Upgrading America's Use of Information to Improve Student Performance

CSE Report 661

Margaret Heritage, John Lee, Eva Chen,
and Debbie LaTorre
University of California, Los Angeles

September 2005

National Center for Research on Evaluation,
Standards, and Student Testing (CRESST)
Center for the Study of Evaluation (CSE)
Graduate School of Education & Information Studies
University of California, Los Angeles
GSE&IS Bldg., Box 951522
Los Angeles, CA 90095-1522
(310) 206-1532

The work reported herein was supported under the Educational Research and Development Centers Program, PR/Award Number R305B960002, as administered by the Institute of Education Sciences, U.S. Department of Education.

The findings and opinions expressed do not reflect the positions or policies of the National Center for Education Research, the Institute of Education Sciences or the U.S. Department of Education.

UPGRADING AMERICA'S USE OF INFORMATION TO IMPROVE STUDENT PERFORMANCE

Margaret Heritage, John Lee, Eva Chen,
and Debbie LaTorre
University of California, Los Angeles

Policymakers and the public demand high levels of performance for all students. The No Child Left Behind (NCLB) legislation requires that all children meet specific state-established standards, and includes a range of consequences for those schools where students fail to meet the requirements. As expectations rise for student performance, the issue of how to improve student achievement becomes a critical consideration.

To ensure that all groups of students are making progress and meeting standards, NCLB mandates annual reporting of the performance of sub groups of students on large-scale achievement tests. However, reporting assessment data in itself will not necessarily lead to effective actions by educators to improve student achievement. A critical determinant of how well school personnel use assessment results to improve student achievement is their capacity to store, retrieve, integrate and analyze assessment and other data.

School data often exists in disparate forms and locations, making it difficult to organize efficiently and to retrieve quickly (Thorn, 2001). Many computer systems are outdated and inadequate, and schools and districts often lack appropriate user-friendly software for data analysis (Bernhardt 2004; Wayman, Stringfield, & Yakimowski, 2004). Furthermore, educators frequently lack the skills of to make effective use of data (Baker, 2003; Choppin, 2002; Cizek, 2000; Cromey, 2000).

To address these problems, for the past three years work at the National Center for Research on Evaluation, Standards, and Testing CRESST at UCLA has focused on the following objectives:

1. Design and develop a decision support tool, the web-based Quality School Portfolio (QSP) version 4.0;
2. Develop a standardized training system for trainers and end users with certification for trainers;
3. Implement a national rollout of QSP will multiple approaches to training and support;

4. Conduct evaluation research to evaluate the effectiveness of the features and functions of QSP, the effectiveness of the training, and the benefits of QSP use on educational improvement;
5. Design requirements for the 5th generation of decision-support tools using results from the foregoing objectives.

This report covers our work related to these objectives over a three year period.

Objective 1: Design and Develop a Decision Support Tool, the Web-Based Quality School Portfolio (QSP) Version 4.0

The design of the web Quality School Portfolio (QSP) version 4.0 was informed by CRESST's research on the implementation of the desktop version of QSP, in use in all 50 states, and by CRESST's research on testing, validity, data interpretation, and reporting strategies. Throughout the development of web QSP, empirical data from focus groups and beta testers in school districts across the country was used to systematically evaluate and revise the tool.

This evaluation process helped identify bugs in the system and refinements that were needed, and it also highlighted the need for a number of features that were not included in the initial design of QSP version 4.0. For instance, as district and school personnel grew more knowledgeable about the requirements of the NCLB legislation they called for features that would increase QSP's capacity to monitor the progress of individual students. For example, not only did the users want to know which subgroups were not meeting standards, they also wanted to know which students comprised the subgroups and wanted access to individual students' records. In response, we added an individual student history report, which includes the capability to access data from prior schools, and also a feature in the Goals tab to view the students who are either meeting or not meeting the targets set for them.

