

First-Year Results From an Efficacy Study of the Acuity Data System

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We thank CTB/McGraw Hill for undertaking a relationship of this sort. While many vendors may be uncomfortable giving up control of the content of the evaluation, this study represents a commitment by CTB/McGraw-Hill to unbiased evaluation and the betterment of education. We commend them for their efforts and we endeavor to provide good work in return.

INTRODUCTION

The present study is part of a larger project that examines the effects of the Acuity data system on student achievement and teacher practice in Mesa Public Schools (MPS). The project employs a two-year, mixed-methods design to examine how teachers use student data to improve their practice, how Acuity use affects teacher practice and student achievement, and what changes can be made to maximize benefit. This report presents results from the first year of the larger study.

In conducting the larger study, we are consistently guided by the tenet that data use is merely a tool to help teachers and other educators know more about their students. Data use for data use's sake does not facilitate educational improvement – using data to improve practice does. The efficient, thoughtful, and well-structured use of data helps teachers better identify student learning needs and become more informed professionals (Copland, 2003; Datnow, Park, & Wohlstetter, 2007; Lachat & Smith, 2005; Wayman & Stringfield, 2006). We believe the improved educational practice that results from better information should lead to better student learning.

Similarly, a computer system that allows teachers to quickly and efficiently examine student data should be viewed as a tool to help teachers do their jobs (Wayman & Cho, 2008; Wayman, Cho, & Richards, in press; Wayman, Stringfield, & Yakimowski, 2004). Consequently, we see the use of Acuity as part of a larger, inextricable data initiative throughout MPS.

The goal of the present study was to identify factors that affected how teachers in grades 3-8 used the Acuity data system and data in general. Toward this goal, we explored two research questions:

1. How do teachers use the Acuity system?
2. What factors affect Acuity use?

To answer these questions, we integrated weekly counts of Acuity use with data about teacher characteristics, school characteristics, and survey data of teacher attitudes toward Acuity and toward data use in general¹. Our report is made up of four sections. First, we present the methodology for our study. Second, we offer our results and analyses. Third, we provide discussion of these results and recommendations for improvement; both are cast in light of previous research. Finally, we offer a short conclusion section.

¹ Upon completion of the larger study, we will examine the effect of Acuity use on student achievement. We do not provide such analyses in the present study because these findings are based on only one year of data – such analyses cannot convey the relationship between Acuity use and student outcomes, and therefore, could be misleading.

METHODS

We employed a mixed-methods design in conducting this study. Qualitative data were collected via interviews, focus groups, and observations of Acuity use. Quantitative data included a district-wide survey of data use, teacher background data, and Acuity use logs. Participants were selected to provide a broad collection of perspectives regarding data use and Acuity.

We conceive of “data” broadly, as any piece of information that helps teachers know more about their students. Consequently, data include not just formal assessments such as state tests, commercially-available interim assessments (e.g., Acuity), and district-created assessments, but also less-formally created data such as teacher-created benchmark assessments, tests, quizzes, demographic information, and teacher judgment. It is interesting to note that, although we encouraged a broad definition of “data,” the teachers in our study implicitly thought of data as formal assessments. Thus, although our participants took a narrower view of data, our interpretations and recommendations stay true to the broader view.

This section outlines our methods and procedures for conducting this study. We first describe the Acuity system and the MPS context. Following this, we offer sections outlining our procedures for collecting data, the measures used, and analyses employed.

About Acuity

Acuity is a software program by CTB/McGraw-Hill that offers numerous functions for accessing data and standards-based instructional content. It is intended to serve educators by assessing student progress on state learning standards and determining students’ readiness for state tests (CTB/McGraw-Hill, 2009). Acuity assessments may be offered online or via pencil and paper, the results of which are then accessible via the Acuity data system. These assessments target reading and mathematics in grades 3-8, as well as Algebra. When fully implemented, Acuity offers three predictive assessments to assess learning and predict progress toward state tests, four diagnostic assessments to assess learning, and a variety of reports and tools for working with these data. For instance, Acuity offers roster and individual level reporting, distracter analysis, item banks, and the ability to create and customize assessments for individual students. The research team was trained in Acuity by CTB staff and provided access to MPS Acuity data for the purposes of becoming more familiar with the system.

There are three forms of predictive tests; the material on these tests is based on state standards. Form A is a baseline test that is given at the start of a year. In each grade, this test consists of material from the prior grade and material that is to be taught in the current grade. Form B is a mid-year test that is typically given in late Fall. It consists of material already taught, but also contains material yet to be taught. Form C is given in the early Spring and is intended to prepare students for the state test by testing all material for the current grade.

Districts are able to determine what levels of functionality are accessible to various roles. For instance, central office administrators usually have access to different functions or data than principals, who have different levels of access than teachers. In this report, we focus on the instructional functions provided to MPS teachers. To evaluate these functions, we examined use logs generated by the Acuity system to track weekly educator use. We categorized instructional functions into five areas: Custom Tests, Instructional Resources, Management, Reports, and Tracking Completion Status (see *Measures* for specific information on how each these functions were quantified).

Mesa Public Schools and Acuity Implementation

Mesa Public Schools (MPS) is located in Mesa, Arizona. The city of Mesa is a suburb of Phoenix, Arizona and has a population of approximately 450,000 (Census Bureau, 2009). For the 2008-2009 school year, MPS enrolled about 79,000 students. Approximately 73% of MPS students identify English as their primary language at home. The district's two largest student demographic groups are white (50%) and Hispanic (38%). Roughly 52% of students are enrolled in free or reduced lunch (Mesa Public Schools, 2008).

MPS has 58 elementary schools (serving grades K-6), 13 junior high schools (serving grades 7-9), and seven senior high schools (serving grades 10-12), not including other more specialized schools or academies. The total district budget in 2008-2009 was \$620.5 million, with its biggest portion (\$433.1 million) allocated for daily operations. Employee salaries and benefits represented approximately 91% of this maintenance and operations budget (Mesa Public Schools, 2008). Like many districts throughout Arizona and the United States, MPS was experiencing the effects of the economic downturn during the 2008 – 2009 school year. Accordingly, MPS was developing plans for restructuring and re-allocating resources at the time of this report. This included plans to reduce personnel, including some teachers, in the in the 2009-2010 school year.

MPS uses a variety of formal assessments to track student learning. The state test is one such example: *Arizona's Instrument to Measure Standards* (AIMS) is a state-mandated, criterion-referenced test, used since the 1990s. The assessment underwent extensive revision and was re-released in its current form in 2005. For grades 3-8, AIMS is administered for several days, usually in April. Students in grades 10-12 follow a different testing schedule that allows for testing in October, February and April. AIMS comprises several components, including reading, writing, and mathematics. Science is offered to fourth and eighth graders, as well as to high school biology students. Another assessment used is the *Arizona English Language Learner Assessment* (AZELLA), an English proficiency test administered to ELL students once or twice per year. The *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS) is administered to evaluate reading fluency; DIBELS is given mostly to students in kindergarten through second grade, though it may be used for students up through the sixth grade. In addition, second and ninth graders take the complete TerraNova battery, a norm-referenced assessment, while students in grades 3-8 take an abbreviated TerraNova version that is embedded within AIMS. As a district, MPS has failed to meet Adequate Yearly Progress (AYP) accountability standards, mostly due to the reading achievement of subgroups, such as those for students classified as ELL and in special education. This failure to meet state accountability standards led district officials to search for a predictive assessment tool; this search culminated in the selection of Acuity.

MPS selected Acuity after an extensive process intended to ensure the contribution of many perspectives (Mesa Public Schools, 2009). Some of these strategies included participation and feedback from major user groups, an adoption committee composed of likely users of the system, and a substantial evaluation and RFP process. The district launched its use of Acuity in the 2007-2008 school year and currently administers the Acuity predictive assessments in reading and mathematics three times per school year (in August, October, and January). These assessments are intended to help teachers track student progress toward state standards and predict performance on AIMS. The Acuity predictive tests are administered on paper, with bubble sheets used for responses. Some schools scan on-site but most tests are sent to the district for scanning. Custom tests and instructional resources were made available to users, but district-wide training was not provided and these aspects of Acuity were not publicized.

New roles and functions for Acuity continue to be rolled out to MPS educators. For example, some teachers have received training in customizing and developing their own assessments in Acuity and future trainings are in the works. Also, many elementary school teachers expressed interest in accessing instructional activities through Acuity, so Fall 2009 training is focusing on those resources. In addition, MPS has implemented training for the classroom response devices commonly referred to as “clickers.” The clicker system typically consists of a receiver and classroom sets of remote controls (the clickers). Often working in conjunction with a laptop computer and LCD projector, clickers enable students to respond to multiple choice items from anywhere in their classroom or wherever the technology has been set up. Because clickers offer a host of functions, one particular expectation is that they will provide a more fluid approach to Acuity testing. MPS has offered basic clicker training to all its schools, and clicker sets are available, one per grade level, at each school. Further, an optional 16-hour training is available for teachers offering more advanced exposure to Acuity, clickers, and formative assessment practices. Some MPS teachers have participated in this training, and future trainings are also in the works.

Rollout of Acuity has been more sporadic than originally planned by MPS personnel (J. O’Reilly, personal communication, September 26, 2009). After rollout of Acuity in the 2007-2008 school year, 2008-2009 was intended to be a full-scale push to train and use all of the above features. This full-scale push was precluded by some unforeseen barriers. For instance, training resources and educator time were diverted in Fall, 2008 from Acuity to an initiative where each teacher was asked to create his or her own webpage. When training resources were reinstated in February, 2009, district personnel decided the timing was not right to embark on full Acuity training. Also, MPS had anticipated training and using interfaces for scanners and clickers enabling teachers to personally input data into Acuity and get immediate results. These interfaces were not ready until late Spring, 2009.

Without these intended functions available, MPS personnel decided to focus on the predictive tests. Other functions were described, with training available for those users who personally chose to pursue them². In 2009-2010, MPS dedicated two educational technology trainers to Acuity and added an Acuity training specialist who works with principals and small groups of teachers. The training originally planned for 2008-2009 is now being implemented by these staff.

