allow educators to administer assessments and rapidly to access results are also important and were commonly desired by NCS D educators. It should be noted that, while rapid data access is attractive, historical data such as student histories and prior test scores are integral elements. Historical data have been shown to be heavily used, even in an environment of rapid assessment (Wayman & Stringfield, 2006).

Educators frequently find utility in wandering through the data, and the system features should support this. This is often accomplished through “drill-down” features. Such features allow the user to click on a graph, on a cell in a summary table, or on some other data aggregation to gain information about certain individuals. For instance, a teacher may request assessment proficiency levels for her class, drill down to identify which students did not pass, and then drill down further to identify which items they missed.

It is also important to allow export of data to other programs, such as Microsoft Excel, Microsoft Access, or another database. However, most features should be kept within the system. Users rarely should need to export data to perform analyses, and systems that tout or require data export to perform important functions should be avoided.

Other features are also important but require less description. Online access is important so educators may access the system from home. The interface should be seamless, so a user is unaware that data are being accessed from separate data systems. To avoid imposing limits on the user, the interface should offer a wide variety of data for joint analysis. Varied methods

¹⁸ Individuals sometimes worry that making a cumulative folder accessible online is a security risk. Just like a cumulative folder, student histories are accessible only to those who have explicit permission, such as the student’s teacher, counselor, or principal.

should be offered to represent data (e.g., tables, charts, graphs). Since some queries are commonly run, a comprehensive store of preformatted reports should be available for one-click access. Educators also should have the ability to share notes, data, and plans with each other.

What Data?

We were pleasantly surprised by the diversity of data and uses of data we observed in schools. While this diversity is one strength upon which NCSD should build a data initiative, it also represents a monumental task for NCSD personnel identifying data and sources to be integrated. During the process of acquiring a data system, we recommend that care is taken to identify every form of data currently stored or in use throughout the district. Failure to do so risks creating an incomplete system for some users that may cause them to use data independently and isolated from any integrated district data use structure or system.

As shown in our results, data used are present in a variety of forms, ranging from data systems to spreadsheets to paper-and-pencil notebooks or sheets. District personnel should query every school, group, and office in the district to produce a thorough “data map.” For example, the district could offer some sort of instrument that each individual would complete to identify the forms of data they use and store.

While we believe thorough integration of all data is necessary, much extant data in NCSD schools will be rendered redundant with better visioning and data systems. To this end, particular attention should be paid to identify esoteric forms of data, such as assessments used by only one school or individual. These forms of data likely can be replaced by a more common form of data offering equal utility and used by other entities in the district.

System Acquisition

Our experience and anecdotal observations indicate that many districts are unhappy with the process or agreements they used in acquiring data system technology. Therefore, we recommend NCSD be careful, diligent, and thorough in ensuring this process goes efficiently.

The up-front work done during calibration activities will provide an excellent foundation for guiding system acquisition. If NCSD has clearly articulated a set of goals and definitions about teaching, learning, and data use, evaluating systems and vendors will be much easier.

These goals and definitions should serve as the base from which to begin deciding exactly what features and systems will best serve NCSD, which are realistic to implement now, and which must wait until later. Relationships and groups already will have been established during the calibration process, so we recommend NCSD build upon this culture in order to gain input from every stakeholder group. District personnel should make public thorough documentation describing the features and systems that will be bought, and how these systems will serve the district.

From these documents, clear Request for Information (RFI) and Request for Proposal (RFP) documents must be written and circulated to commercial vendors. We cannot stress enough how important these documents are. Our informal observation and conversations with vendors indicate that most districts do not produce adequate documents and are often unhappy with the product they receive. Clear and comprehensive RFIs and RFPs enable vendors to craft effective responses that allow the district to properly evaluate the product. Through these documents, the district also should demand exact and specific price estimates.

In assessing vendor proposals, NCSD should take care to heavily involve their information technology experts throughout—get your “techies” to talk to their techies. Most individuals involved in the acquisition process on both sides eventually encounter a point where

technological details go beyond their understanding. It is at this point that NCSD must use locally housed technology expertise to ensure that every technical detail meets district needs. Further, care must be taken to obtain each and every specification in writing. As an example, one important question to be explored is the compatibility of the vendor systems with computer platforms (PC or Macintosh), because of the mix of platforms used in NCSD. Most vendors claim to support both platforms, but our experience is that this occurs in varying degrees.

The elements described thus far should be present in an efficient contract that clearly states the nature of the relationship and exit strategies for both sides. While this may appear obvious, we are always surprised by the stories we hear about data system troubles that result from poor contracts.

It is also important that NCSD personnel visit districts that are implementing software provided by vendors under final consideration. In doing so, NCSD should not only request reference districts from vendors, but also should identify and visit districts implementing the software but that are not on the recommendation list.

We recommend that NCSD not only rely on district-housed expertise for the system acquisition process, but also employ outside consultants and advisors. One helpful example is Contract Commons (<http://www.contractcommons.org>), a partnership with the New York Law School, the Cornell Law School, and the Stupski Foundation that provides contract language and other resources to help districts with technology acquisition. Individuals or groups expert in various areas of this process can help, and other districts that have been through this process may provide learning and guidance.

Lastly, we recommend that a freeze be immediately placed on any system acquisition until this process is defined. As an example, one participant mentioned that the district was considering purchasing a district-wide library system. It will be important to integrate such a system with the larger system but would be inefficient to buy a library system without benefit of the processes described here.

Security

Data security is an important consideration in acquiring a data system. Unfortunately, we are not experts in data security and cannot provide advice. Instead, we suggest NCSD personnel enlist the help of outside experts to ensure that data are secure within the district and that vendors are providing adequate security. We offer some issues that NCSD personnel should consider in working with outside experts and vendors:

1. District personnel should ensure adequate coverage under the Family Educational Rights and Privacy Act (FERPA; <http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html>).
2. District personnel should outline clear policies for who should access various forms of student data. Some policies undoubtedly already exist; others will need to be developed relevant to data systems. Some of these policies will be supported by calibration activities that explore which data most appropriately serve which roles, and what uses of these data are most appropriate.
3. District personnel should outline clear policies about how data should be accessed. For example, leaving student data unattended on a computer is the equivalent to leaving a gradebook or cumulative folder open and unattended.
4. District personnel should ensure that their data system is encrypted and protected against outside attacks.

We stress again that we are not qualified to give advice on security issues, and nothing in this section should be construed as advice or guidelines. However, we are happy to help NCSO personnel pursue and to evaluate outside consultants to help with security.

Interoperability

Interoperability refers to the manner and ability through which data systems work together. Although all data systems will be integrated through the data warehouse, it is still incumbent on NCSO to carefully address interoperability issues. The data systems acquired by NCSO must have maximum interoperability so NCSO can respond flexibly to future changes in district needs and technology.

Interoperability may be described using a kitchen analogy. Kitchen components such as blenders, microwaves, and refrigerators are fully interoperable because they all use the same electrical current as the standard outlets in a kitchen. Consequently, when a microwave breaks or the owners finds one they like better, all the owners must do is plug it in. Further, consumers are not restricted to one brand of appliance in outfitting their kitchen. Data systems should be interoperable in the same way. Rather than electricity, this is accomplished through data exchange standards that allow systems to “talk” to the data warehouse (or, in the future, each other). Unfortunately, data exchange standards are not as uniform and well developed for data systems as electric standard are for kitchen appliances. In the following paragraphs, we outline some issues that NCSO personnel should consider in ensuring their systems are interoperable and as flexible as possible for the future.