Description of QSP

QSP is built with the latest technology, including Microsoft .NET development tools, and enables educators to bring together data from a range of disparate sources to analyze data as the basis for decision making at the school and district level. Core features of QSP are the longitudinal student database, the disaggregation capabilities, the report functions, the digital portfolio, and the goals and monitoring

functions. All QSP functions are organized by color-coded tabs, rather like a filing system. What follows is a description of the functionality included in each of the tabs that are used by educators:

Student tab. Using QSP, educators can create an individual, longitudinal record for each student, including background information, achievement data, and data related to students' perceptions and opportunities to learn (Appendix A). For example, background information can include a student's age, ethnicity, and language spoken at home. Achievement data from statewide tests can be stored in QSP, and because QSP can be customized to meet the needs of specific districts or individual schools, data from district tests or tests that are only given at the school level can also be included. Information on students, teachers, and parents from surveys, interviews, and observations about other aspects of students' learning (e.g., feelings of safety in school, motivation, particular interests, opportunity to learn) can be added. With the Student tab, administrators and teachers can have easy access to each student's history to identify persistent problems and to monitor progress over time.

A digital portfolio in which samples of student work and performance can be stored is accessed via the Student tab (Appendix B). The range of media used for storing artifacts in the portfolio, includes text, images, video, and audio. For example, a student's essay on the Civil War along with the scoring rubric for the essay might be included. A video of a student's presentation on a model he or she designed to illustrate a form of renewable energy, together with an image of the model could be stored in the portfolio.

Groups tab. Test and other data can be disaggregated by various groups in the Groups tab (Appendix C). Users can create three types of groups: system, custom, and combination. System groups, which represent the first level of disaggregation (e.g., male and female), are automatically created in the system. Custom groups are created based on performance of students on various measures, including state, district, and classroom assessments (e.g., students scoring at the bottom quartile in math, represented as NRT Math <= 25). Additionally, users can combine system and custom groups to make a combination group. For example, teachers wanting to identify low-performing students on a number of measures could create one or more combination groups. First, they would create custom groups for each measure consisting of the lowest performing students (e.g., NRT Math <= 25, NRT Language arts <= 25, District Reading <= Below Basic, PBA Math <= 2, etc.). Next, they would

combine the custom groups, and at that point, QSP would locate the students who meet the criteria. Then the teachers would be able to see a list of the individual students who comprise the low-performing combination group across a number of assessments.

Using the disaggregation capability in the Groups tab, educators can reveal hidden patterns in the data. For example, in a school with a high average score, it may be that sub-groups of students, including those in the at-risk group, are not doing well, but their performance is hidden because the higher performing students' scores are masking those of the sub-groups.

The Groups function can also assist in program evaluation. In a situation where administrators want to determine the effectiveness of an intervention program, they could construct the variable, "participation in the program" and generate groups according to this variable. The performance of these students, pre- and post-intervention, could be compared. Also, a comparison of their performance with those students who had not received the intervention could be made.

Reports tab. Once the groups have been defined in the Groups tab, reports can be generated to display the performance of the groups. QSP has 24 reporting options and users can select the most appropriate report for the analysis they are conducting (Appendix D). With QSP, users can conduct descriptive, comparative, correlation, longitudinal, and cross-sectional analysis. The results of the analysis are instant and are displayed in easily understandable formats. Reports are saved in PDF format, which are very small in size (10-12kb). This permits users to keep a large number of reports, to email them to colleagues and parents, and to use them in PowerPoint presentations for the school's community.

Examples of the reports include:

- a bar chart to show the performance by grade level on statewide tests
- a pie chart to identify the ethnic composition of a low-performing group on the tests
- a cohort line graph to show the previous years' performance of the low-performing group
- a line graph to show the performance of students over time on benchmark assessments
- a scatterplot to show the relationship between problem solving and computation on the schoolwide mathematics tests

- a floating bar chart to show the feelings of school safety for students performing at a range of proficiency levels
- a relational report to show student performance relative to teacher characteristics (e.g., amount of professional development) and parent characteristics (e.g., education level)
- a score range chart to show the range of scores for 9th-grade students on statewide tests
- a statistics chart showing the statistics (mean, median, standard deviation, Q1, Q2, Q3, Q4, variance, confidence interval) for 6th grade end of semester math test

Goals tab. Using the goal function, educators can determine achievement goals and set targets to monitor student progress toward meeting standards (Appendix E). Each target represents the desired performance of a group of students on a particular measure over a specified time period. Targets can be mandatory or optional, allowing for conjunctive and compensatory models for meeting the goal. Once goals and targets are established, strategies that will be employed to realize the targets can be identified. One advantage is that schools are able to document their processes for meeting goals, and over time can review the effectiveness of the strategies they used. A timeline-based goals report can be generated to monitor progress on the targets, and through the "view +" and "view –" features in the Goals tab, teachers and administrators can see which students are meeting the target and which are not.