Procedures

Numerous types of data were collected for this study, including an online survey, district data such as teacher and school demographic information, weekly use logs from the Acuity system, focus groups of principals and teachers, and observations of Acuity use. The following sections describe the definition of “teacher,” data collection procedures, and the resulting samples.

Defining “Teacher”

We worked with MPS district personnel to create a definition of *teacher* that would enable us to study educators whose primary responsibility was to directly instruct students. As a

² While MPS personnel were disappointed at these roadblocks, we note that this was a substantial amount of information to give educators during one school year. In earlier work (Wayman, Cho, & Johnston, 2007), we have advocated a slow, one-at-a-time rollout of functions, and we believe these roadblocks may have been a blessing in disguise.

result, MPS educators were considered *teachers* if they had a self-contained classroom and students in grades 3-8. This definition excluded teachers who primarily served as instructional consultants or facilitators (e.g., basic skills specialists), but included teachers who served distinct student populations (e.g., special education, self-contained classrooms) or who had special roles (e.g., content-area team leader). Also included were teachers with special certifications who still taught in classroom settings.

Data Collection

Survey. The research team administered online surveys from February 23 through March 11, 2009. Educators were assured in the survey invitation (and subsequent reminders) that their responses and participation would be kept confidential and that only the research team would handle these data. Each educator received an email containing a randomly-generated link to the survey; each link was electronically connected to the educator's unique MPS ID number. Participants were not allowed to leave blank responses except for demographic and open-ended questions.

In order to ensure a variety of perspectives and maximum participation, numerous strategies were implemented: (1) Every MPS educator was invited via email to participate in the survey. (2) Reminder emails were sent weekly, with a final reminder sent three days prior to deactivation of the survey. (3) Principals were encouraged to support participation rates. This was done by way of letters sent by the district office, flyers sent by the district office for posting around schools, and personal phone calls to principals. (4) The district offered paper supplies as an incentive. Each school that participated received a case of paper. Further, all schools with at least a 60 percent response rate received more paper. (5) Schools were given status updates of their response rates in advance of the final deadline.

The online survey consisted of three parts: (a) A demographic section, (b) The *Survey of Educator Data Use* (Wayman, Cho, & Shaw, 2009), and (c) The *Teacher Sense of Efficacy Scale* (Tschannen-Moran & Woolfolk-Hoy, 2001). In the demographic section, educators provided basic information about themselves, including how long they had been employed in education, what grade and subject they taught, their school, and their position (e.g., teacher, principal).

The *Survey of Educator Data Use* (SEDU) is an 81-item instrument assessing a variety of factors, including attitudes toward data use, support for data use, instructional practices, technology, and specific ways in which data are used by the respondent. Development of the SEDU was informed by a review of the literature, as well as the *Use and Perceptions Educational Data Survey* (Wayman & Supovitz, 2007). Included in the SEDU were 14 items that asked specifically about Acuity and other MPS data systems. Measures from the *Teacher Sense of Efficacy Scale* (Tschannen-Moran & Woolfolk-Hoy, 2001) were not used for the present study.

The entire online survey was piloted with 23 doctoral students in the Department of Educational Administration at The University of Texas at Austin. These pilot students represented a variety of educational roles including teaching, building administration, upper-level district administration, and educational policy. The instrument was also piloted with eight teachers in MPS, and feedback was solicited from district personnel prior to survey activation.

District data. School and teacher demographic data were provided by MPS district personnel. Data elements included gender, ethnicity, total years of experience in education, years of experience in the district, grade or subject taught, and degree attainment. Teacher background

data includes a unique identification number that allowed linkage to school-level data, Acuity system use logs, and survey measures.

Acuity use logs. Descriptions of teachers' use of the Acuity system, in the form of weekly use logs, were developed and provided by Acuity's vendor, CTB/McGraw-Hill. These logs reported specific actions taken and the date of the action. As such, these logs allowed us to investigate who executed which actions with the system and how often she or he performed an action. As with the teacher background data, teachers' unique identification numbers allowed linkage to student achievement data and teacher data use measures from the survey.

Focus groups. Six schools (four elementary schools and two junior high schools) were recruited as "study schools." MPS central office personnel helped in identifying schools that were, as a group, representative of the district. Principals were contacted via email and phone, introduced to the study, and asked to participate. Their participation represents a two-year commitment; our research team will maintain contact with them throughout the duration of the project and revisiting in Spring, 2010.

Qualitative data were collected in May, 2009 via site visits to the study schools. The goals of these visits were to learn about MPS educators' use of data, the factors affecting data use, the relationship between data use and teacher practice, and the role of technology. Particular attention was paid to the use of Acuity, perspectives regarding Acuity, and the implementation of Acuity in schools.

Two focus groups and four individual observations were conducted at each study school. Each was guided by a semi-structured protocol focusing on data use at MPS with a particular emphasis on the use and effects of Acuity. The individual observations focused directly on observing Acuity usage and describing its effects. All qualitative interviews were recorded. Each participant was offered the opportunity to decline having their response recorded; none chose this option.

At each school, focus groups consisted of two types: An administrative group and a teacher group. For the administrative focus groups, principals were asked to choose three to five other participants who were knowledgeable about school data use practices. Administrative team focus groups lasted approximately one hour. Discussions were guided toward the use of data in daily work, access to data, attitudes about data, leadership for data use, structures for supporting data use, and Acuity-specific questions. Questions about Acuity assessed attitudes about the system, its data and function, use of the system, and Acuity's role in the educational process.

To choose participants for the teacher focus groups, random lists of 10 teachers were generated for each school and provided to principals. From these, principals were then asked to select four to six teachers³ and to arrange for their participation in the group. In order to ensure a broad range of perspectives, principals were asked to include at least one teacher from a non-Acuity grade level (grades K-2 in elementary schools and grade 9 in junior high schools). To ensure teacher voice, principals or other building staff were not included in these groups. Teacher focus groups also lasted approximately one hour and were guided by similar issues as in the administrative team focus groups.

Acuity observations. Four teachers from each school were selected by the principals to demonstrate their use of the Acuity system. Conducted *in situ* during the site visits, these observations were designed to focus on the interaction between Acuity users and the Acuity system. These observations lasted approximately 15 minutes apiece and were geared toward the

³ This procedure was chosen to enable a balance between randomly choosing participants and the difficulty principals might have in obtaining class coverage for participants.

user's abilities and familiarity with Acuity, Acuity's ease of use, Acuity's functions and their implications for classroom practice.

Quantitative Sample

The quantitative sample was restricted to teachers in grades 3-8⁴ from the 58 elementary and 13 junior high schools in MPS. District data identified a population of 1,288 individuals whom we were able to classify as teachers during the 2008-2009 academic year. Of these teachers, 853 (66%) completed the online survey and 728 (56%) were identified by use logs as having used Acuity in 2008-2009⁵.

The survey sample was very similar to the MPS population. For example, 68% of the population of 1,288 teachers taught elementary school and 32% taught junior high; the survey sample was comprised of 62% elementary teachers and 38% junior high teachers (see Table 1). Table 2 shows the survey sample almost exactly mirrored the MPS population by experience: The population and survey sample differed by 1% or less for teachers in every category of experience.

By experience, Acuity users were also very similar to the MPS population. Distributions were identical in all categories except teachers with 20+ years of experience, where the distributions only differed by 1% (see Table 2). In terms of school membership, Acuity users were *not* representative of the population of MPS teachers: 84% of Acuity users taught elementary students and 16% taught junior high (see Table 1). The lack of fit between the Acuity sample and the MPS population presents no threat to the validity of this study because the Acuity group is defined by their actions, not by selection (as with the survey). In fact, it is one of the purposes of this report to discern why educators choose to use Acuity or not.

To ensure that the survey sample was not biased toward Acuity users, we examined the use logs of survey respondents. Teachers in the survey sample actually had less Acuity use – 49% of survey respondents used Acuity in 2008-2009, while 71% of survey non-respondents did (see Table 3).

Study School Sample

The study schools represent a variety of contexts. Table 4 describes demographic information relating to the study schools and the district as whole. In the following paragraphs, we offer a brief description of each school.

Brock Elementary School is a Title I school in the central part of the district. Most students at Brock are either Latino (58%) or White non-Latino (33%), and English is the predominant language in 56% of homes. Seventy-seven percent of Brock students are eligible for free or reduced lunch. In 2008, Brock met AYP and was ranked Performing by the Arizona Department of Education.

Hornsby Elementary School is a non-Title I school in the central part of the district. Most students at Hornsby are White non-Latino (83%), with no other ethnic group comprising more than 10% of the student population. English is the predominant language in 96% of the homes, and 17% of Hornsby students qualify for free or reduced lunch. In 2008, Hornsby met AYP and was ranked Excelling by the Arizona Department of Education.

Musial Elementary School is a non-Title I school in the eastern part of the district. Most students at Musial are either White non-Latino (68%) or Latino (23%), and English is the

⁴ Recall that Acuity tests are only given in grades 3-8.

⁵ Some teachers who completed the survey were not identified by use logs as Acuity users, and vice versa.

predominant language in 91% of the homes. Thirty-six percent of Musial students are eligible for free or reduced lunch. In 2008, Musial met AYP and was ranked Highly Performing by the Arizona Department of Education.

Freed Elementary School is a Title I school in the eastern part of the district. While no one ethnic group represents the majority of students, most students are either Latino (47%) or White non-Latino (43%), and English is the predominant language in 69% of homes. Seventy-nine percent of Freed students are eligible for free or reduced lunch. In 2008, Freed met AYP and was ranked Performing by the Arizona Department of Education.

Gibson Junior High School is a Title I school located in the central part of the district. The majority of Gibson students are White non-Latino (66%), and 25% of Gibson students are Latino. English is the predominant language in 86% of the Gibson homes. Forty percent of Gibson students qualify for free or reduced lunch. In 2008, Gibson failed to meet AYP, and was in a Federal School Improvement warning year. The Arizona Department of Education ranks the school as Highly Performing⁶.