Perhaps the most prominent interoperability initiative is the Schools Interoperability Framework (SIF; <http://www.sifinfo.org>). Through SIF, standards and definitions are set for how systems should exchange data and all systems using SIF standards interoperate. For a price, vendors can certify their software with SIF (a list of SIF-certified software is given at http://certification.sifinfo.org/cert_proclist.tpl). SIF-certified systems must interoperate through a Zone Integration Server, and the system must be outfitted with a SIF agent, both of which are typically paid for by the district. As of July 31, 2007, two systems owned by NCSO are shown to be SIF certified: ENCORE! and SASI. Others, such as the SunGard Bitech IFAS system, are described as “SIF-compliant” but are not SIF certified.¹⁹

Many districts require the systems they buy be SIF certified. We recommend NCSO personnel look for SIF certification but not limit themselves to SIF-certified systems. While we are supportive of SIF, we recognize that it has not yet become the industry standard. This is because the establishment of SIF standards has been slow, the number of element definitions is not yet comprehensive, and some researchers are unsure that interoperability is best accomplished through SIF (Midgley, 2006). Consequently, there are many good commercial products that are not SIF certified, and we do not want NCSO to be limited in the products that can be acquired. Still, we believe NCSO should adhere to SIF as much as possible to protect against buying a system with esoteric data exchange protocols.

Vendor partnerships are another way that interoperability is accomplished. In this case, vendors have working relationships with other vendors and have worked out data exchange standards between their two systems. Sometimes these standards translate to other systems or can be modified quickly. In pursuing a system, NCSO personnel should probe in detail which other

¹⁹ Our anecdotal experience is that vendors are typically very loose with their “SIF-compliant” terminology and that districts should probe deeply for details about how this actually affects interoperability.

systems a particular vendor may work with and what plans are in place for future interoperability.

Connectivity and Bandwidth

Educators are not patient with technology that does not work (Wayman & Stringfield, 2006; Zhao & Frank, 2003), so for data systems to be effective, it is critical that each educator have rapid access to accurate data (Wayman et al., 2004). This means that when educators log on, the data they ask for must be returned nearly immediately and the system must work flawlessly.

One area of this charge is accomplished by the vendor through efficient data architectures, sufficient server power, and proper infrastructure. The vendor must be queried intensely about these issues and required to offer district examples. Personnel from NCSD should visit these districts—and independently identify others for visits—to verify the real-world implementation of a considered vendor’s product.

Another area deals with district infrastructure, an area where NCSD may have problems. Interviews with technology staff and building educators indicate that some buildings do not have the infrastructure to support the type of data access necessary to promote use of a system, both in terms of desktop computers and bandwidth to transmit data. This is true within the city of Casper and may be especially problematic in the rural schools served by NCSD.

We recommend that NCSD fix these problems immediately. If there are cases where this is not immediately possible, we recommend NCSD personnel not make the system available. Instead, it is critical that personnel attend quickly to the cultural component of this problem by meeting with such faculties or groups, explaining the problem, explaining what will be done for them, and providing a timeline for rollout of the system. The efficiency of data systems is predicated on rapid movement of data, and failing to provide efficient bandwidth and connectivity, along with the hardware to access it, will be crippling for a data initiative—educators in these buildings will pass off the system, and the entire initiative, as one more thing in education that did not work.

Implementation of the Data Initiative

Expecting and realizing effective, district-wide use of data to inform educational practice is not as easy as creating goals and buying a system. Rather, a data-informed district is marked by vigilant attention to the implementation and maintenance of a healthy data initiative that reaches every corner of the district.

In this section, we outline how we believe NCSD should implement such an initiative. Recognizing that no initiative can be fully effective without proper technology (Wayman, 2007) and that change is unsustainable without clear plans and goals (Fullan, 1999), we propose the centerpieces of the initiative be the calibration exercises and the data system. Many other aspects are important, both in the short term and as the initiative unfolds over time. The following sections discuss aspects of the data initiative; including awareness building; data system implementation; initiative starting points; necessary supports; data entry; interdepartmental data use; and, perhaps the most important components of a data initiative, what occurs at the building level, specifically with principals and teachers.

Build Awareness

Right from the start, a committee should be charged with building and maintaining awareness throughout the district and in the community of NCSD’s endeavor to become a data-

informed district. We believe awareness will be particularly critical in NCSD because our results showed some suspicion about district use of data and lack of transparency in data and district processes. The Community Relations group may provide a good core for this committee, augmented by members from other district roles.

Awareness should be founded in the purposes of the data initiative. Goals of awareness building should be the following:

1. *Educate the public and educators on all aspects of the initiative.* This includes why data are used, how data use will help education in NCSD, how data use will be conducted in NCSD, who will be involved, how educator jobs will be enhanced and not overburdened, how a data system will support data use, and what outcomes may be expected from a data initiative.
2. *Outline for the public and educators the process of calibration.* This goal provides clarity and transparency for the process. Groups and individuals involved should be identified to show an inclusive ethic. Notes and results of meetings should always be readily available, as should all aspects of planning. Public comment and input should be solicited consistently.
3. *Provide frequent, ongoing updates for the public and educators.* Varied mechanisms should be constructed to inform the public of information and progress of calibration efforts, such as Web sites, newspaper reports, and television and radio coverage. A schedule should be defined and adhered to about the dissemination of information.

We are only aware of one instance where a district embarked on a public awareness campaign to promote a data initiative (Wayman & Conoly, 2006). However, traditional public relations tenets should apply, and NCSD personnel are well equipped to identify awareness-building methods best suited to the district context.

Data System Implementation

The data system should be the core of the data initiative; without an efficient data system, data use is a burden on, rather than an improvement of, the work of education (Mieles & Foley, 2006; Wayman et al., 2004). Therefore, it is important that implementation of the data initiative and data system be wholly connected.

Data system architecture is a massive undertaking, so the full complement of data systems (integrated through the data warehouse) is unlikely to be available at once. The district should not wait on the entire system to become available but should get some piece of the system up and running soon and then roll out pieces of the system over time. This accomplishes many functions. It improves troubleshooting because architects are able to focus on smaller groups of issues. It maintains continuity of process rather than create a large wait period after calibration and planning. It also increases familiarity; since system features and data will be dosed out in small portions, users will have the opportunity to become familiar with them before the next phase is rolled out.

In rolling out the system, district personnel should begin with the portions of data and system that will provide the most value and immediate impact. This will engage users in the system and build support. In rolling out this first system phase, the district should choose data that show off functionalities of the system that will excite NCSD educators, such as longitudinal data, easy access, and linking disparate forms of data. In addition, NCSD *must* make sure the initial rollout contains no errors—first impressions will be critical to district-wide support of the system.

Starting Points

We advocate making the data system the centerpiece of the district-wide data initiative, so once the data system is ready, work on the data initiative is also ready to begin. At this point, NCS D will have in place clearly stated goals, direction, and expectations for teaching, learning, and data use. The district also will have built anticipation of the initiative so that all educators understand what is expected of them. Despite this up-front work, it is important to keep in mind that our data suggest NCS D educators will be unprepared to make effective use of data. Therefore, it is important that the course of the initiative be charted to start small, start slowly, and be thorough.

Immediately prior to rollout of the data system, the district should mandate training for every educator in the properties, functions, and uses of formal learning assessments. Of course, all data are important, but formal learning assessments comprise most of the extant learning data available to NCS D educators, and PAWS assessments are the most public. By offering training before the system is rolled out, NCS D will have in place a critical piece of knowledge to support system use, and users can hit the ground running.

Results show that the data used most commonly are the PAWS data and NWEA growth assessments. We suggest these data plus student demographic data from the SASI system (cleaned and verified) be made available for the first round of system rollout. This small set of data will offer effective and attention-getting functionality: the ability to link state assessments, periodic learning assessments, and student demographic data together for the first time. In addition, educators will have recently received training on assessments such as these.