Gradebook. There are two forms of gradebook in QSP. One functions like a traditional gradebook and permits percentage and letter-based grading. The other is a standards-based gradebook in which the teacher connects standards with assessments and scores the students' progress with reference to the standards (Appendix F). The gradebook variables can be linked to the core set of student data, which includes school-, district- and state-level testing scores, demographic, and opportunity to learn information.

Additionally, teachers can quickly and easily create individualized student progress reports that show the up-to-the-minute status of students' performance on a range of classroom measures. The progress reports can be printed and sent home, or parents can be invited to view the progress reports online.

In addition to the end-user tabs, there are a number of tabs that are for the exclusive use of system administrators.

- The District/School tab provides the interface to manage districts' and/or schools' user accounts and search for users based on specific criteria.

- The SysConfig tab permits system administrators to customize certain aspects of the system.

- The In/Out tab comprises all the import and export wizards in QSP.

- The Database tab provides a complete view of all the student, teacher, and parent data in QSP and enables system administrators to manage the custom variables.

- The Standards tab allows standards to be created manually, or imported from a file.

Objective 2: Develop a Standardized Training System for Trainers and End Users with Certification for Trainers

The development of data skills has not traditionally been a part of administrator preparation programs, and hardly ever a feature of teachers' pre-service and inservice training (Cromey, 2000; Stiggins, 2002), Moreover, professional preparation rarely includes training in school improvement processes using data (Cromey, 2000). Hence, providing educators with a data tool and with training in the software alone will not necessarily lead to effective data use. Educators also need training in data use skills.

Equally important is training for IT personnel at the district and school level on how to set up the software, import data, and manage the database. Without skilled IT personnel, the chances of end users having access to reliable data are diminished.

CRESST developed two training programs to meet the needs of educators (end users) and IT personnel.

End-User Training

The end-user training program was designed and first implemented in face-to-face environments. Revisions to the program were made based on the evaluations of participants. Subsequently, the program was transferred into an online environment and underwent the same process of implementation and revision. The online program comprises six online, self-paced, interactive modules and focuses on

training in the QSP software in the context of an investigative process that incorporates five core skills.

The process for investigating data is shown in Figure 1. Embedded within each component of the process are the skills that we have identified to use data effectively for school improvement.

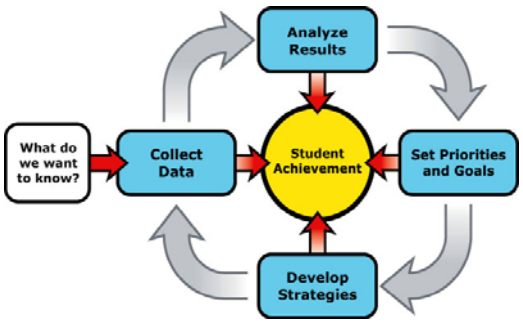


Figure 1. Process for investigating data.

What follows is a brief description of the skills included in each component of the process:

What do we want to know? Questions start the process of investigation and determine the data that is collected. Different kinds of questions are asked throughout the process, often leading to further data collection. In our training we identify three types of questions, each of which has a different function. They are: general questions, drill down questions, and interpretive questions. In addition to the types of questions, we focus on the features of well-framed questions for data analysis, including: defining a clear purpose, what will be measured, how and when it will be measured, who will be assessed, and how the results will be interpreted.

Collect data. Collecting data involves accessing existing data or collecting new data to answer the starting questions and the questions that arise from analyzing the data. Because collecting good data is key to getting credible information, our program focuses on the factors that influence data quality (e.g., validity, reliability, and alignment).