Pujols Junior High School is a Title I school in the western part of the district. Most students at Pujols Junior High School are either White non-Latino (59%) or Latino (25%). English is the predominant language in 90% of the Pujols homes. Thirty-eight percent of Pujols students are eligible for free or reduced lunch. In 2008, Pujols met AYP and was ranked Highly Performing by the Arizona Department of Education.

Measures

In this section, we describe the measures used for quantitative analyses. These include teacher demographic data, data use scales, Acuity use logs, and school data.

Teacher Demographic Characteristics

Two teacher demographic measures were used: Years of experience in the district and degree attainment. Years of experience was collapsed into a four-level variable: (a) 5 years or less, (b) 6–10 years, (c) 11 – 20 years, and (d) 20 or more years. Degree attainment took on two levels: Bachelor's (including extra hours) and Master's or higher (including extra hours, specialist degrees, and doctorates).

School Data

Three school-level measures were used in this report. These measures included Title I status (yes/no), average enrollment, and school level (Elementary School or Junior High School).

Data Use Scales

Individual items on the *Survey of Educator Data Use* (Wayman et al., 2009) 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*). Five scales measuring different areas of Acuity and 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 scale. Scales thus ranged from one to four.

The *Acuity* scale consisted of nine items regarding the participant's attitude toward Acuity (e.g. ease of use, dependability, accuracy). The alpha reliability for this scale was 0.985.

⁶ The inconsistency between state and federal accountability ratings are due to differences in the policies.

The *Data's Effectiveness for Pedagogy* scale consisted of five items that asked about the contributions that data can make for improving educational practice (e.g., helping to plan instruction, reveal new insights, or identify learning goals). The alpha reliability for this scale was 0.919.

The *Instructional Resources* scale was an eight-item scale that asked how often participants used data for varied instructional purposes (e.g., identify students' learning needs or take actions based upon data). The alpha reliability for this scale was 0.937.

The *Principal Leadership* scale was a five-item scale that described actions that principals and assistant principals took to promote data use. This scale evaluated how school leaders led with data, encouraged teachers to use data, or created opportunities for improving data use. The alpha reliability of this scale was 0.900.

The *Support for Data Use* scale was a six-item scale assessing structures that provide support for educator data use. This included adequate preparation and professional development, as well as support from knowledgeable individuals. The alpha reliability of this scale was 0.901.

Single Survey Item

Besides the scales, there was a single survey item also used in the present study. This item asked how often the respondent used Acuity. It was embedded in a group of items that asked about many computer systems, preceded by the phrase, "In a typical month, how often do you use the following computer data systems?" Possible responses ranged from less than once a month to a few times a week. For analyses, non-users were also included on this item, yielding the following responses: Never used Acuity, less than once a month, once or twice a month, and almost weekly or more.

Use Log Data

Since the present study is focused on how Acuity helps teachers improve their practice, we focused on the instructional functions offered by Acuity. Some of these functions were supported by more training (e.g., report access) than others (e.g., custom tests). Examination of all instructional functions not only provides insight into use during the first year of this study but also provides a baseline for subsequent years.

Teachers' use of instructional functions in Acuity was tracked and categorized into five areas: Custom Tests, Instructional Resources, Management, Reports, and Tracking Completion Status. Use logs generated by the Acuity system allowed us to count the number of functions accessed for the week and generate a yearly sum for each user in each of the five areas. In addition, we added all of these functions to obtain a grand total of yearly instructional uses for each user. We not only used this total to ascertain prevalence of use, but to assess which users did and did not access Acuity during the year. In what follows, we describe the various functions that make up each area of use.

Custom Tests. Teachers may use Acuity to write and assign tests for students or classes. Three functions are associated with this category of use. The *Manage Custom Tests* function allows users to find an existing custom test or create their own. The *Assign Custom Tests* function allows users to assign custom tests to students, and the *Share Custom Tests* function allows users to share their tests with other educators.

Instructional Resources. Besides periodic assessments, Acuity also offers users access to a content bank and practice assignments (instructional resources) for individual students or an entire class. Acuity offers four capabilities within the domain of instructional resources. *Assign*

by *Skill/Standard* allows educators to assign to the entire class a resource dealing with a particular skill group or standard. *Assign by Student* allows educators to assign instructional resources to individual student(s). *Preview Instructional Resources* enables users to browse and explore the various instructional resources available. *Preview/Print* allows educators to view print paper copies of these resources.

Management. Acuity also offers teachers limited capacity to manage administrative functions of their classes. *Manage Classes* allows teachers to manage their students' passwords, to log in as particular students, and to remove students from their roster. *Manage Student Passwords* allows teachers to manage permissions for changing passwords.

Reports. Acuity allows users to access summaries of data in the form of reports. Acuity provides seven types of reporting functions, which are often further differentiated by individual student or class level reporting. *Assessment Report* provides various summaries of Acuity periodic assessments, such as for individual students or by class. *AYP Report* provides information about performance by NCLB subgroups and their predicted performance on AIMS. *Item Analysis Report* provides information about student or class responses to particular items on Acuity periodic assessments, including information about the question, associated learning standard, correct answer, and selection of distracter responses. *Longitudinal Report* charts student progress on Acuity periodic assessments over the course of the school year. *Portfolio Report* allows teachers to look up individual students and to view summaries of their performance on various tests at once. *Roster Report* presents lists of students and their overall scores on specific periodic assessments. *Summary Report* compiles into simple figures the overall performance for a class group or student.

Tracking Completion Status. Besides the capacity to assign further instructional resources or assessments, Acuity enables teachers to track the completion status of these assignments. This can be done in two ways: By assessment or by student. The *View/Assign Status by Assessment* function allows teachers to view which assessments have been assigned and/or completed. The *View/Assign Status by Student* function allows teachers to view which assessments have been assigned to particular students and whether students have completed their assessments.

Total Instructional Uses. The aforementioned instructional functions were all summed to obtain a figure of total instructional uses by each teacher over the course of a week and for the school year. This sum assessed prevalence of use. A total of 0 indicated no use during the year, enabling a dichotomous used/not used measure.

Analyses

Quantitative and qualitative analyses were conducted to understand MPS educators' use of the Acuity system and the factors affecting its use. We used these types of data in support of each other and to provide insight unique to each type of data. In the following two sections, we detail the specific analyses undertaken for each type of data.

Qualitative Analyses

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. 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. For

the present study, we focused on identifying specific sub-themes relating to our research questions.

For Research Question One, *how do teachers use the Acuity system*, we focused on interview data that illuminated how often the teachers used the system, when they used it, and what features they used. For Research Question Two, *what factors affect Acuity use*, we focused on interview data that focused on what types of teachers used Acuity, on teacher attitudes towards Acuity, and on teacher attitudes toward data use.

Quantitative Analyses

Descriptive statistics. Descriptive statistics were used in support of both research questions. For Research Question #1, *how teachers use the Acuity system*, two measures were used: (1) Total number of uses from the use logs, and (2) Self-reported use from the survey. Distributions of both measures were disaggregated by four categories: No use, less than once a month, 1-2 times per month, and almost weekly or more. The number of uses each week was aggregated district-wide and presented graphically by week. This offered insight into periods of heavy and light use. In addition, counts and percentages were presented detailing use of the five distinct instructional areas (see *Measures*).

To explore Research Question #2, *what factors affect Acuity use*, descriptive statistics are presented for having used Acuity during the school year, prevalence of Acuity use during the school year, and for the survey scales (see *Method*). Descriptive statistics are presented in advance of hierarchical linear models to answer this question.

Hierarchical linear models. In the present study, teachers are nested within schools. Hierarchical Linear Modeling (HLM) is an appropriate method for analyzing data of this structure. Unlike traditional methods such as ANOVA or Regression, 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). We used HLM to explore Research Question #2, *factors that affect Acuity use*. This was done in two ways: (1) Identifying characteristics of teachers that used Acuity, and (2) Describing attitudes toward Acuity.

Three dependent variables were used. First, to identify characteristics of teachers who used Acuity, we examined two outcomes from the use logs: A dichotomous outcome that categorized teachers as to whether or not they used Acuity during the 2008-2009 school year and a continuous outcome that assessed prevalence of use in terms of total uses during the 2008-2009 school year. Second, to describe attitudes toward Acuity, we examined one outcome from the survey: Perceptions of Acuity, as estimated by the Acuity scale. Within HLM, logistic regression was used for the dichotomous outcome and regression was used for the continuous outcomes.

Independent variables that explained these outcomes included both teacher- and school-level variables. Teacher-level variables included two groups: (1) Demographic variables (degree attainment and years of experience), and (2) Perception variables (four survey scales: Instructional Uses of Data, Data's Effectiveness for Pedagogy, Principal Leadership, and Support for Data Use). School-level factors included Title I status, school level, and average enrollment.

For each of the three outcomes, we identified significant factors by employing a backward selection strategy within a hierarchy: First, we used backward selection to identify teacher-level demographic variables significant at the .05 level. Second, controlling for those variables, we used backward selection to identify school-level variables significant at the .05

level. Third, controlling for both sets of variables, we returned to the teacher level and used backward selection to identify perception variables significant at the .05 level. Since some teachers did not respond to the survey, this strategy resulted in five models that drew from different samples:

For the dichotomous used/didn't use outcome, this strategy produced two models. The first model resulted from completion of the backward selection process within the first two hierarchies (teacher demographic and school variables) described above; this model drew from the entire use log sample. The second model resulted from completing the third hierarchy which tested perception variables. Since perception variables were drawn from the survey, this sample was narrowed to include only teachers who responded to the survey.

For the continuous prevalence (total use) outcome, this strategy also produced two models. The first model resulted from completion of the backward selection process within the first two hierarchies (teacher demographic and school variables); this model drew from the sample of teachers whose use logs indicated they used Acuity during 2008-2009. The second model again resulted from entering perception variables, but was narrowed from the sample used in the first model – it included only teachers who used Acuity last year *and* who responded to the survey.

For the Acuity attitudes outcome, we restricted the sample to survey participants who reported ever having used Acuity. Since the inclusion of perception variables did not affect the sample size, only one model was produced for this outcome. Model selection proceeded using backward selection and the hierarchy described above.