It is important to remember that even making just a small portion of data available will be overwhelming to many NCS D educators with little data experience. Consequently, care should be taken at each individual school to embark on data use appropriate to the level of readiness. Our results indicate this should be a strikingly simple level in most schools and may remain so for some time. In fact, even with presystem training on assessments, we anticipate most users will be unprepared to make use of PAWS data and NWEA data simultaneously. Beginning simply is fine; what is critical is that schools and groups begin using data at a level appropriate to their preparation and advance at a pace that best suits their context.

Supports

Besides the data system, it will be important to build numerous other forms of support into the data initiative. Our data suggested a few forms may be particularly valuable for NCS D to address, building on district strengths and responding to weaknesses. In the following paragraphs, we discuss these issues, including professional development, Instructional Facilitators, time and collaboration, consistent data entry protocols, interdepartmental data use, principals, and teachers.

Professional development. A clear trend in our data was that NCS D educators want and need more professional development about what data are, what data mean, and how data can be used to change practice. Fortunately, the data also show that NCS D is in a good position to respond to this need: NCS D historically has provided a wide variety of professional development opportunities, and the Office of Assessment and Research is well regarded in terms of data training.

One necessary change is the access model. The data show NCS D to be responsive to requests for data use training, but those who do not ask for training receive none. The district must move away from this passive model toward one that ensures adequate data use training for every educator. This probably will involve mandated training and may involve hiring more staff.

Instructional Facilitators. We observed that the Instructional Facilitator position provided a great deal of data support in NCSd. We recommend this position continue to provide support for effective data use, but with changes.

First, a narrowing and defining of the Instructional Facilitator position will be necessary. Our data indicate inconsistency in the way the position is used, and neither Instructional Facilitators nor the educators they work with know exactly what they are to do. We recommend this position be clearly defined entirely in terms of data support for the next 5 years, and we recommend these definitions be constructed to build independent capacity for data use in each individual educator. The Instructional Facilitator position should be defined as very hands-on during the first 1–3 years of the initiative in terms of teaching about data use, helping access data, and turning data into information. Later, the Instructional Facilitator position should move more toward consultation as individuals assume responsibility for their own use.

Second, the position should be defined heavily in terms of teacher contact and involvement of entire faculties in data use. Although there will always be stragglers, research has shown that even teachers relatively uninterested in data use will participate when it is valuable and supported (Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006). Instructional Facilitators will provide critical, face-to-face support for both individuals and groups of teachers.

Third, this group must receive more training on data use immediately, and plans should be made for ongoing training as the initiative develops. Many Instructional Facilitators showed skill in using data, but nearly all expressed a desire to know more. Furthermore, it will be difficult to keep this support position out ahead of teachers and other educators as the initiative builds momentum. Development should not be isolated merely to data use skills, but should include important aspects such as linking data to instruction, facilitating dialogue, and fostering collaboration.

Time and collaboration. The research is clear and consistent that offering time for data use is a critical support, and that collaboration is an effective method for fostering use (Datnow et al., 2007; Chen et al., 2005; Lachat & Smith, 2005; Wayman et al., 2006; Wayman & Stringfield, 2006). We recommend time to use data and ways to collaborate as integral supports offered by NCSd.

Time to use data must be structured, directed, and consistent. Expecting users to find time on their own will not work; instead, time must be created and worked into the day. As hard as it is to find time in a school day, structuring time turns out to be the easy part; the hard part is the actual work of using data once time is provided. Consequently, there must be an adequate amount of guidance and direction, especially early in the initiative. Also, time to use data will not be effective if given sporadically. Structured, directed time must be offered at least once a week; more often is preferable.

Collaboration about data use also must be structured, directed, and consistent. Many forms may be useful: as a full faculty, grade-level teams, subject-level teams, or around individual students, just to name a few. Guidance and direction are paramount to the success of these groups, as are frequent meetings.

Time and collaboration can be offered jointly, but both must be supported at the district and school levels. It is important that principals continually search for ways to offer collaborative time; in fact, we heard good examples of how NCSd principals innovatively had found time for their faculty to meet about data. This responsibility must not lie solely with principals, however—the district also must create policies and structures that allow principals flexibility in

providing time, and the district should look to provide district-wide days devoted to data use (e.g., FRED days currently in use).

Consistent Data Entry Protocols

One of the problems NCS D faces is inaccurate and incomplete data. Our results suggest this is largely due to the number of individuals entering data and the lack of clear guidelines and protocols for entering data. In this section, we recommend three changes to alleviate this problem.

First, we recommend NCS D establish clearly defined data entry protocols. These would involve definitions of each data element to be housed in NCS D data systems, such as how the element will be named, the ranges or levels it may assume, and where it will be housed. Once the system is implemented, no new data element would be allowed in the system without first being defined by these protocols. These protocols should be documented and available for review by anyone.

Second, protocols must be established for oversight and verification of data entry. Oversight of the data should become the responsibility of a small, designated district administration group, whether that be an extant group in Central Office or a group formed by representatives of multiple offices. Verification protocols must be established at the data entry level, such that each element is entered twice to verify accuracy.

Third, we recommend establishing a district certification program for entering data and only allowing certified individuals access to entering data. Likely, one or two individuals per school will be certified, along with a handful of specialized positions at the Central Office level. This necessarily will disallow most teachers from entering data other than grades or observations; as the initiative matures, NCS D personnel may revisit these rules and amend as district context demands.

Interdepartmental Data Use

Our data suggest that the only real barrier to interdepartmental collaboration in NCS D around data is the lack of an integrated data system. We believe NCS D should look to support and foster interdepartmental data use early in the initiative and should grow these relationships as an integral component of district data use.

Although many Central Office interviewees stated a desire and openness to cross-departmental data use, we also heard that such sharing rarely has been the case in NCS D. Consequently, it is likely that district administrators do not know how to collaborate with others outside their department or what topics to address. Data will serve as a concrete, neutral centerpiece, but it is unrealistic to expect collaboration as a natural consequence of system implementation. Therefore, it will be important to charge specific individuals from varied offices with identifying problems for collaboration and seeing these partnerships through.

Specific individuals at the district level also should be charged with identifying groups or offices for potential collaboration. We observed that some groups exist on the periphery of NCS D educational business and will likely remain there if they are not actively invited to participate.

Principals

In all school districts, data use lives and dies in the principal's office because principals are in contact with so many aspects of district data use—their own data use, their teachers' data use, and the district's data use. We found no reason to believe NCS D will be any different: Our

results found some principals who were engaged in effective data use but many more who were not. Further, our results indicated a disconnect between how principals reported using data and how we saw them using data. Also, the data indicate that principals are not engaged in helping their faculties change instruction based on data.

Even in the presence of an effective data system and the aforementioned supports, we believe a data initiative in NCSD will be unsustainable without quality leadership from all principals. Such leadership cannot be dependent on dynamic, heroic leaders—research has shown these initiatives are unsustainable (Stringfield et al., 2001). Further, research has highlighted plenty of contexts where everyday individuals are providing data leadership in non-heroic fashion (Lachat & Smith, 2005; Wayman & Stringfield, 2006). Therefore, we recommend that NCSD immediately focus a variety of resources toward intense principal preparation around data use skills and leading faculties in data use.

One reason the principalship is so important is that they lead teachers, and since teachers are the most proximal contact for student learning, we believe no data initiative can be fully effective without involving teachers (Wayman & Stringfield, 2006). Leading entire faculty in data use can be difficult because neither teachers nor principals are typically prepared to engage in data use. Additionally, relationships and school culture often are hindrances to data use (Ingram et al., 2004). In fact, the findings from this study indicate that many NCSD principals are not working extensively with teachers on using data.

Consequently, it will be important to enable NCSD principals with a variety of new skills for leading teachers in data use. Examples of important skills are methods for dialogue around data, methods for fostering collaboration among teachers and administration, and methods for changing instruction as a result of data. Since many choices will be school dependent, principals should be offered an overabundance of ideas and resources so they can tailor their data leadership practices to their school context.