Analyze results. Effective action is dependent on teachers' and administrators' capacity to analyze the data accurately and to infer a reasonable next step. The program concentrates on descriptive, comparative, and correlation analyses, the information that can be gained from each type of analysis, and on when to use

longitudinal and cross-sectional analyses. This module also focuses on which type of analysis matches each report in QSP.

Set priorities and goals. After analyzing data, choosing priorities from among competing needs and establishing clear goals and benchmarks is key to guiding improvement efforts. We use Schmoker's (1999) criteria for creating goals: measurable; time-sensitive; focused on student achievement; linked to assessment; written in clear, direct language; and realistic and achievable. Once goals have been established, the program guides participants through a process of setting targets tied to assessments that have to be met for the goal to be achieved.

Develop strategies. Knowing the "what" (the goals) without knowing the "how" (the strategies) for achieving the goals will not result in focused school improvement. The focus of this module is on establishing clear strategies that will define the specific actions needed to achieve the targets for each goal.

Systems training. While the modules described above involve practice in using the functions of QSP in conjunction with learning data use skills, the program also includes a separate module that focuses exclusively on learning how to use the software. This module is self-paced, and users acquire information about the system from movies showing how each tab works and from written directions. There are also practice items for each of the tabs. An online help system and a glossary of terms are included in the software for users' reference after the training has concluded.

Except for the systems training, throughout each module, participants respond to questions in their interactive journal. At the end of the module, there is a section termed "teamwork." Participants are given a copy of all their responses, and using the guiding questions provided, they can engage in individual reflection or get together with colleagues for discussion.

Each module also includes a quiz, which covers the essential points of the training. If participants' answers are incorrect, they are given the correct answer after each item. They receive their total score at the end of the quiz.

In addition to the online training, further support is available through the QSP User Manual. The manual comprises 10 chapters and provides comprehensive and detailed information about all aspects of QSP.

Technical Training for IT Personnel

The technical training was developed using the same process as the end-user training and, in addition to the end user systems training, comprises four modules. What follows is a brief description of the content of each module:

Server setup. This module focuses on the hardware and software requirements and on installing the QSP software. Participants learn how data is organized in QSP and how to prepare and import data. They also learn how to use the data parser in QSP (enabling them to convert ASCII type line data into a comma separated values file ready for import into QSP) and how to secure all the data.

System administration. QSP has many different user accounts available, ranging from district superintendent, to principals, to program coordinators, to classroom teachers. This module focuses on how to set up all the user accounts.

QSP IT systems training. In addition to the tabs described earlier in this report, a number of tabs are exclusive to IT personnel who administer QSP. This module introduces the tabs and provides instruction on how to use them.

Data management. QSP administrators need to know how to use create, delete, backup, and restore databases, which is done through the database tab. In this module, participants learn how to use the database tab and how to manage the database.

At the end of the program participants can print a technical manual, which gives them detailed information from each of the modules for future reference.

Certification for Trainers

The development of the certification for QSP trainers was undertaken in several stages. At the beginning of the national rollout of QSP, members of the CRESST project team conducted face-to-face training for end users and information technology (IT) personnel. Based on our experiences, we developed a set of competencies that QSP trainers would need to demonstrate in order to receive certification. Next, several prospective trainers, including district and school personnel, as well as consultants, attended QSP training sessions at CRESST, during which time project staff observed and evaluated their performance against these competencies. A number of these participants were certified as trainers and went on to train prospective users.

After these trainers had gained experience in working with districts and schools across the country, we convened a group of them to discuss standardizing the certification. In light of their experience of training, we revised the list of competencies for trainers, identifying specific skills in four areas: research and evaluation; data use; using the tool; and effective training. We devised case studies and short-answer questions to assess these competencies.

Two of our training partners piloted drafts of this competency assessment in face-to-face sessions. Our last step was to make revisions to the certification materials as a result of the feedback we received from the face-to-face sessions.

Through this process, we have standardized the certification of QSP trainers. To become certified, prospective QSP trainers are required to complete all of the online training modules described earlier, and answer both the multiple choice questions and questions about the case studies. The responses are evaluated by CRESST personnel.