RESULTS

Though this report focuses primarily on teachers' responses to the Acuity system, any data tool should be considered part of a larger data initiative. Consequently, the results presented in this section are focused on use of the Acuity system, and necessarily, the use of data in general. These results are presented in two major sections corresponding to the research questions. In answering Research Question #1, *how teachers use the Acuity data system*, we focus on three areas: When, how much, and what features. In answering Research Question #2, *what factors affect Acuity use*, we focus on two areas: Characteristics of Acuity users and attitudes toward data use.

How Do Teachers Use Acuity?

To answer Research Question #1, *how teachers use the Acuity data system*, we triangulated the qualitative and quantitative data. In doing so, we separated our results into three sections: (1) Timing of Acuity use, (2) Quantity of Acuity use, and (3) Commonly used features of Acuity.

Timing of Acuity use

We examined weekly totals of Acuity use and found access to be cyclical (see Figure 1). Acuity results are typically not received by schools until about 5 – 10 days after test administration. Similarly, a spike in Acuity use can be seen around the second week following each predictive test administration. These findings are especially notable in two regards. First, the most frequent use of Acuity follows Form B. Although interview participants did not report favoring Form B, many presented criticism regarding its predecessor, Form A. Form A was described as being uninformative and frustrating due to the presence of material that teachers had not yet taught. Some reported that Form C was less informative, because by the time of its administration, teachers had already developed a refined sense for students' abilities and needs. Also notable, Acuity use leading up to the April administration of AIMS was lower than at any time following an administration of a predictive test and we heard no reports of teachers using Acuity printouts to prepare for AIMS⁷.

Quantity of Acuity Use

In order to determine the frequency with which MPS teachers used Acuity, we drew upon data from the Survey of Educator Data Use (Wayman et al., 2009), Acuity use logs, and qualitative interviews. Before conducting analyses, we first set out to create consistency between the use log and survey data that separately assessed how often teachers accessed Acuity. To do this, we structured the use log data to count the number of weeks each Acuity user accessed the system during the 2008-2009 school year. We then categorized these counts using the same categories employed on the Acuity survey use question: No Acuity use, less than once a month; once or twice a month; and weekly or more.

Table 5 presents frequencies of Acuity use from the use logs. Although a substantial portion of teachers (44%) do not access Acuity, over half do, if infrequently. Fifty-one percent access Acuity less than once a month, while 5% of teachers access Acuity once a month or more.

Acuity use is also triangulated by a survey question about teachers' self-reported use. Table 6 presents MPS teachers' self-reported frequency of Acuity use. When surveyed, most

⁷ In fact, MPS personnel encourage teachers not to use Acuity two weeks prior to AIMS administration so as not to appear to be ignoring instructional time in favor of test preparation. Even prior to this two-week period, use is low.

teachers reported using Acuity in some way, and only 28% reported never having used Acuity. Specifically, 34% reported themselves as using Acuity less than once a month, and 23% said they used Acuity once or twice a month. In fact, some teachers (15%) reported using Acuity almost weekly or more.

Self-reported frequencies are higher than those presented by the use logs. Certainly, this discrepancy could be due to self-report bias or because the survey was given following the availability of Form B data. However, interview data suggest another possible explanation: Logging into the Acuity system is not the only gateway to its use. With considerable frequency, interview participants reported “using Acuity” or its data via printouts, and there exists some likelihood that this was a factor in teachers’ self-reports. Indeed, reports can be printed, stored, and referred to as needed and without logging in. Most Acuity-using teachers in our interviews reported logging in after each predictive test administration, and many did so only to print out results.

The use logs and teacher self-reports both paint a common picture of infrequent Acuity use. This was also supported by interview data, where very few participants described steady, consistent use. In fact, only two teachers said that they used Acuity almost weekly or more, and for one of these teachers, this use was exclusively via printouts. Of the other teachers who did use Acuity, most described only punctuated use, such as upon receiving test results.

Commonly Used Features of Acuity

Teachers’ use of Acuity for instructional purposes is made up of various actions. We summarized use log data into five areas: Custom Tests, Instructional Resources, Management, Reports, and Tracking Completion Status. We used qualitative data to further describe the use of these areas. Table 7 provides an overview of the frequency with which each area was accessed; Tables 8 and 9 provide more detailed information on the two most-accessed areas (Reports and Instructional Resources).

Although levels of use varied greatly among these various areas, the bulk of access occurred between one and 20 times during the school year. The Reports area showed the most prevailing use, with 93% of teachers using Reports to some degree. Also, a majority of teachers (54%) accessed instructional resources and a substantial share of teachers (45%) accessed management functions. In contrast, two other Acuity areas were used infrequently: Only 20% of teachers accessed the functions for tracking assessment status and 12% accessed custom tests. In what follows, we describe the use of specific functions with each category.

Reports. As demonstrated in Table 7, reporting functions were the most frequently accessed among teachers. Their strong utility was frequently mentioned by interview participants. While nearly half (51%) of access occurred between 1-20 times, 42% of users accessed this area even more frequently. As seen in Table 8, teachers who accessed Reports predominantly accessed four types: Roster Report (81%), Assessment Report (79%), Item Analysis Report (74%), and Summary Report (55%).

This selection of reports is consistent with what we heard in interviews. Many teachers stated that they accessed reports because reports were an easy summary to examine and because they provided detailed insight into student performance according to learning standards. Further, many of these reports also allowed teachers to assign students particular items based on these standards, and this type of functionality was viewed positively by interview participants. In the case of the Item Analysis report, teachers considered the ability to view and analyze test item distracters to be a powerful tool.

In many cases, however, interview participants did not distinguish between similarly-natured reports (e.g. Roster Report vs. Assessment Report). Instead, many discussed reports in terms of their specificity and interpretability. Many teachers stated that class level reports, such as those presenting lists of students and overall achievement, were more easily used as guideposts of general decisions, such as for planning lessons or for grouping students. Other teachers reported that individualized reports helped teachers develop an understanding of students' strengths and weaknesses, such as might be needed in one-on-one tutoring situations.

Many teachers preferred class level reporting because of time. General reports are more quickly interpreted, whereas individualized reports take time to review and digest. Although this attitude was found at both the elementary and junior high levels, the fact that junior high teachers typically had overall class loads of over a hundred students made the time issue particularly salient for these teachers.

Finally, no users accessed the Longitudinal Report. Although CTB personnel report that MPS staff have chosen not to provide teachers this accessibility, responses collected during our site visits reveal that several teachers would have considered this function highly beneficial to their practice. In fact, more than one teacher had developed his or her own parallel method for comparing longitudinal performance. Typically, these strategies involved printing or hand-writing individual scores for each test form for each student.

These results described that many MPS teachers found utility in various reports. Still, report use was not ubiquitous and we talked to many teachers who infrequently accessed reports because they believed their professional judgment was better or because they found reports difficult to access. To this end, interview participants (especially those that participated in observations) also revealed several issues relating to reporting functions. A common example of the confusion between Acuity's predictive tests and its diagnostic tests. Although MPS has not implemented the latter, we observed that teachers saw this option and often selected it. In turn, this resulted in system error and consternation on the part of the teacher, with some blaming the Acuity system for not giving them what they wanted.

Instructional Resources. Also used frequently by teachers were functions relating to instructional resources, with 54% accessing this feature at least once. Table 7 shows that almost all who accessed this feature did so between 1 and 20 times. Table 9 shows the most popular functions were the Assign by Skill/Standard function and the Preview/Print function (both at 33%). Regarding Preview/Print, interview participants often described printing out Acuity items, typically for whole class instruction via an overhead projector. In fact, Acuity's general ability to assign specific items for various students was viewed favorably by many interview participants as a good way to individualize instruction. Some teachers who were not using this function suggested that greater familiarity with it would have helped them, and many who were familiar with it still perceived it as difficult to navigate. Similarly, some also described how Acuity's design for specifying the assignment of resources to students could be made more intuitive and efficient. These teachers seemed unaware that similar functions also existed in the Reports area.

Management. Although accessed slightly less frequently, a substantial portion of users (44%) managed students' access to Acuity. As seen in Table 7, nearly all users of this area did so between 1 and 20 times. In terms of specific functions, most users either managed their classes or accessed students' password settings (data not shown). Despite their different names, both of these functions manage student passwords, and the former allows for the changing of student passwords.

Tracking Completion Status. Approximately 79% of all users did not access functions for tracking test completion. Of the users who did access this function, all but one did so 20 or less times.

Custom Tests. Similarly, 88% of all users did not access functions for custom tests. Of the users who did access this function, all but one did so 20 or less times. Several interview participants, however, were excited about the ability to assign customized tests, which is a functionality still being rolled out MPS. Most promising was the ability to provide targeted support and assessment, in accord with everyday classroom practice. Still, these teachers all agreed it was a time-consuming endeavor. In fact, we spoke to many teachers who had tried this function, but felt the reward was not worth the time they had to invest. Users cited the system, lack of training, or improper training as barriers to their use of this function.

Factors That Affect Acuity Use

To answer Question #2, *factors that affect Acuity use*, we explored two areas: teachers' actual Acuity use and their attitudes toward Acuity. We constructed Hierarchical Linear Models (HLMs) that modeled these outcomes in terms of teacher characteristics, school characteristics, and teacher attitudes toward data. We triangulated these models with interview data. In the text that follows, we present our findings in three sections: (1) Descriptive representations of our analysis variables, (2) Characteristics of teachers who used Acuity, and (3) Attitudes toward Acuity, data, and data use.

Descriptive Representations of Analysis Variables

As reported above (see Table 5), 56% of our sample accessed Acuity during the 2008-2009 school year. Teachers who accessed Acuity averaged 20.85 total actions during the school year.

Five scales from survey items were developed to assess teachers' attitudes toward various aspects of data use: Acuity, Data's Effectiveness for Pedagogy, Instructional Uses of Data, Principal Leadership, and Support for Data Use. Descriptive statistics for each of these scales are provided in Table 10.

Mean scores on the Data's Effectiveness for Pedagogy Scale were highest ($M=3.41$), indicating that teachers most strongly agreed that data are effective for pedagogical practices such as planning instruction, setting learning goals, and supplementing their professional judgment about student progress. However, this did not seem to translate into action: The mean for the Instructional Uses of Data scale was only 2.36, suggesting that these actions are done not every day, but only weekly or monthly.