One strategy of particular note used by some principals is called *nonthreatening triangulation* of data (Wayman & Stringfield, 2006). In employing nonthreatening triangulation of data, principals require that multiple data observations be used to make decisions; educational decisions are not based on merely one piece of data. We recommend one of these data points always be teacher judgment. Further, it is important that these data points are used in a manner that is nonjudgmental (nonthreatening) of the persons involved. These points merely represent diagnosis of student learning and, when interpreted correctly, offer guidance toward a more effective course.

Besides leading teachers in using data, principals also will require their own set of data skills. These skills not only will enable them to use data on their own, but will be critical in deciding methods that are most appropriate for their teachers. These skills also should be greater and broader than those expected of teachers, which presents a challenge: We have observed anecdotally and within NCSD that principals and teachers are often equally unprepared to use data. Consequently, NCSD should endeavor rapidly to get principal skill sets up to speed.

In preparing principals, NCSD should endeavor to tap resources both within and outside of the district. Within the district, a number of skilled data users may provide preparation, such as the Office of Assessment and Research, Instructional Facilitators, and already-skilled principals. Outside the district, many national experts are available, but we also recommend NCSD identify principals and other practitioners in the field; these practitioners are often a greater source of fresh ideas.

Unknown to us is the exact effect that our recommended changes may have on the structure of the principalship in NCSD. We recommend district planners be vigilant and proactive to make these changes positive and involve principals and their service organizations in this process. For instance, our recommendations may lead to a restructuring of the district job description for principals. Since our recommendations involve more work for principals, it may be necessary to identify responsibilities that can be accepted by other staff. Perhaps staffs will need to be reconfigured in some buildings to incorporate these new responsibilities and possible new leadership models. Whatever the needed changes are, we believe the principalship is so critical to the success of the data initiative that all efforts should be made to enable and support this position in using data.

Lastly, we note that we do not interpret the lack of principal data use we saw as any fault of NCSD principals. Rather, we believe these voids are due to lack of preparation and the newness of data use to the profession. We believe principals will engage efficiently and enthusiastically in data use when afforded the preparation and support.

Teachers

Because teachers are so important in effecting student learning, we believe they are an integral part of a data initiative. In fact, we believe that any data initiative will be unsuccessful if it does not involve all teachers using data in their day-to-day function (Wayman & Stringfield, 2006). In our evaluation, we observed some data use among teachers but found few that were deeply engaged. Further, most who were using data were dependent on others for data access and interpretation.

Research has shown that teachers will use data if such use helps their students and is properly supported (Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006). We recommend that NCSD place a clear expectation on teachers to become involved in the effective, daily use of data to inform their craft. In doing so, the district will need to provide support and training, along with the flexibility and vision to allow for an inevitable evolution of teacher data use.

First, NCSD must provide its teachers immediate, relevant, but adequately paced professional development on data use. Research is clear that data skills are a must (Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006), and our data suggest that NCSD teachers want data use training. As described previously, such training should not be isolated to those who ask for it but should be mandated for all teachers in the district. Development opportunities should include training on what data are, how they can be used, what information is provided by learning assessments, and—most importantly—how to use data to effect changes in practice. This last opportunity is particularly important because our data indicate this as a weakness among many NCSD teachers. Professional development about effective use of the data system is also a must because the system will be the primary point of access for all data.

Opportunities for collaboration are also important in fostering teacher data use. Research has shown collaboration and data use to be reciprocal—individuals often gravitate toward others when using data, but data also form a starting point for conversations about data (Chen et al., 2005; Wayman et al., 2006). As noted previously, NCSD must help faculty identify varied and frequent opportunities to collaborate around data use. We observed many good instances already occurring in schools, so there is much to build on. The new data initiative further will offer many opportunities around calibration, the data system, and newfound knowledge provided by professional development

In expecting and effecting teacher data use, district personnel must pay close attention to the needs of the position and ensure that expectations dovetail smoothly with the work of teaching. This is especially critical for the many teachers that our results showed have incorporated data use as an extra burden in their day as well as for those who are currently not engaged in data use.

Exactly how this will unfold is unclear, but the data provide some points for observation. For instance, we observed that NCSD teachers use almost all of their data formatively (for immediate, day-to-day decisions on teaching). We also observed that many teachers are maintaining parallel processes—maintaining their old ways of doing their job while simultaneously adding new data responsibilities. In addition, we heard general statements that data currently in use provide more information on students than was previously available, but that these data do not provide all the information teachers need.

Foreseeing the exact evolution of NCSD teacher data use is complicated and cannot be solved right away. One thing is certain, however: From the start, data use must be implemented in a supported fashion that shortens a teacher's day, not lengthens it. In fact, implementing even basic data use practices into a teacher's natural workday will provide surprisingly increased knowledge and efficiency. Still, the process and work of teaching should be monitored, and adjustments must be made constantly in order to seamlessly build data use into the teacher workday.

Further Data Use Issues for NCSD

In addition to the recommendations about becoming a data-informed district, acquiring an integrated data system, and implementing the data initiative, there are other issues our data enable us to address. In the following paragraphs, we offer recommendations regarding the dropout problem, school differences, hiring a new superintendent, addressing public perception, and ongoing study of the data process.

School Dropouts

In our interviews, we heard reference to a high dropout rate in NCSD, with most estimates placing the rate at about 32%. All educators who mentioned the dropout rate described it as unacceptably high, but we also heard how difficult it was to address dropout issues. Difficulties were often attributed to incorrect and incomplete student data on dropouts. Consequently, we recommend that NCSD place the school dropout problem high on its list of priorities to address through the data initiative.

Our data suggest that there is an information flow problem in NCSD regarding school dropouts. Several components necessary for effective information flow are in place (e.g., staff dedicated to dropout issues, dropout reports, and monitoring techniques), but the flow is inconsistent, the information is unreliable, information often does not get to the right individuals, and some individuals who get the information do not know what to do with it. We believe a noticeable portion of the dropout problem can be solved through straightforward use of the data system and establishment of tightly coupled structures. Since dropout prevention was not a focus of this evaluation, our data do not allow us to provide a full set of recommendations. However, the following recommendations will offer an excellent start.

First, we recommend that NCSD adopt a clear definition of what constitutes dropping out of school. While most agencies count dropout (or graduation) rates through some form of cohort measurement, an integrated data system will position NCSD to adopt a student-specific dropout definition. We suggest a school dropout be defined as a student who has not attended school for

at least 30 days, has not transferred to another school, is not being home-schooled, and has not contacted the school system about absence or readmission (Chavez, Oetting, & Swaim, 1994). (A simpler definition was recommended by Morrow, 1986, who suggested a dropout be defined as a student with unexcused absences from school of 2 consecutive weeks or more.)

Second, we recommend that the district assign a staff member to use the data system to monitor this definition, follow up with students to verify that each actually meets the definition, and classify students accordingly. This staff member should produce weekly lists for schools of students who have newly dropped out of school and monthly cumulative lists of all dropouts to date. Dropout rates should be monitored monthly by school, and an official dropout rate should be published at the end of each year.

We hypothesize that these two steps will provide positive progress toward NCSD's dropout problem. These methods will produce a definite dropout rate rather than the vague estimates currently available. Further, establishing a clear, *student-specific* definition of dropout provides a clear picture of who is dropping out and when. Perhaps most important, the mere act of identifying dropouts and verifying their situation has been shown to help in dropout prevention and recovery (Wayman, 2002) because district educators are able to react in real time.

Once these two steps are in place, the dropout issue can be examined in more thorough fashion and appropriate decisions can be reached. For example, educators can use the data to examine more thoroughly known patterns of concomitant data such as mobility, low grades, or truancy. Prediction models can be estimated at the individual, school, and district levels, or prevention and recovery programs can be individually targeted.