Objective 3: Implement a National Rollout of QSP With Multiple Approaches to Training and Support

A phased national rollout of QSP began in January 2003. Phase 1, a pilot rollout, was conducted between January and April 2003 and was intended as an opportunity to test the stability of the QSP software, to learn about the import functionality and to do load testing with multiple concurrent users. The second phase of the rollout began in May 2003, and the final phase in September 2003.

Those who participated in the pilot rollout were primarily drawn from existing desktop QSP users across the country. Districts were sent a letter of invitation, which included information about the server purchase and necessary licenses. Districts interested in participating invited one or more schools to be involved in the pilot. Before confirming their participation, to ensure districts of varying demographics, sizes, types, and locations in the pilot, as well as ensuring that they had the Internet access to use web QSP, we asked invitees to complete an online eligibility form requesting information about the schools and district and their technical capabilities.

Regional training partners for the rollout were identified during the period of recruitment of districts for the pilot. These included independent trainers under the aegis of NCREL, County Offices of Education staff, state training teams, district

superintendents, and district leadership teams. They were invited to attend QSP training by CRESST personnel at UCLA and became the trainers for the pilot phase.

After the pilot phase was completed, new districts were "rolled" in during phase 2. These comprised districts that had attended CRESST presentations on QSP, and also a number that had become aware of QSP, independent of CRESST. In the main, existing training partners conducted the training for phase 2, but some district leaders did attend trainings by CRESST both at UCLA and at sites in their region.

Phase 3 of the rollout began in September 2003 and continued until September 2004. For the most part, districts in this last phase approached CRESST to participate in the QSP program. Although CRESST personnel attended some informational regional meetings by invitation, most information sharing about QSP was done via web demonstrations. During this period we expanded our cadre of training partners to include additional district trainers, independent consultants, and foundation personnel.

Throughout each phase of the rollout, a range of approaches to training and support were adopted. These were:

- Attendance at a two- or three-day CRESST training with follow-up technical support by CRESST personnel.

- Attendance at a district training conducted by district trainers (length of training varied, but often one day) with follow-up support from the district. In many cases districts initially produced reports for the schools with the goal of eventually transferring responsibility to the school site. IT support was regularly given by CRESST to district personnel.

- Attendance at a district training conducted by district trainers, with continued support on the technical aspects and data querying given by designated district personnel. This support often involved school visits.

- Multiple days training throughout the year from independent consultants (certified by CRESST), using CRESST's core program, but tailored to individual districts. Ongoing technical and data querying support at the school site was given by the consultants, and in some cases, data cleaning and importing was done by the consultants.

- Online CRESST IT and data querying training without follow up support.

Objective 4: Conduct Evaluation Research to Evaluate the Effectiveness of the Features and Functions of QSP, the Effectiveness of the Training, and the Benefits of QSP Use on Educational Improvement

Background

Research points to the importance of data analysis for school improvement (Anderson & Postl, 2001; Cawelti & Protheroe, 2001; Cotton, 1992; Glickman, 1998; Johnson, 1997; Khanna, Trousdale, Penuel, & Kell, 1999; Lee, Herman, & Mitchell, 2001; Rubenstein & Wodatch, 2000; Teddlie & Reynolds, 2000; Tognieri & Anderson, 2003). Additionally, longitudinal analysis of student and subgroup performance can help practitioners to identify strengths and needs in curriculum and instruction and potentially lead to school improvement (North Central Regional Educational Laboratory, 2000). Moreover, analysis of benchmark assessment data, in particular when conducted by teachers and principals who have received training in interpreting these data, can help raise students' performance (Snipes, Doolittle, & Herlihy, 2002).

CRESST research on data use for continuous school improvement utilizing a data tool (the desktop version of QSP) reported that schools started to look at data in ways they had never done previously and came to a deeper understanding about the levels of performance among their students. The study also found that examining data promoted dialogue in schools about raising achievement (Lee et al., 2001; Mastergeorge, Hammersley, Fennell, & Barela, 2001). Other research on data analysis using desktop QSP found that some schools successfully undertook longitudinal analyses of assessment data, which led to changes in programs and practice, while others analyzed "event-based" data and used the information for discussions on student behavior and teacher management practices (Webb, Mason, Choppin, Green, Thorn & Watson, 2001).