As seen by the Principal Leadership and Support for Data Use scales, teachers were in moderate agreement that their principal facilitated their use of data ($M=3.09$), but were in less agreement that they were supported for data use by someone at their school or through district-level professional development ($M=2.79$). Means on the Acuity scale indicate teachers who had ever used Acuity were in moderate agreement that Acuity was easy to use, improved their instruction, made their work easier, responded quickly, and provided accurate information ($M=2.80$).

Characteristics of teachers who used Acuity

To identify characteristics of teachers who used Acuity, we examined quantitative and qualitative data. We used HLM to examine two outcomes from the use logs: (1) A dichotomous

outcome that categorized teachers as to whether or not they used Acuity during the 2008-2009 school year, and (2) A continuous outcome that assessed prevalence of use by counting total uses during the 2008-2009 school year. Independent variables that explained these outcomes included both teacher- and school-level variables. Teacher-level variables included two groups: Demographic variables (degree attainment and years of experience) and perception variables (four survey scales: Instructional Uses of Data, Data's Effectiveness for Pedagogy, Principal Leadership, and Support for Data Use). School-level factors included Title I status, school level, and average enrollment.

We also examined qualitative data to identify characteristics of teachers who used Acuity. In the following narrative, we present two sections that describe HLMs for each of the two quantitative outcomes, followed by one section of qualitative analysis.

Dichotomy of Acuity use in 2008-2009. Two logistic regression models were estimated for this outcome. The first model used the entire use log sample and examined teacher-level demographic and school-level variables. In the first model, no demographic characteristics from the teacher level were shown to be significantly related to whether teachers used Acuity last year. At the school level, average enrollment was not significantly related, but Title I status and school level were: Educators in Title I schools were 2.59 times more likely to have used Acuity last year, and educators in elementary schools were 6.46 times more likely to have used Acuity last year (see Table 11).

The second model added perception variables to the previous models. Since perception variables were drawn from the survey, the sample for this model was reduced to teachers who completed the survey. Controlling for variables significant in the first model, the second model additionally indicated two significant perception scales: Instructional Uses of Data and Data's Effectiveness for Pedagogy (see Table 12). For each one-point increase on the Instructional Uses scale, teachers were 1.45 times more likely to have used Acuity (controlling for Effectiveness). Data's Effectiveness for Pedagogy, however, was inversely related to Acuity use when controlling for Instructional Uses: For every one-point increase on this scale, a teacher's likelihood of having used Acuity reduced by a factor of 0.68.

Prevalence of Acuity use. Two regression models were also estimated for prevalence (total number of Acuity uses). The first model examined teacher-level demographic and school-level variables (see Table 13); it included only teachers whose use logs indicated they had used Acuity during the 2008-2009 school year. Teachers with 20 or more years of experience showed the least amount of use, averaging 14.58 less uses per year than did new teachers. Teachers with a Master's degree or higher averaged 13.31 more uses than did teachers with a BA degree. At the school level, Title I status was the only significant variable. Title I schools averaged 11.56 more uses per year than did non-Title I schools. In addition, elementary schools averaged 11.28 more uses per year than did junior high schools. This relationship was not strictly significant at the .05 level ($p=.10$), but we chose to present it for illustrative purposes and further discussion.

The second model additionally included perception variables; the sample for this model was narrowed to teachers who used Acuity during 2008-2009 *and* completed the survey. Of the perceptions variables, Instructional Uses of Data was the only factor found significant. Controlling for the other variables in the model, every 1-point increase on the 4-point response scale was associated with a 17.76-action increase in average number of uses (See Table 14). This was the largest effect found in any of the use models.

Interview data. Interview data provide additional perspective regarding the factors that contribute to Acuity use. These data help elucidate the nature of Acuity users, their schools, and

the structures that support Acuity use. In what follows, decisions to use Acuity are discussed both in terms of users and their environments.

In accord with our quantitative findings, individual demographic factors did not seem to determine Acuity use. Although we heard more use in elementary schools than junior high schools, interview participants were varied in their degrees of Acuity use regardless of their personal demographics. Outside of demographics, Acuity users appeared to share characteristics that set them apart from non-users. Generally, users saw immediate, practical value in Acuity and exhibited a basic level of training.

Acuity users often saw opportunities to take Acuity use a step further into specific educational practices. In the words of one teacher enthusiastic about Acuity:

I was sold the product...I was hooked, line and sinker. I knew compared to [other products], this is what I want. Because your kids are in your head! What would benefit my kids? What would benefit my students? What would benefit my instruction?

Overall, Acuity users were able to situate Acuity in a broad sense of data use, practice, and student needs. With non-users, Acuity did not resonate as pragmatically. Non-users typically felt that Acuity could not provide them much information beyond what they already knew about their students' learning (via personal assessments or regular, direct observation).

Two factors shaped users' acceptance of Acuity. First, users found ways to incorporate Acuity data in ways that also provided them with immediate feedback about students. For example, teachers described creating overheads of Acuity items, using clickers in conjunction with Acuity, and creating short, targeted classroom quizzes based upon Acuity data. They saw these types of activities as allowing them to have immediate and direct conversations with students about their learning, in both group and one-on-one settings.

Second, Acuity-using teachers saw Acuity as fitting into a bigger picture of data use and sources of data. Whereas non-users felt that they knew enough about their students via conventional means, Acuity users thought of Acuity data as one piece in a larger process of triangulation. These teachers described how Acuity added to the knowledge gained from data such as grades, DIBELS, AIMS, and other technologies or assessments. This knowledge could then be applied in the classroom or used to add depth to conferences with parents or students.

Finally, non-users or infrequent users of Acuity often lacked data literacy or experience using the system. For instance, several teachers questioned the repetition of certain test items, while some questioned Acuity's validity because of external factors affecting students or because Acuity results differed with classroom grades and observations. It is important to note that although teachers varied in terms of familiarity with Acuity, very few teachers whose use we observed demonstrated strong abilities with the system. Many had to look up their passwords or did not know their passwords at all. A number of teachers hunted and pecked for specific functions, unable to distinguish between similarly named functions or menu options, often selecting the wrong one. Repeatedly, teachers discussed how their skills could be improved via better training and time to apply or reflect upon what they had learned.

Several school-level processes and structures also appeared to support Acuity use. These related to collaboration, time, and access to resources.

First, some Acuity-using teachers described the value of working as part of a larger community of practice. At the simplest level, this meant pooling time and resources, such as in splitting the hours it took to create overhead sheets for Acuity items, or sharing templates for Acuity-based quizzes. More importantly, teachers described collaboration as a way to improve practice. Teachers who triangulated using data also described the benefits of examining that data

together, and of implementing strategies together. In effect, this pooled not only effort, but knowledge and expertise. One teacher envisioned how collaboration could improve the process of understanding and evaluating Acuity's broad selection of instructional resources. Another teacher described the impact collegial relationships:

Pull a classroom teacher who is REALLY using [Acuity] – and then come in. Just through the excitement, that's what got me excited. She sat next to me in this classroom and said, “THIS is what I do, and THIS is what I do.” And I said, “tell me, what are the results?” [And she said] “Oh MY KIDS! They're just doing wonderful. They really pick it up! They pick it up quick! They like using the technology!” So you've got to have somebody in there that's motivating and can excite you into getting into it – and can actually show you, step by step.

Unfortunately, while mentions of collaboration were impactful, they were far the exception rather than the rule in our interviews.

Second, teachers repeatedly cited the need for time to learn, reflect upon, and use Acuity. Many described lunch time, which is often fraught with time constraints, as their only common time to discuss matters of pedagogy and data. Some described the occasional 30-minute school-wide training or collaboration session. Almost all described their time for any data use as inadequate, and one elucidated the point by describing time in terms of risk. It takes time to access Acuity, explore its functions, and interpret its data – and the returns on this investment may be unclear. We also observed that many teachers who cited Acuity as a time-consuming endeavor misunderstood Acuity's functions or were very inefficient at using the program.

Third, teachers often described access to Acuity as a factor affecting their Acuity use. Some described using Acuity exclusively in computer labs, whether it was for reviewing Acuity data, printing it out, or using Acuity with students. In addition, some schools have assigned certain staff, such as basic skills teachers, the duty of accessing and printing out Acuity results for teachers. In fact, one principal considered this her strategy for improving her teachers' overall access to Acuity, given the time and resources needed to create those reports.

Attitudes toward Acuity, Data, and Data Use

Besides the use of Acuity, we also considered attitudes – not just toward the Acuity system, but toward data use and data in general. As above, we triangulated HLMs with interview data. In the following two sections, we describe HLMs for the perceptions of Acuity and we present a section of qualitative analysis.

Perceptions of Acuity. We estimated one regression model that used the Acuity scale to estimate teacher perceptions of Acuity. For this model, the sample included only those participants who reported on the survey that they had ever used Acuity.

Table 15 shows results for teacher-level variables. Teachers with less experience perceived Acuity more positively: Teachers with 20 or more years of experience were similar to teachers with 11-19 years of experience in that they perceived Acuity more negatively than teachers with 0-5 or 6-10 years of experience. In addition, each of the other perception scales was significantly associated with Acuity perceptions. The strongest relationship was found in the Support for Data Use scale: For every one-point increase in perceptions of Support, users were almost a quarter-point more positive about Acuity.

The only significant school factor was school level. Teachers at the elementary level were more positive about Acuity, averaging more than a quarter point higher than teachers at the Junior High level.

Interview data. In interviews, we found teachers' attitudes toward the Acuity system were mixed. Many teachers liked the features and level of detail provided, but didn't feel that the time required to navigate the system made using it a practical and sustainable feature of their teaching practice. This conclusion excludes an important minority of teachers who were able to incorporate Acuity effectively. Regarding data in general, many educators do not yet feel as though data use can be incorporated clearly and consistently into their work. The following paragraphs provide more detail toward this summary.