School Differences

The discovery of between-school differences regarding data use and school culture was not surprising, especially in a district characterized by significant site-based control. However, significant and consistent differences existed by school level: High schools scored alarmingly lower than middle and elementary schools on data use and school culture; elementary schools scored higher on culture and data use than middle or high schools.

Besides the data we offered, we recommend NCSD further explore and understand these differences. Clearly, there is a problem to be addressed in high schools regarding how they feel about their work and their environment. Our data were not completely clear about the roots of these problems but did suggest that leadership, alignment, vision, and clarity are strong candidates and could be pursued to improve culture.

It is not surprising that elementary schools use data more than middle schools and that middle schools use data more than high schools. Many more formal assessments are available for younger children, and most of the data use research is conducted on elementary or middle schools. Nevertheless, we believe the middle and high school levels may benefit greatly from more efficient data use, if for no other reason than their teachers are responsible for many more students and thus unable to know their learning as intimately as do elementary teachers.

The district can and should address these issues. For instance, high school teachers feel left out of the data process, as do middle school teachers to a lesser degree, so efforts should be made to include them. Also, assessments for older students should be acquired or developed, and other data that particularly address the high school context should be identified.

Many discrepancies due to culture and data use will be addressed by the process and establishment of definitions, structures, and infrastructure for more efficient data use. However, the district additionally must be vigilant for conditions that are not solved by this process and move to improve them.

The New Superintendent

The process of hiring a new superintendent is underway, as NCS D's long-serving superintendent has announced he will be retiring at the end of the 2007–2008 school year. We believe it will be important to hire someone who is savvy about district-wide data integration as described in this report. Understanding that such experience is rare, NCS D at least must require that the new superintendent be enthusiastic and invested in establishing NCS D as a data-informed district. Portions of this report will provide excellent resources and description for the interview process.

While NCS D has been fortunate to have a history of longevity in the superintendent position, the district must not depend on the next superintendent's serving so long. Consequently, we again remind of the importance of establishing structures that are not dependent on individual leadership; although it is important to hire a person who will facilitate this initiative, it is also important to structure the initiative to succeed regardless of who fills the superintendent position.

Transparency, Education, and Public Perception

Our data revealed that many NCS D stakeholders were not completely comfortable with district dissemination of data or with their own ability to draw meaning from the data. Although schools and districts have collected data for years, the current accountability era has made these data public for the first time. Regardless of their ability to do so, the public is making decisions and conclusions from these data, and we observed that NCS D has provided insufficient input into these uses or decisions.

Guided by the old adage, "tell your story or someone else will," we recommend NCS D embark upon a public education campaign about data. Many aspects of this program can be accomplished simply. For instance, when test scores are sent home to parents, a clear, basic description of the meaning of these scores can be provided. Online access to data should be accompanied by similar information. Public education programs can be provided in a number of ways: meetings, online, or the media, to name a few. Many entities are disseminating school data for their own purposes (e.g., parent organizations, realtors, and media), so efforts must be made to identify these entities and form partnerships. At every turn and in many forms, every stakeholder must be met with clear, short, and simple descriptions of what data mean and how NCS D is using data to improve education.

It is particularly critical to address public evaluation of schools and teachers. Informal evaluations of which schools or teachers are the "best" have abounded in education for years, yet our data indicate that NCS D educators do not often engage parents in data discussions. Paraphrasing one interviewee, parents are going to talk about teachers and schools at basketball games, meetings, or backyard barbecues anyway, so it is important the district provide honest, grounded information to inform perceptions. This is consistent with a forecast provided earlier that formal evaluation of teachers may be on the policy horizon (see the System Integration: Data Warehouse section above), and we believe it will be culturally important for the district to provide proactive evaluation with improvement and transparency in mind.

Improving the Fit Between Data Use and Educational Work

We saw many instances where data use was not improving how educators did their jobs. In these instances, data were used almost separately, rather than in support of educator work. Consequently, it will be critical that NCS D continually search for ways to incorporate data use into the natural flow of any educator's workday. This problem is a vexing problem for all

districts, and we are not aware of any research that has directly addressed it. Still, we can recommend ways to begin exploring and addressing this problem.

Outside NCSD, we have observed that most building-level data policies and practices are set counter to the way education is conducted. While the workflow of education involves teaching and assessing simultaneously (i.e., formatively), it is unfortunate that data use typically involves halting the flow of education. For example, rather than conducting formal assessment as part of the classroom process (as is traditionally done with quizzes, reading, and assignments), schools often stop classroom activities for a number of days to administer assessments. As a result, teachers often view assessment, teaching, and data use as disconnected parts of their jobs (Ingram et al., 2004; Wayman & Stringfield, 2006).

The data showed NCSD processes were similarly counter to the flow of education. Regardless, teacher uses were almost always formative, and this mismatch often infused inefficiency and dissonance to data use. In light of these observations, we offer three preliminary recommendations of how the district may proceed. First, we recommend that district personnel should endeavor to identify many more forms of effective formative assessment for teachers to use. Second, we recommend the district look to establish formative data processes that mesh well with the traditional flow of education, stepping outside this flow only when necessary. Third, we recommend that work is done with individuals, providing specific training to ensure that their data processes are not an extra layer of work (as with the teacher described in the Results section who maintained both paper and electronic grading processes) but support and improve their work.

Further Study

Consistent with the tightly coupled feedback cycles that characterize a data-informed district, it will be important for the district to design a program of ongoing study and evaluation of the NCSD data initiative. Such study will provide consistent information and feedback about what works in the initiative. Such study also will offer a foundation from which to pursue external funding, provide guidance to other school districts, and nationally distinguish NCSD as a leader in effective education.

There are many examples of components to be included in ongoing evaluation. Some involve clear and immediate measures of the progress and integrity of the initiative. Examples include the number of individuals participated in the visioning process and which roles or groups they serve. Data system usage can be observed through frequency of access and duration of sessions. Student achievement should be monitored over time to provide information about the effect of the initiative on learning.

Other research should inform process changes. Job shadowing should be conducted to examine actual practices. Further knowledge should be gathered about the work of education in classrooms, offices, and buildings and how data use can support this work to create an efficient work environment. Further study should describe processes, structures, and data that uniquely serve elementary, middle, or high schools. Additionally, more information should be gathered about the invention or acquisition of types, forms, and characteristics of data that best inform the craft of education.

CONCLUSION

This evaluation has provided the NCSD with detailed, in-depth information about the ways data are used throughout the district and how they may be used to better inform education. We used this information and our research expertise to design a course for establishing a healthy data initiative that will improve NCSD education for years to come.

As Friedman (2005) pointed out, the first decade of the 21st century is characterized by information exchange—a *flat world*, to use his term. Information exchange arrived recently and suddenly in education, in the form of accountability legislation that makes school data available for public consumption.

As the public consumes education data, districts, schools, and educators struggle with a far more complicated charge: how to make effective use of these data in ways that improve teaching and learning. This is difficult because education long has been conducted with the educator as the sole resource, usually basing decisions on professional experience and judgment. While professional judgment is still recognized as a valuable source of information, it is now but one source of information. Educators in the flat, 21st-century world should be able to triangulate their judgment with a variety of sources of learning information, resulting in sound, well-informed decisions. However, we are still learning effective methods to do this.

Despite this new charge, the core work of education remains the same. Educators still are trying to gain as much information as they possibly can about each student's learning in order to provide a better learning experience for all. The way this information is accessed, processed, and used has changed, and it is new and exciting. In this report, we hope we have provided valuable information and suggestions for the educators of NCSD to pursue this exciting charge.

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TABLES

Table 1

Interviewees and Their Roles

Building staff	Central Office	Outside
Assistant principal (2)	Business Services (7)	Board of Trustees (1)
At-risk tutor (2)	Curriculum & Instruction (15)	Employee service orgs. (3)
Counselor (5)	Facilities and Technology (4)	Parents (6)
Instructional Facilitator (12)	Human Resources (6)	Students (5)
Principal (14)	Superintendent's Office (1)	
Support staff (7)		
Teacher (38)		

Note. Number of interviewees reported in parentheses.