While there is little to no pre-service emphasis on the use of data in school improvement processes (Cizek, 2000; Cromey, 2000; Stiggins, 2002), research suggests that providing in-service training for school personnel to use existing data to analyze both student achievement data and non-academic data, and providing instruments to encourage local data collection can have a positive impact on school improvement and student performance (Anderson & Postl, 2001; Khanna et al., 1999; Rubenstein & Wodatch, 2000; Ward, 1998). Additionally, helping schools formulate

their own research questions and collect local data can lead to more accurate information about students and to better decisions in school improvement efforts (Glickman, 1998).

Rationale for QSP Evaluation

Prior research provides evidence that collecting, analyzing, and interpreting school data on a timely basis, and supporting educators to use data through in-service training, can lead to higher student achievement. Additionally, research on the desktop version of QSP foreshadowed the potential for school improvement afforded by a web-based version of QSP. This evaluation research focused on practitioners' data use with QSP. Specifically, the study examined how educators used web-based QSP, how QSP assisted the data collection and analysis in schools and districts, and the impact of QSP use on school improvement efforts. Data that examined other factors expected to affect school improvement efforts and QSP implementation were also collected. These factors include professional training and effective communication between school leaders and teachers (Hipp & Huffman, 2000; Newmann, King, & Rogdon, 1996; Wheeler & Agruso, 1996).

Research Questions

The evaluation research was designed to address three main questions:

1. How is web-based QSP being implemented at different sites?
2. What affects the QSP implementation process?
3. How does using web-based QSP affect schools' and districts' data use and decision-making?

Evaluation Methodology

This evaluation employed both qualitative and quantitative research methods. Evaluation data was collected through: a) a post-QSP user survey (N=59, response rate 45%); and b) in-depth telephone interviews with a further sample of 41 current users, who were not in the survey sample.

Sites and Participants

The participants in this research were from a range of school districts (rural, suburban, urban) in 15 states across the country and were all voluntarily

implementing web QSP. Two post-QSP surveys were developed. The long post-user survey was designed for those who had begun implementation and continued using QSP. Those who had begun implementation and were stalled or had discontinued were asked to complete a shorter survey. Altogether, we received 59 completed post-QSP user surveys, 30 from those who had continued to implement QSP and 29 from those who had either stalled or discontinued their implementation. An additional 41 respondents, all active web-QSP users at the time of contact, were interviewed by telephone.

Measures: Post-QSP User Surveys

The long post-QSP user survey, completed by those who were using QSP, collected data in the following areas:

User background characteristics. Data were collected about users' technology experience and attitudes toward data use.

Data use. Users were surveyed to measure their level of QSP use, including how frequently and to what extent they a) used different functions of QSP; b) conducted data collection; c) conducted data analysis; d) received support at the school and district level for QSP implementation; e) felt the impact of QSP on their use of data to make decisions about students' learning; and f) communicated information about students with colleagues and parents.

QSP training and professional support. QSP training environments included online training, face-to-face training, and a mixture of both, two modules online and the remaining modules in a face-to-face context. Users were asked to comment on who conducted their training, in what environment, and how useful it was in preparing them to implement QSP. They were also asked about the extent of continued support they have for QSP.

The short post-QSP survey, completed by those who had either stalled or discontinued using QSP, collected data on: a) the nature of their training, b) their reasons for participating, c) features of QSP that they found useful and not useful, and d) reasons for discontinuing their implementation of QSP.

User Telephone Interviews

Phone-interviews, lasting 30-45 minutes, were conducted with a further sample of current users (N = 41). All the interviews were recorded. The interviewer asked

the participants to comment on their experience of using QSP, what they hoped to achieve with QSP, the effectiveness of the training sessions, the support they received at the school and district level for QSP implementation, and the impact of QSP on their use of data to make decisions about students' learning. During interviews, users were also prompted to reflect on how data collection, analysis, and reporting using QSP has affected teacher collaboration, communication among teachers, communication between principals and teachers, and communication between teachers and parents.