Regarding data use in general, teachers could be loosely classified into one of three general categories: Completely opposed to data use, in favor of data as supplemental information, and feeling as though data are essential to their practice. Teachers completely against data use felt as though their experience and intuition were at the core of their pedagogical practices and did not see how data could provide added value. These teachers used data only when they felt it was compulsory, tended to resent outside influences asking them to use data, and rarely used data to inform their practice. Teachers moderately in favor of data were typically less resentful of compulsory data use, though they still felt that their own teacher-created rubrics and judgments provided the most amount of information about their students. These teachers did not necessarily advocate for data use, but did acknowledge its usefulness in helping to provide a more comprehensive picture of student achievement and learning progress. Last, teachers in favor of data use felt as though data informed what, when, and how they covered material in their classrooms. These teachers sought out new opportunities and technologies that allowed them to use data, and sometimes developed their own strategies and systems for using data. In a group setting, they often advocated for the use of data by describing how it helped them improve their instructional processes. In our interviews, the majority of teachers we interviewed and surveyed fell in the middle category of attitudes toward data use. The other two groups were smaller, yet often vocal minorities. In particular, teachers advocating against data use tended to dominate group discussions about data use.

Teachers' perceptions of the information given by Acuity were closely aligned with their perceptions of data and data use in general – if teachers held positive perceptions toward the use of data to inform their teaching practice, they also seemed more amenable to using a system such as Acuity. To this end, we encountered teachers for whom Acuity use was a natural addition to a work flow that included the use of information to improve their craft. This qualitative finding is supported by the HLM models above: Teachers who reported more instructional uses of data were more likely to be using Acuity, and all of the perceptions scales correlated positively with perceptions of Acuity.

On the other hand, some teachers felt as though the system was not providing them with information that they did not know about their students' progress or abilities. Also, several teachers cited concerns that information from Acuity predictive tests were valid for only a short duration of time; these teachers preferred more frequent types of assessments to inform their views of students' progress. Finally, some teachers did not trust predictive assessments to inform their teaching. Since the predictive exams test students over content not yet taught, many teachers stated that these assessments were not aligned with their instruction.

Many teachers familiar with the Acuity system were impressed with the detailed information Acuity provided at the student- and class-level. They found that it was a powerful tool in allowing them to assess students' progress toward mastering content standards – in other words, these teachers felt Acuity held professional value for them.

Unfortunately, most teachers did not feel Acuity was a user-friendly application. Many were unhappy with the time they spent using the system and the number of steps involved in navigating from one feature to another. For instance, they found that some features required an inordinate amount of time, especially when attempting to “unpack” a specific content standard for individual students. They also reported that assigning assessments or instructional activities was not straightforward or timely. Although some usability complaints came from users familiar with Acuity, it is important to note that training plays a strong role in these complaints. Many complaints came with concessions that a lack of training caused their difficulties and some teachers felt that they used the system too infrequently to become sufficiently comfortable with it.

Interviewees’ attitudes about Acuity’s dependability and accuracy were often favorable. However, we heard some frustrations, such as dropped sessions, difficulty logging in, inconsistent in response times, and occasional system crashing. It is critical to note that, when pressed, every teacher but one attributed these issues to MPS technical difficulties. But while these issues may not be the fault of the Acuity system, they have become implicitly associated with using Acuity. Consequently, these issues impact teachers’ perceptions of whether Acuity is a system on which they can consistently depend.

Finally, we highlight an important issue that arose frequently: Educators were concerned about the amount of time taken up by testing. Naturally, these educators cited state testing and preparation. But many of these educators complained even more about the time taken to conduct Acuity testing. Resigned to the realities of state testing, these educators viewed Acuity tests as extra time that threatened an already cramped school year. Many of these educators were negative toward both Acuity and data in general.

DISCUSSION

Introduction

In the preceding section, we described in detail the results of our study. To introduce our discussion, we first summarize these results. We then set the stage for the discussion that is to follow.

Summary of results. Acuity use was more common in elementary schools, Title I schools, among teachers who reported a variety of instructional uses of data, and among less experienced teachers. Still, Acuity use was not widespread. Forty-four percent of teachers in grades 3 – 8 did not use Acuity at all during the 2008-2009 school year, and of those who did, half used it less than once a month.

Acuity users were ones who found professional value in Acuity assessment results. They found a way to work Acuity data into their everyday work and into data use with a larger scope. Depending on the teacher, this larger scope included a variety of elements such as professional collaboration, triangulating with other assessments, or creating personal assessments. For these teachers, Acuity data represented another piece of information that they found useful to their practice.

Acuity non-users were ones for whom Acuity was seen as an extraneous addition to their already busy schedule and thus did not provide professional value. Some of these teachers found the Acuity system cumbersome to use, others were skeptical that Acuity data could provide information about their students that they did not already know. Others were not negative toward using Acuity, but felt time and training were large barriers. In general, Acuity non-users did not feel that Acuity could be incorporated clearly and consistently into their work.

Thus, the first year of our study has revealed a mixed bag of Acuity use. This situation is very common – studies have not only found the use of data systems to be spotty (Means, Padilla, DeBarger, & Bakia, 2009), but have found the use of *data* to be spotty (Datnow et al., 2007; Wayman, Cho, & Johnston, 2007; Young, 2006).

While MPS' use may be in line with many other contexts, we envision a deeper, more thorough, and more widespread use of Acuity and data in MPS. The situation we envision is not yet common, but it has been done – sustainably and without unrealistic effort (Wayman & Stringfield, 2006). There are many positives in MPS and the Acuity system on which to build. In the following paragraphs, we offer some suggestions and interpretations to this end.

Setting the stage. The first decade of the 21st century has been characterized by information flow. While American education has generated great amounts of data this decade, it has been relatively unprepared and slow to manage how this flow of data might inform the improvement of teaching and learning.

In our visits, it was clear to us that teachers in MPS see the value that more information provides their craft. Teachers consistently – though often unwittingly – described how the search for extra information drives their day. Unfortunately, many do not see student data (e.g., formal assessments) as a valuable or valid form of the extra information they seek. It's not that MPS teachers don't want to use student data. It's that they haven't been shown good ways to get it and use it, nor have they been shown the value of it. Thus, when they do access a tool such as Acuity, there is ample room for frustration. All of this has resulted in obstacles and interruptions in what should be a powerful flow of information

This does not characterize all MPS educators. Acuity may not be in widespread use, but for some teachers, it is an impactful support that greatly facilitates information flow. These teachers believe that Acuity data is helping them educate their students better.

For teachers, data use and the Acuity system are ultimately about value-added. From every angle, the results of our study point to the importance of considering teachers' daily work in improving their use of data, Acuity, and information flow. What can teachers be given that makes their day better? What helps them know more about their students? As we considered our results in terms of prior research, we determined that there were three areas particularly important to discuss: The principalship, better professional learning (professional development), and improved interaction between the teacher and the data system.

In the following discussion, we will briefly consider teacher work before describing our interpretation of the three issues above. We believe that both MPS and CTB/McGraw-Hill have a vested interest in improving the use of Acuity, so we consider the improvement of teacher daily work to be a partnership between the two entities.

About the Daily Work of Teachers

While talking to MPS teachers, we heard frequent discussion of real-time assessment of student learning, usually without the aid of what many might consider "formal" assessment. We also heard teachers talking about the "whole" picture of student learning and what effect students' entire situations had on learning. We expected these comments. Data use research is clear that teachers' daily work is about integrating immediate feedback into an historical picture of the student (Lachat & Smith, 2005; Wayman & Stringfield, 2006; Young, 2006).

In conducting their work, teachers prefer to assess "on the fly." They assess quickly and incorporate that information, often in the midst of teaching. This cycle of assessment, review, reflection, and integration is similar to that commonly articulated in models of data use (e.g., Black & Wiliam, 1998; Copland, 2003).

One difference in these models and our data is that many of these models presume assessment to be of a formal nature. This was not necessarily the case in MPS: While some teachers talked about formal assessments, many more talked about informal means of assessment, such as observation and individual interaction. In fact, our teachers spoke of their discomfort with the pedagogical disconnect that was introduced when they were required to stop teaching in order to administer lengthy formal assessments. Consequently, most teachers saw formal and informal assessment as mutually exclusive. Few talked about incorporating all forms of assessment available to them.

Despite this, the teachers in our study were acutely focused on their information use. They were solely and simply focused on getting information *that they deemed valuable* for helping their students learn. Since they did not feel properly supported to integrate a variety of assessments into their practice, they typically judged only their own assessments as valuable.

Herein lies the contradiction that constrains effective data use in MPS: The goals, vision, and support for using data in support of daily work are not as focused as teachers are. The consequence is that data use (and specifically, Acuity use) in MPS often does not fit the daily routines and practices of MPS teachers. We believe that steps can be taken to improve this fit, via supporting principals, offering better professional learning, and teacher interaction with Acuity. We discuss each in the following sections.

The Principalship

Reality is – perhaps unfairly – that the daily work of teachers eventually comes back to the principal. Although our survey data indicated that teachers do not feel entirely unsupported by their administrative teams, principal support for data use was notably absent from our interview results. This is notable because data use literature has been very clear about the important role principals play in the success of data use (Copland, 2003; Datnow et al., 2007; Lachat & Smith, 2005; Wayman, Brewer, & Stringfield, 2009; Wayman & Stringfield, 2006). This highlights an opportunity for growth in MPS.

The principals in our study schools were mixed in their commitment to using data and the emphasis they placed on their teachers using it. However, we saw no evidence of support to help principals build data use capacity throughout their faculties. We do not lay blame on these principals because research notes that most principals lack the training that would enable them to lead faculties in this way (Copland, 2003; Deike, 2009).

We believe better support can be provided to them. While it is beyond the scope of our data collection to provide a comprehensive program of principal support, our data suggested three issues that would be particularly important to consider: Collaboration, time, and structures. In offering this brief discussion, we do not recommend that principals be charged with improving these issues on their own. Rather, it should be the responsibility of MPS to provide district support and training to ensure that these aspects are implemented successfully.