Table 2

Number of Interviewees Per School

Alcova Elementary School (1)	Mountain View Elementary School (1)
Centennial Junior High School (7)	Natrona County High School (4)
CY Junior High School (3)	North Casper Elementary School (1)
Dean Morgan Junior High School (6)	Paradise Valley Elementary School (7)
Evansville Elementary School (4)	Park Elementary School (6)
Fort Caspar Academy School (2)	Pine View Elementary School (1)
Frontier Middle School (6)	Red Creek Elementary School (1)
Grant Elementary School (1)	Roosevelt High School (1)
Kelly Walsh High School (4)	Southridge Elementary School (2)
Manor Heights Elementary School (1)	Westwood Elementary School (8)
Mills Elementary School (5)	Willard Elementary School (6)

Note. Number of interviewees reported in parentheses.

Table 3

Number of Online Survey Participants, Disaggregated by Role and District Experience

Role	1 year	2–5 years	6–10 years	11–20 years	20+ years	Total
Assistant principals	0	0	0	2	0	2
Central Office	2	1	2	4	4	13
Counselors	1	1	0	4	2	8
Instructional Facilitator	1	0	3	5	3	12
Other	4	8	10	18	5	45
Principals	0	1	2	4	9	16
School support staff	4	13	15	19	10	61
Teachers	29	41	56	92	60	278
Total	41	65	88	148	93	435

Table 4

Description of Teachers Participating in Online Survey, by School

School	<i>n</i>	%	School	<i>n</i>	%
Alternative Learning Center	1	<1%	Natrona County High	28	10%
Bar Nunn Elementary	5	2%	North Casper Elementary	1	<1%
Casper Classical Academy	2	1%	Oregon Trail Elementary	4	1%
Centennial Junior High	14	5%	Paradise Valley Elementary	5	2%
Crest Hill Elementary	5	2%	Park Elementary	3	1%
CY Junior High	15	5%	Pineview Elementary	4	1%
Dean Morgan Junior High	28	10%	Poison Spider School	3	1%
Evansville Elementary	6	2%	Roosevelt High	4	1%
Fort Caspar Academy	6	2%	Sagewood Elementary	8	3%
Frontier Middle	15	5%	Southridge Elementary	2	1%
Grant Elementary	4	1%	University Park Elementary	5	2%
Kelly Walsh High	36	13%	Verda James Elementary	11	4%
Manor Heights Elementary	9	3%	Westwood Elementary	4	1%
McKinley Elementary	4	1%	Willard Elementary	6	2%
Midwest Elementary	3	1%	Woods Learning Center	7	3%
Midwest High	6	2%	More than one school	12	4%
Mills Elementary	3	1%	School not listed	3	1%
Mountain View Elementary	6	2%	TOTAL	278	100%

Table 5

Data Use Scales and Their Items

Scale	Items
District Vision	<p>There are clear goals and structures for teaching and learning in my district.</p> <p>There is a clear vision for the use of data to inform education in my district.</p>
Instructional Uses of Data	<p>How often do you use data for the following purposes:</p> <ul style="list-style-type: none"> Assigning or reassigning students to classes or groups Developing recommendations for tutoring or other educational services for students Identifying and correcting gaps in the curriculum for all students Identifying individual students who need remedial assistance Setting learning goals for individual students Tailoring instruction to individual students' needs
Professional Data Practices	<p>I adjust my practice based on data I access about students.</p> <p>I am good at using data to diagnose student learning needs.</p> <p>I collaborate frequently with other educators about data and how it relates to the learning needs of students.</p> <p>I use a variety of formal learning assessments (examples: PAWS, growth assessments, etc) to measure student performance.</p>
Supportive Computer Systems	<p>I have the proper technology to efficiently examine data.</p> <p>The computer systems (for data use) in my district are user-friendly.</p> <p>The computer systems in my district provide me access to lots of data.</p>
Supports for Using Data	<p>I am adequately prepared to use data.</p> <p>I am adequately supported in the effective use of data.</p> <p>I am given enough time use data effectively.</p> <p>My district provides useful professional development opportunities to help me learn more about how to use data.</p> <p>There is someone I can go to who can answer my questions about using data.</p>

Table 6

School Culture Scale Means for NCSD and Norm Group

Group	Shared Vision	Facilitative Leadership	Teamwork	Learning Community
NCSD	3.62 (0.83)	3.71 (0.81)	3.64 (0.75)	3.55 (0.72)
Norm group	4.09 (0.71)	3.93 (0.72)	3.86 (0.63)	3.85 (0.64)

Note. Standard deviations are in parentheses. NCSD $n = 435$, norm group $n = 1,124$.

Table 7

School Culture Scale Means for NCSD, Disaggregated by Role

Role	Shared Vision	Facilitative Leadership	Teamwork	Learning Community
Teachers	3.61 (0.88)	3.69 (0.86)	3.66 (0.76)	3.57 (0.74)
Administrative teams	3.66 (0.83)	3.98 (0.71)	3.69 (0.75)	3.56 (0.72)
Central Office	2.98 (0.93)	3.21 (0.90)	3.08 (0.95)	3.02 (0.77)
School support staff	3.73 (0.66)	3.78 (0.68)	3.68 (0.64)	3.60 (0.63)
Other	3.64 (0.69)	3.63 (0.64)	3.60 (0.69)	3.54 (0.64)

Note. Standard deviations are in parentheses.

Table 8

School Culture Scale Means for Norm Group, Disaggregated by Role

Role	Shared Vision	Facilitative Leadership	Teamwork	Learning Community
Teachers	4.09 (0.71)	3.93 (0.71)	3.88 (0.63)	3.84 (0.65)
Administrative teams	4.52 (0.45)	4.55 (0.38)	4.07 (0.48)	4.07 (0.50)
Central Office	N/A	N/A	N/A	N/A
School support staff	4.15 (0.70)	3.97 (0.72)	3.84 (0.64)	3.93 (0.66)
Other	N/A	N/A	N/A	N/A

Note. Standard deviations are in parentheses. Teachers $n = 805$, administrative teams $n = 33$, school support staff $n = 186$. N/A denotes information not available for these groups.

Table 9

School Culture Scale Means for NCSD, Disaggregated by District Experience

District experience	Shared Vision	Facilitative Leadership	Teamwork	Learning Community
5 or fewer years	3.67 (0.81)	3.76 (0.80)	3.61 (0.74)	3.63 (0.72)
6–10 years	3.64 (0.78)	3.80 (0.80)	3.69 (0.70)	3.56 (0.69)
11 or more years	3.59 (0.86)	3.66 (0.86)	3.64 (0.77)	3.52 (0.73)

Note. Standard deviations are in parentheses.

Table 10

Data Use Scale Means, Disaggregated by Role

Role	Instructional Uses of Data	Supports for Using Data	Supportive Computer Systems	Professional Practice	District Vision
Teachers	2.98 (0.71)	2.42 (0.65)	2.59 (0.81)	3.23 (0.63)	2.56 (0.79)
Administrative teams	3.06 (0.58)	2.64 (0.68)	2.89 (0.67)	3.72 (0.41)	2.30 (0.86)
Central Office	2.33 (1.11)	2.43 (0.74)	2.69 (0.78)	3.38 (0.77)	2.23 (0.75)
School support staff	2.34 (0.87)	2.67 (0.63)	2.80 (0.69)	3.16 (0.59)	2.80 (0.69)
Other	2.33 (0.94)	2.68 (0.58)	2.98 (0.65)	3.21 (0.62)	2.72 (0.66)

Note. Standard deviations are in parentheses.