Survey analysis. The answers to the open-ended survey questions were analyzed qualitatively along with the interview data. Descriptive analyses were conducted on the survey data, which yielded frequency counts or means for the following survey items: a) technology use; b) use of QSP features and functions; c) data use; d) QSP impact; and e) training and professional support.

Qualitative analysis. Each interview tape was numbered according to the sequence of the interviews, and all the interviewees were given pseudonyms to ensure their privacy. All the interview tapes were transcribed and coded to examine emerging patterns and themes that illustrated the implementation process, experience with training, and the perceived impact of QSP.

A list of codes was created prior to the interviews based on the research focus and key concepts of the evaluation. New codes emerged during the interview and analysis process. For reporting purposes, the coded data were sorted according to major themes or categories.

Research Results

The majority of our respondents to the long and the short surveys (81%) were school or district administrators, as were those interviewed by telephone (91%). The tables below report data from the long survey. Data from the interviews and summary data from the short survey are included in the narrative.

Technology access. Most respondents had access to a computer at work with a high-speed Internet connection. All of them had a computer at home and 58% had access to a high-speed Internet connection at home. However, while all respondents stated that they used word-processing and email software on a daily or weekly basis, there was a relatively steep decline in the use of more quantitatively oriented software packages. Whereas 71% used a spreadsheet package such as Microsoft

Excel on a daily or weekly basis, this figure declined to 25% in the case of database software, and to 8% for statistical packages such as SPSS (see Table 1).

Table 1

Users' Technology Access and Use

Technology information	Percentage of users
Having a computer at home	100%
Having access to shared computers in school	80%
Having access to high-speed Internet connection at office/classroom	88%
Having access to high-speed Internet connection at home	58%
Daily or weekly spreadsheet use	71%
Daily or weekly use of database software	25%
Daily or weekly use of statistics package	8%

Reasons for implementing QSP. Most users expected to use QSP for data analysis (73%), with the least number hoping to improve their classroom instruction with QSP (4%). The low response for the latter is compatible with the fact that the vast majority of respondents were administrators, rather than teachers. However, the teachers who did participate in the survey may also not yet see the possibilities of data analysis for improving classroom instruction. Half of the respondents intended to demonstrate student achievement with the reports, while 41% indicated that their participation in QSP was motivated by the instructions of supervisors. A lesser number (32%) reported that they wanted to collect and store data for themselves (see Table 2).

Table 2

Participants' Reasons for QSP Implementation

Reasons for QSP implementation	Percentage of respondents
I planned to use QSP to help me conduct data analysis	73%
I intended to demonstrate student achievement with reports from QSP	50%
I was instructed by my school to use the software	41%
I wanted to collect and store data myself	32%
I hoped to improve my classroom instruction with QSP use	4%

Access to Data

Lack of easy access to data is an obstacle to educators' use of data for school improvement (Thorn, 2001; Wayman et al., 2004). Interview participants reported that QSP had improved their access to data and had resulted in increased data use. For example, one superintendent commented:

> To be quite honest, I have done much more with data and data analysis the last year than I did probably the three previous years in the district just because of the ease of use. It's very easy to use software. It's step-by-step. Also the data is all in one place. In the past, it may have been all in my office, but maybe in four different file cabinets. To have to do that by hand as opposed to being able to do it electronically, it has saved me hours and hours, if not days of time.

A school principal pointed out that before having access to QSP, his school only had an attendance database, which lacked the capacity to store student achievement data. Student achievement scores had been kept on paper, which impeded data analysis. With access to QSP, for the first time, student academic data was being stored electronically, and he envisioned that QSP would enable him and his colleagues to compare student performance from different years and to be able to examine trends in performance:

> We have an attendance database called FASE…But there is no room on that program to input the academic stuff…We're depending on QSP to be our database…This is why I'm saying that we're taking a big leap because we have not been technologically sophisticated…. We have this year's data, and now next spring when we test again, we'll have next year's data, and I'll be able to compare next year to this past year and things

like that…the more years that we build on it, I think the better off we're going to be able to look at some long-term trends of what's happening with our kids.