We observed a handful of teachers who were successful data users in part because of their collaboration with other educators about data. Collaboration around data and data systems has been shown to be an effective way to advance data (Armstrong & Anthes, 2001; Wayman et al., 2006), often because of the professional conversations these collaborations produce. The ability of principals to keep these conversations non-threatening has further been shown to be important (Wayman & Stringfield, 2006). Not surprisingly, the value of professional conversations around data was evident in the findings of the present study. Consequently, we believe it will be necessary for MPS principals be given the training and support necessary to build their school data initiatives around collaboration and conversation.

Collaboration takes time, as does data use. Unfortunately, lack of time was one of the major complaints from MPS teachers. We recognize that time may be an even more precious commodity in the 2009-2010 school year, given the budget cuts and class size increases described in our interviews. Still, our findings were clear that teachers in MPS will not increase their data use unless afforded time to do so. Research has found a similar phenomenon in other contexts (Datnow et al., 2007; Lachat & Smith, 2005; Wayman & Cho, 2008; Wayman & Stringfield, 2006).

How may collaboration and time be provided by a principal? Research suggests that principals who are effective in leading faculty data use are ones that establish formal structures for both collaboration and time (Datnow et al., 2007; Lachat & Smith, 2005; Wayman & Cho, 2008; Wayman, Brewer, & Stringfield, 2009). For example, a principal might structure professional groupings of teachers by grade level or subject area. Groups could focus on making sense of data together, including a variety of appropriate data not limited to Acuity. Additionally, a principal might leverage planning periods, team time, or other contract time in an effort to establish consistent time structures for using data. In fact, developing such formal structures may facilitate other, informal ones (Wayman et al., 2009). We imagine a school environment where teachers and principals regularly interact in manners that demonstrate develop shared meaning from data.

Professional Learning

Our interpretation is that lack of understanding about how to use data and the Acuity system is crippling data use in MPS. We believe lack of understanding may contribute to negative outcomes, such as low Acuity use rates, resistance to data, and even teachers' perceptions of the time they are offered. Such knowledge is also critical for principals, who need skills both in using data and in leading teachers as described above. However, in this section, we will focus on developing teachers' abilities to effectively use data. We consider two important and interconnected dimensions to professional learning: Formal professional development and informal interactions.

Professional development and formal training should be focused on helping teachers access and use a variety data in their daily routines. MPS teachers are already attempting to integrate a diversity of information, as evidenced by continued reference toward information use in interviews. Further, the consistent significance of the Instructional Uses of Data scale suggests that providing teachers with more opportunities and reasons for using data should increase their Acuity use, and presumably, their data use in general. Consequently, any professional learning for teachers should be based on the premise that teachers need to understand how to *triangulate* and incorporate *multiple forms of data* into their practice. Any use of data should be cast in light of ways it can improve practice and be of immediate use to the teacher (Wayman & Cho, 2008).

Professional learning should be viewed as small and multifaceted (Wayman et al., 2007). Professional learning can be supported by individuals serving a number of roles, for instance district personnel, principals, resource faculty, or even fellow teachers (Wayman & Stringfield, 2006). Training in support of professional learning can be delivered one-on-one, or in small groups. School and individual contexts will dictate effective methods of delivery (Supovitz & Klein, 2003). Further, professional learning should be characterized by differentiation. Our data revealed some groups to be more likely to use Acuity than others, such as less-experienced teachers⁸, Title I schools, and elementary schools. District and school leadership should consider these and other differences in designing targeted professional learning.

Accordingly, well-designed structures can help ensure that professional learning is sustainable (Wayman & Cho, 2008; Wayman et al., 2007). For instance, the aforementioned collaborative structures could be used to strategically include respected teachers and strong data or Acuity users. Such structures offer educators clear, constructive opportunities for sharing expertise and sustaining learning. While this type of professional learning has the potential to be as rewarding as it is informative, it will not be sustainable without structuring the time to do it. Our data indicate that MPS teachers do not believe they can undertake such learning on their own time, so structures should also be in place to support learning via appropriate uses of time.

We believe it is the mutual best interests of MPS and CTB to see professional learning as a partnership. Our data suggest a variety of topics or approaches that could be implemented. For instance, many teachers we observed could not remember how to navigate Acuity effectively. A simple response to this problem is a set of YouTube-like videos that demonstrate how to log on or conduct other commonly-used functions. These videos could be developed by MPS, CTB, or

⁸ It is tempting to stereotype less-experienced teachers as tech-savvy and thus more open to data systems. While this may have some effect, our data and prior research indicate this issue may be more complicated. We talked to many experienced MPS teachers who were tech-savvy but did not see Acuity as a valuable system. Further, the inverse relationship of Data's Effectiveness for Pedagogy to Acuity use may suggest that experienced teachers who use data may discount Acuity. Finally, Wayman et al. (2007) showed negligible differences in attitudes toward data systems by experience. In sum, this phenomenon needs further study.

both, but be posted on the Acuity interface so users have access immediately when they encounter a problem. As different learning organizations, the different perspectives MPS and CTB bring to this problem would be beneficial for all.

Teacher Interaction with Acuity

Acuity is a broad and powerful tool, providing numerous functions that can facilitate and improve the everyday work of a teacher. CTB/McGraw-Hill has invested substantial resources in the development of this system to provide an intuitive interface and an efficient architecture that make data access easy for everyone. We believe Acuity ranks among the leaders in facilitating teacher access, both based on research-developed rubrics (Wayman, Stringfield, & Yakimowski, 2004) and our anecdotal experience with numerous systems.

Despite these efforts, both our qualitative and quantitative data indicated room for improvement in the ways that teachers interact with Acuity. This is a problem faced by data system developers worldwide. Users also struggle with these problems and the way districts implement a system can have a great effect on the ultimate success of the system (Wayman et al., 2007; Wayman & Conoly, 2006). We believe MPS has done a decent job of implementing the Acuity system district-wide. Still, as good as Acuity is and as well as MPS has implemented it, teachers are having trouble. We believe solutions exist to which MPS and CTB may each contribute.

Acuity has a clean interface, using web elements familiar to nearly all users. Acuity functions dependably, rarely displaying the response drag that we have seen in some other systems. Still, there are aspects that are troublesome to users, especially those who do not use Acuity frequently – in these ways, Acuity is not “mentally ergonomic.” For instance, our results suggest that some names or labels may not be intuitive to teachers (e.g., various types of reports or diagnostic vs. predictive assessments). As another example, there are important functions that take substantial time, such as creating Custom Tests. Many teachers were enthusiastic about making their own assessments (Custom Tests), but this process was time-consuming. Finally, many other issues were mentioned that we deemed minor or user-specific. As a group, however, these issues are *not* minor because of the collective negativity we heard developing. This collective negativity – founded or not – can be crippling to a culture of data use (Ingram, Louis, & Schroeder, 2004).

MPS can address some Acuity issues structurally in order to help teachers interact better with Acuity and leverage Acuity’s full range of functionality. For instance, our data indicated that many teachers want to write their own assessments but are concerned about the time it takes. MPS or individual schools could address the time issue through sound practices as outlined above: Teachers could be supported to work in groups on these assessments, thereby increasing collaboration and reducing workload. Also, teachers could be encouraged to share assessments through the Acuity system. In these examples, the aim of these structures would be to help teachers see that the time needed to write their own assessments pays off in terms of their work and student learning. Consistent with our theme, we believe district personnel must be savvy about supporting Acuity use as it supports everyday teacher work.

Finally, we will stress that time spent by teachers with Acuity should advance them professionally and improve their workday, rather than merely automating tasks⁹. To illustrate, we return to the example of teacher-created assessments. We heard some teachers who were

⁹ Student Information Systems (SIS) are better designed than assessment systems to automate daily transactional functions of teaching and schooling (Wayman & Cho, 2008).

interested in transferring their already-existing quizzes and tests into Acuity's Custom Test function. On the surface, this may seem to fit well with teacher work because it would enable teachers to automate an existing process (and save a bit of grading time). However, Acuity offers even more value to the teacher by providing item-banks and guidance for writing new items that are linked to state and district learning standards. Focusing solely on automating their existing work ignores added functionality that could bring substantial extra information to their practice.

Improving teacher interaction with Acuity is an important area for partnership between MPS and CTB. We have observed that the relationship between these two entities is already healthy, but can be made even deeper by collaborating on this and other issues. Such collaboration would be beneficial for both parties and is likely necessary to solve these issues.

CONCLUSION

In collecting the qualitative and quantitative data for this study, we encountered many positives relating to the use of Acuity and the use of data in Mesa Public Schools. The Acuity system is a powerful, effective system with great potential to provide added knowledge to teachers. Throughout the district, many MPS educators recognize the value that student learning data can provide.

Similar to many districts, however, data use can be difficult in MPS. The issue rests perhaps not on teachers and their motivation to use data, but rather the systems, supports, and structures around them. As much as teachers can and will distinguish for themselves what is most appropriate to their practice and for their students, more can be done to meet them where they are. Those MPS teachers who embraced data use often saw immediate, rewarding feedback for their efforts. Unfortunately, this was not the case for all. For other MPS teachers, efforts to use Acuity came with some expense, risk, or even frustration.

In this report, we have outlined some potential solutions to these issues and areas for further consideration. In doing so, we posited that considering data use as a staple of teacher work will be necessary to improve Acuity use and data use in MPS. We believe that MPS has not yet scratched the surface of the powerful functionality that Acuity can provide for teachers. We believe that by implementing sounder data practices that are focused in adding *value* and reducing *burden*, MPS will realize a substantial increase in the depth, breadth, and quality of data use.

Long-term, we envision MPS as a district where data are integrated with professional judgment to inform every educational decision at every level, and where leadership, structural supports, and learning supports enable educators in doing so. We envision Acuity as a critical and central component of the MPS data initiative, part of an integrated set of data systems that enable MPS educators to easily view concomitant student information at will. We believe this vision can result in improved teaching and learning in MPS.

Finally, we have outlined opportunities for MPS and CTB to partner toward this vision. We do not believe such a partnership should be rare, but that this partnership should serve as an example that should be pursued in educational contexts worldwide. In previous work (Wayman, Cho, & Richards, in press), we have lamented what we worry is a state of stagnation in data systems and data use. We believe partnerships such as these are critical to moving these fields forward.