Table 11

Data Use Scale Means, Disaggregated by District Experience

District experience	Instructional Uses of Data	Supports for Using Data	Supportive Computer Systems	Professional Practice	District Vision
5 or less years	2.85 (0.85)	2.65 (0.64)	2.83 (0.77)	3.37 (0.56)	2.81 (0.79)
6–10 years	2.90 (0.85)	2.58 (0.64)	2.71 (0.77)	3.31 (0.56)	2.55 (0.79)
11 or more years	2.76 (0.80)	2.40 (0.65)	2.62 (0.79)	3.21 (0.68)	2.49 (0.75)

Note. Standard deviations are in parentheses.

Table 12

Responses to Selected Data Use Survey Items, Disaggregated by Role

Role	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Item: "Improving my ability to use data will help me become a better educational professional."				
Teachers	9 (3%)	36 (13%)	129 (46%)	104 (37%)
Administrative teams	0 (0%)	1 (3%)	10 (26%)	27 (71%)
Central Office	2 (15%)	1 (8%)	2 (15%)	9 (62%)
School support staff	3 (5%)	4 (7%)	36 (59%)	18 (30%)
Other	1 (2%)	3 (7%)	24 (53%)	17 (38%)
Total	15 (3%)	45 (10%)	201 (46%)	174 (40%)
Item: "I think it is important to use data to inform educational practice."				
Teachers	4 (1%)	17 (6%)	134 (48%)	123 (44%)
Administrative teams	0 (0%)	1 (3%)	4 (11%)	33 (87%)
Central Office	0 (0%)	1 (8%)	3 (23%)	9 (69%)
School support staff	2 (3%)	1 (2%)	36 (59%)	22 (36%)
Other	1 (2%)	6 (13%)	17 (38%)	21 (47%)
Total	7 (2%)	26 (6%)	194 (45%)	208 (48%)
Item: "I would like my entire district to become a 'data-informed district,' where data are used effectively to inform educational decisions at every level."				
Teachers	17 (6%)	52 (19%)	145 (52%)	64 (23%)
Administrative teams	0 (0%)	2 (5%)	18 (47%)	18 (47%)
Central office	1 (8%)	1 (8%)	27 (44%)	25 (41%)
School support staff	1 (2%)	8 (13%)	27 (44%)	25 (41%)
Other	1 (2%)	10 (22%)	23 (51%)	11 (24%)
Total	20 (5%)	73 (17%)	218 (50%)	124 (29%)

Table 13

Responses to Selected Data Use Survey Items, Disaggregated by District Experience

District experience	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Item: "Improving my ability to use data will help me become a better educational professional."				
5 or fewer years	2 (2%)	6 (6%)	53 (50%)	45 (43%)
6–10 years	1 (1%)	10 (11%)	40 (46%)	37 (42%)
11 or more years	12 (5%)	29 (12%)	108 (45%)	92 (38%)
Total	15 (3%)	45 (10%)	201 (46%)	174 (40%)
Item: "I think it is important to use data to inform educational practice."				
5 or fewer years	0 (0%)	7 (7%)	42 (40%)	57 (54%)
6–10 years	0 (0%)	7 (8%)	36 (41%)	45 (51%)
11 or more years	7 (3%)	12 (5%)	116 (48%)	106 (41%)
Total	7 (2%)	26 (6%)	194 (45%)	208 (48%)
Item: "I would like my entire district to become a 'data-informed district,' where data are used effectively to inform educational decisions at every level."				
5 or fewer years	4 (4%)	9 (9%)	62 (59%)	31 (29%)
6–10 years	6 (7%)	14 (16%)	41 (47%)	27 (31%)
11 or more years	10 (4%)	50 (21%)	115 (48%)	66 (27%)
Total	20 (5%)	73 (17%)	218 (50%)	124 (29%)

Table 14

Hierarchical Linear Model Estimates for Culture Scales, Accounting for School-Level Variables

Scale	Intercept	High school	Middle school	Title I	<i>p</i> (school)
Shared Vision	4.26	-1.23**	-0.70**	-0.38**	0.001
Facilitative Leadership	4.24	-1.11**	-0.45**	-0.37**	0.000
Teamwork	4.18	-0.99**	-0.49**	-0.33**	0.000
Learning Community	4.03	-1.00**	-0.50**	-0.07	0.000

Note. *p* assesses between-school variance after accounting for level-2 variables.

** *p* < .05.

Table 15

Hierarchical Linear Model Estimates for Data Use Scales, Accounting for School-Level Variables

Scale	Intercept	High school	Middle school	Title I	<i>p</i> (school)
Instructional Uses of Data	3.28	-0.68**	-0.41**	0.13	0.052
Supports for Using Data	2.46	-0.19	-0.06	0.24*	0.044
Supportive Computer Systems	2.70	-0.51**	-0.12	0.34**	0.500
Professional Data Practices	3.28	-0.22**	-0.14**	0.24**	0.500
District Vision	2.73	-0.21	-0.24	-0.02	0.011

Note. *p* assesses between-school variance after accounting for level-2 variables.

* *p* < .10.

** *p* < .05.

Table 16
Respondent Rankings of Data Uses, Disaggregated by Role

Teachers	Administrative teams	Central Office
1. Identifying individual students who need remedial assistance (3.17)	1. Setting school improvement goals (3.50)	1. Evaluating district achievement trends and performance (2.62)
2. Developing recommendations for tutoring & educational services for students (3.06)	2. Developing recommendations for tutoring & educational services for students (3.42)	2. Evaluating building achievement trends and performance (2.46)
3. Tailoring instruction to individual students' needs (3.03)	3. Identifying individual students who need remedial assistance (3.39)	3. Identifying individual students who need remedial assistance (2.46)
4. Setting school improvement goals (2.99)	4. Evaluating building achievement trends and performance (3.26)	4. Setting school improvement goals (2.38)
5. Setting learning goals for individual students (2.97)	5. Setting learning goals for individual students (3.16)	5. Developing recommendations for tutoring & educational services for students (2.38)
6. Evaluating building achievement trends and performance (2.83)	6. Determining topics for professional development (3.03)	6. Tailoring instruction to individual students' needs (2.38)
7. Assigning or reassigning students to classes or groups (2.83)	7. Assigning or reassigning students to classes or groups (2.92)	7. Identifying and correcting gaps in the curriculum for all students (2.31)
8. Identifying and correcting gaps in the curriculum for all students (2.79)	8. Evaluating district achievement trends and performance (2.87)	8. Setting learning goals for individual students (2.31)
9. Encouraging parent involvement in student learning (2.68)	9. Encouraging parent involvement in student learning (2.84)	9. Determining topics for professional development (2.23)
10. Identifying where teachers need to strengthen content knowledge, teaching skills (2.59)	10. Tailoring instruction to individual students' needs (2.79)	10. Identifying where teachers need to strengthen content knowledge, teaching skills (2.15)
11. Determining topics for professional development (2.56)	11. Identifying where teachers need to strengthen content knowledge, teaching skills (2.74)	11. Assigning or reassigning students to classes or groups (2.15)
12. Evaluating district achievement trends and performance (2.51)	12. Identifying and correcting gaps in the curriculum for all students (2.66)	12. Encouraging parent involvement in student learning (2.00)

Note. Mean response is shown in parentheses.