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FIGURES AND TABLES

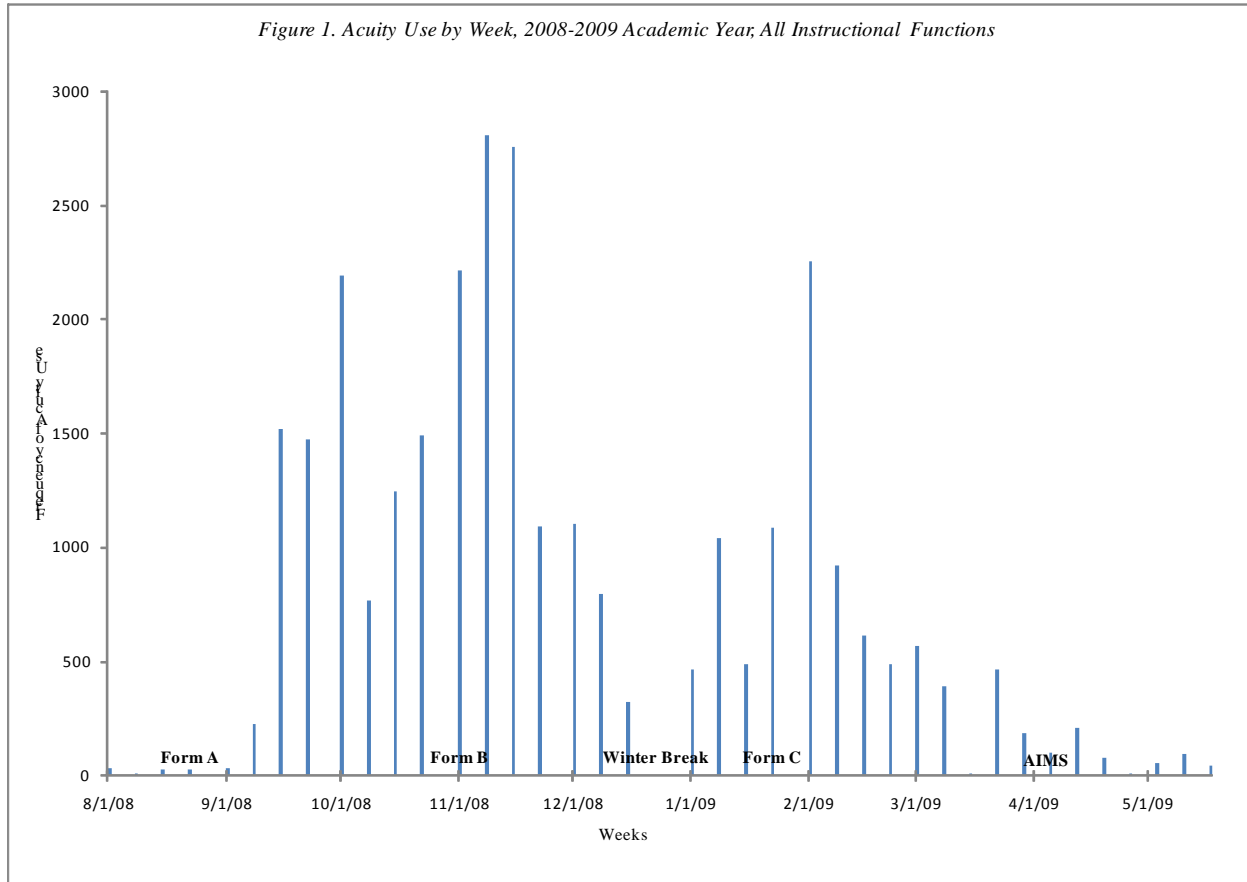


Table 1

Teachers by School Level

	MPS Teachers	Survey Respondents	Acuity Users
Elementary School	870 (68%)	531 (62%)	592 (84%)
Junior High School	418 (32%)	322 (38%)	116 (16%)
Total	1288	853	708

Note. For 20 teachers, Acuity use logs and demographic data could not be linked.

Table 2

Teachers by Experience Level

	MPS Teachers	Survey Respondents	Acuity Users
0-5 Years	336 (26%)	217 (25%)	185 (26%)
6-10 years	252 (20%)	161 (19%)	140 (20%)
11-19 years	381 (30%)	256 (30%)	211 (30%)
20+ years	319 (25%)	219 (26%)	172 (24%)
Total	1288	853	708

Note. For 20 teachers, Acuity use logs and demographic data could not be linked.

Table 3

Use Log Data by Survey Respondents

		Responded to survey		Did not respond to survey		Total
		<i>n</i>	%	<i>n</i>	%	<i>n</i>
Used Acuity	Yes	419	(49%)	309	(71%)	728
	No	434	(51%)	126	(29%)	560
Total		853		435		

Table 4

Study School and District Demographics, 2008-2009 School Year

	Ethnicity		Title I	Free Lunch	English as Primary Language
	White	Latino			
Brock ES	33%	58%	Yes	77%	56%
Hornsby ES	83%	7%	No	17%	96%
Musial ES	68%	23%	No	36%	91%
Freed ES	43%	47%	Yes	79%	69%
Gibson JHS	66%	25%	Yes	40%	86%
Pujols JHS	59%	25%	Yes	38%	90%
District Total	49%	40%	n/a	52%	73%

Table 5

Frequency of Acuity Use, According to Use Logs

	<i>n</i>	%
No Acuity use	560	44%
Less than once a month	655	51%
Once or twice a month	69	5%
Almost weekly or more	4	0%
Total	1288	

Table 6

Frequency of Acuity Use, According to Survey

	<i>n</i>	%
Never used Acuity	235	28%
Less than once a month	290	34%
Once or twice a month	200	23%
Almost weekly or more	128	15%
Total	853	

Table 7

Frequency of Acuity Access, by Areas of Use

	None	1-20	21-60	61 or more	Total
Reports	48 (7%)	368 (51%)	243 (33%)	69 (9%)	728
Instructional Resources	327 (45%)	360 (49%)	32 (4%)	9 (1%)	728
Management	396 (54%)	287 (39%)	42 (6%)	3 (0%)	728
Tracking Completion	578 (79%)	149 (20%)	1 (0%)	0 (0%)	728
Custom Tests	643 (88%)	84 (12%)	1 (0%)	0 (0%)	728

Table 8

Frequency of Access to Reports, by Type

	<i>n</i>	%
Roster Report	590	(81%)
Assessment Report	576	(79%)
Item Analysis Report	536	(74%)
Summary Report	404	(55%)
Portfolio Report	68	(9%)
AYP Report	1	(0%)
Longitudinal Report	0	(0%)
Total Users of Reports	680	

Table 9

Frequency of Access to Instructional Resources, by Type

	<i>n</i>	%
Assign by Skill/Standard	242	(33%)
Preview/Print	238	(33%)
Preview Instructional Resources	205	(28%)
Assign by Student	185	(25%)
Total Users of Instructional Resources	401	

Table 10

Teachers' Attitudes Toward Data and Data Use

Scale	<i>n</i>	Mean	SD
Acuity	582	2.80	0.57
Data's Effectiveness for Pedagogy	853	3.41	0.57
Instructional Uses of Data	853	2.36	0.79
Principal Leadership	853	3.09	0.68
Support for Data Use	853	2.79	0.66

Table 11

Logistic Regression Model for Ever Used Acuity: School Variables

Factor	Odds Ratio	95% Confidence Interval		<i>p</i>
		Lower Bound	Upper Bound	
School-level Factors				
Elementary School	6.46	3.51	11.86	0.00
Title I School	2.59	1.36	4.93	0.01

Note. n = 1288.

Table 12

Logistic Regression Model for Ever Used Acuity: Demographic, Perception & School Variables

Factor	Odds Ratio	95% Confidence Interval		<i>p</i>
		Lower Bound	Upper Bound	
Individual-level factors				
Instructional Uses of Data	1.45	1.17	1.79	0.00
Data's Effectiveness for Pedagogy	0.68	0.51	0.90	0.01
School-level factors				
Elementary School	7.21	4.29	12.10	0.00
Title I	2.15	2.10	3.86	0.01

Note. n = 853.

Table 13

Regression Model for Prevalence of Acuity Use: Demographic and School Variables

Factor	Mean Difference	95% Confidence Interval		<i>p</i>
		Lower Bound	Upper Bound	
Individual-level factors				
6-10 years experience	-1.39	-14.96	12.17	0.84
11-19 years experience	-7.35	-18.96	4.26	0.22
20+ years experience	-14.58	-27.46	-1.70	0.03
Master's Degree	13.31	3.86	22.76	0.01
School-level factors				
Elementary School	11.28	-1.82	24.38	0.10
Title I	11.56	2.33	20.79	0.02

Note. n = 708.

Table 14

Regression Model for Prevalence of Acuity Use: Demographic, Perception, and School Variables

Factor	Mean Difference	95% Confidence Interval		<i>p</i>
		Lower Bound	Upper Bound	
Individual-level factors				
Instructional Uses of Data	17.76	3.53	31.98	0.02
6-10 years experience	-5.81	-28.62	17.00	0.62
11-19 years experience	-12.08	-31.18	7.02	0.22
20+ years experience	-20.79	-39.07	-2.51	0.03
Master's Degree	17.09	0.48	33.69	0.04
School-level factors				
Elementary School	10.07	-14.81	34.95	0.43
Title I	13.49	2.07	24.91	0.02

Note. n = 582.

Table 15

Perceptions of Acuity, by Demographic and School Variables

Factor	Mean Difference	95% Confidence Interval		<i>p</i>
		Lower Bound	Upper Bound	
Individual-level factors				
6-10 years experience	-0.02	-0.13	0.09	0.71
11-19 years experience	-0.15	-0.25	-0.04	0.01
20+ years experience	-0.19	-0.32	-0.06	0.00
Instructional Uses of Data	0.06	0.00	0.12	0.04
Data's Effectiveness for Pedagogy	0.10	0.01	0.18	0.03
Support for Data Use	0.23	0.14	0.32	0.00
Principal Leadership	0.09	0.01	0.18	0.03
School-level factors				
Elementary School	0.29	0.16	0.42	0.00

Note. n = 853.