Table 17

Comprehensive List of Data Systems Mentioned by Participants

1. Achenbach System of Empirically Based Assessment (ASEBA)	23. Filemaker Pro	49. Read Naturally
2. Advantage Math Program	24. Firstclass	50. Reading First Database
3. AESOP	25. GIS mapping systems	51. Reading Plus
4. AIMSweb	26. Grade Quick	52. Remote Desktop
5. Alphon's Allie	27. Gradekeeper	53. SASI
6. AppleWorks	28. Harcourt Brace InfoCentre	54. Scholastic Reading Inventory (SRI)
7. Assessment Management System (AMS)	29. Integrated Financial and Administrative Solution (IFAS)	55. Schooldudes.com
8. Behavior Assessment System for Children (BASC)	30. Legacy	56. School-Wide Information System (SWIS)
9. Bridges Math	31. Library 2.0	57. Spectrum/Sagebrush
10. Cafeteria system	32. Literacy First	58. SPSS
11. Career Inventory System (CIS)	33. Making the Grade	59. Star Early Learning
12. Clique-View	34. Math Trail Blazers	60. Star Math
13. CPS ePads	35. MS Access	61. Star Reading
14. Crystal Reports	36. MS Excel	62. StudyWiz
15. Data-based Evaluation Center	37. MS Project	63. Success For All tools
16. DIBELS system	38. MS Word	64. Swift Program
17. District Data Replicator	39. My Data First	65. Taskstream
18. District Website	40. NEA	66. Teamplayer
19. Dlese.org	41. NWEA Growth Assessments	67. TeenBiz
20. ENCORE!	42. Orchard	68. TotalReader
21. Everyday Math	43. Palm	69. Transportation system
22. Fast Track Scheduler	44. PAWS online system	70. Versatrans
	45. Pinnacle	71. Vineland Adaptive Behavior
	46. Police Response Log	72. Winnebago Spectrum
	47. Primavera	73. Wyoming Department of Education
	48. Promethean Boards	

Table 18

Count and Percent of Participants Reporting Frequent Use of Specific Data Systems, by Role

Role	AIMS web	Encore	NWEA	Pinnacle	SASI	Other
Teachers	23 (8%)	44 (16%)	132 (47%)	166 (60%)	87 (31%)	52 (19%)
Administrative teams	9 (24%)	5 (13%)	29 (76%)	9 (24%)	27 (71%)	9 (24%)
Central Office	1 (8%)	1 (8%)	7 (54%)	6 (46%)	10 (77%)	2 (15%)
School support staff	4 (7%)	13 (21%)	14 (23%)	20 (33%)	36 (59%)	13 (21%)
Other	6 (13%)	11 (24%)	15 (33%)	12 (27%)	18 (40%)	10 (22%)
Total	43 (10%)	74 (17%)	197 (45%)	213 (49%)	178 (41%)	86 (20%)

Note. Percent of participants reporting moderate or extensive use given in parentheses.

Table 19

Data Systems Reported by Five or More Respondents, Disaggregated by Role

Administrative teams	Teachers	Central Office
PAWS online (7)	PAWS online (7)	SASI (19)
SASI (6)	SRI (7)	Pinnacle (10)
SRI (6)	Pinnacle (6)	Filemaker Pro (8)
Pinnacle (5)	Encore (6)	IFAS/Links (7)
NWEA (5)	NWEA (6)	ENCORE! (6)
	AIMSweb (5)	MS Excel (5)

Note. Number of respondents reported in parentheses.

APPENDIX: DISTRICT REACTION TO EVALUATION



11/2/2007

Prioritizing Information Use NCS D Initial Reaction to *“The Data-Informed District: A District-Wide Evaluation of Data Use in the Natrona County School District”*

Dr. Jim Lowham, Ed.D.
Superintendent, Natrona County School District

Trevor Mahlum
Assessment Data Coordinator, Natrona County School District

Natrona County School District #1, in Casper, Wyoming has gathered more and more data—like too many other school districts in the country, this work is rapidly growing, erratically coordinated and consists of systems of information that are systematically inaccessible. Unlike other districts, NCS D has commissioned an evaluation and recommendations for improved information use. Through an RFQ/RFP process, researchers from the University of Texas at Austin, led by Dr. Jeff Wayman, were selected to conduct a study and generate recommendations. This team studied the culture, expectations and use of data in NCS D in April and May 2007. The team finalized and submitted a report of findings and recommendations for system improvement on August 20, 2007.

Initial review of the report highlighted four key findings of importance to NCS D.

- The conditions of culture and climate in the NCS D will facilitate and support a systemic data initiative
- There is a need for clarification of focus about how data informs learning, teaching, and general district operations
- Current infrastructure and tools are perceived as ineffective and inaccurate sources of data due to isolation, difficulty of use, lack of use and lack of access as a system
- More focused professional development around data use and access is needed for all district staff

The report also offered the following recommendations based on the findings, the existing limited research on data use in schools and expert opinion.

- Creating a district wide focus and priority on becoming a “Data-Informed District” and committing to the growth process this entails

- Purchasing and developing comprehensive, integrated systems of information management
- Initiation of a data focused district transformation built on an inclusive process of establishing data use standards and practices
- Support the ongoing district data initiative with continuous improvement planning and accountability.

August 2007

Formal response from the district as a whole was muted at first. One of the discoveries made about the district is the absence of a mechanism or resource to manage the results of external review. No formal structure or team is currently in place to receive, review, react and advise response to external recommendations like those contained in the report. This was compounded by the fact that this is not seen as a high priority by many. Having or not having such data management is not on the checklist for Annual Yearly Progress (AYP), school safety, or directly connected to areas of public interest.

Very soon after the final version of the report was received, copies were sent electronically to cabinet members representing all the divisions for their review. Electronic copies were also sent to members of the working group responsible for developing the RFP for the report. A follow up session with the cabinet was scheduled shortly after to discuss the findings and request direction for next steps. This first meeting of the cabinet resulted in positive response and direction to make the report available to those initially involved in requesting the report.

September 2007

The RFP team met twice to discuss plans to disseminate the report more fully and to gather input from a group representing the classroom perspective. The report was circulated to the wider district leadership electronically. An informal focus group of teachers, tutors and instructional coaches met to brainstorm around some desired functionality of an eventual information system tool.

October 2007

The board of trustees heard a summary of the findings at a work session prior to one of their regularly scheduled meetings. Their response was largely positive. They requested the recommendations of the report begin to be implemented with the first step being a facilitated discussion regarding establishing district information standards and policy. The board plans to react to the suggestions generated by the facilitated discussion and then make a formal statement of intent regarding becoming a data-informed district.

Preliminary planning is underway to arrange a representative group facilitated discussion during the first week of December 2007. The charge for this group will be to establish a framework of information standards and outline a practical structure for implementing the initiative.

Conclusions

All response to the evaluation report has been positive. No group or individual has questioned either the need for improved information systems or the methodology and value of the report itself. It must be noted that in the larger universe of issues jockeying for priority in

any school district a comprehensive information management policy, practice and system may not match the priority of AYP determination, community relationships, or budget concerns. Major external pressures are not in place demanding better information handling and use by school districts.

The district has experience with external review by state and federal agencies. While the state and federal agencies request data, evaluate progress and audit systems occasionally, these groups do not often holistically recommend initiatives or describe paths to new practice. NCSD, like many districts, does not have a specific resource tasked with managing external review and initiating and sustaining change beyond those required by statute or rule.

In conclusion, NCSD has had the detailed report on data use from Wayman et. al. for 90 days at this writing. The recommendations made in the report have now been heard by most with the authority to effect change in the system. Concrete planning to begin to enact the major recommendations is now underway. NCSD's reaction to the report, though perhaps not immediate, is now growing in scope and priority. While it is likely too soon for the effects of the recommendations to be felt, the underlying concerns for more efficient data tools remain as intense as ever. While no part of the organization is in the purchasing process, there is a high level of urgency from many quarters to make such decisions in the very near future. Yet, largely, this remains a call from individuals or small groups for a "program" or "tool" that addresses their unique needs rather than a system for management of information. Developing such a system will prove difficult and will call for collaboration in a time of increasing anxiety.

For those individuals most closely involved with the request and production of the report inside the district, guarded optimism about the potential for positive change is present. Future changes made because of the expressed internal need, the external evaluation and the report are likely to dramatically alter the way the staff, students and community of the NCSD view information use in all aspects of district practice.