For a seventh-grade reading teacher, access to data meant that she could readily use the test item level information to guide her instruction:

> The obvious strength is you have that information right at your fingertips. I mean it's right there and you're not having to go through each child's file individually….Because the test scores that we put in, it gives us a cross section of not only reading comprehension but just basic understanding, vocabulary, and all of that kind of stuff. And so it allows us to have more specific goals in mind of what each child needs individually, and as a whole population.

However, the short survey data and the interview data also point to some important factors that need to be considered before access to data can be achieved.

School data can exists in many different places, ranging from a main district data store to Excel spreadsheets, to loose papers in files. Prior to data entry, it is important to take an inventory to identify data sources and locations and from this inventory determine which data will be useful for analysis and will be imported into the data tool (Wayman et al., 2004). An equally important task is to make sure that the data are "clean." Inaccurate and incomplete data will present problems for data analysis and so educators will need to assess the quality of the existing data and take the necessary steps to ensure clean data. Finally, it will be important to identify the resources for any data cleaning and for importing data into the system.

These data preparation tasks described above had a negative impact on attitudes toward QSP use. A number of interviewees stated that prospective users' initial enthusiasm for using data with QSP was dampened somewhat when they realized what was required to clean their data before importing them into the software. Most of them had not been aware of what was involved in data preparation. A principal summed up a central problem when he stated:

> The hardest part was getting the data into the system. The reason being because we didn't really have a protocol here for preparing data within our student information system. For example, when the kids took the PSSA, their student number wasn't on the test. So we had to mix and match all that stuff up.

Other users indicated that the amount of available IT personnel time is a factor that can impact data use. At the beginning of implementation, sites were importing data for multiple years, which required a great deal of time. An additional time burden resulted from the iterative process of software development described

earlier. New versions of QSP were released periodically, which required data to be re-imported. However, even with the final version of QSP, because importing data is an ongoing process, longer-term considerations of time remain. For example, one user pointed out that he is importing state level data several times a year:

> I'm continually adding new things because our state information comes sometimes quarterly, as far as the demographic data. The testing data usually comes in the spring. So when that stuff gets here, I run it through all of our programs and then run it into QSP.

Those districts and schools using additional kinds of data (e.g., from schoolwide tests and benchmark assessments) are required to import data frequently and may lack the resources to do that. One interviewee, who was involved in an incremental process of district-wide implementation, was concerned about whether current resources would be sufficient when the whole district implemented QSP.

Reponses to the short survey (those who had stalled or discontinued implementation) indicated that the most common reasons for discontinuing use were the amount of time for data preparation and importing data into the system.

One possible solution to the time and resource problem came from a consortium of school districts in Michigan who had a central administrative service that is responsible for data entry and technical support, with each district paying an administrative fee. This enabled districts that would not be able to afford this kind of support if functioning on their own to pool resources and make data analysis available to their schools.

Another factor highlighted by several interviewees was that before preparing and importing data it is important to consider the types of data available and which data the will be most useful. Based on his experience of importing data, one interviewee stated:

> The thing I would do first is to just formulate in your mind and on paper the types of data that you have, just so you can start to visualize what you want to get in there. From there, I would ask myself which sets of these data can I get or which ones do I have or how hard would it be to get them.

A district administrator reported that after a period of QSP implementation, he had reviewed the value of the existing data in the system with administrators:

> We asked last spring how to make the data set that was in QSP more valuable. With that feedback we have been working this fall to add all of those items.

Climate for Data Use

Although QSP had increased access to data in schools, it will remain largely ineffective if teachers and administrators are unwilling to use it. For practitioners to develop a commitment to data use, district and school climates that trust data and support data use must be nurtured. The survey respondents were prompted to express agreement or disagreement with statements that described factors contributing to the climate in their schools and districts for data use. Overall, the results showed that there was a positive climate for data use among respondents. Ninety percent reported that value was placed on data use in their schools and districts, 70% of them thought that effective decisions were made based on data analysis, and 80% reported that data use is an expectation at their site. Seventy-five percent of respondents knew where to seek help in interpreting student performance, and 70% reported that there were opportunities to receive training on data based inquiry at their school. Trusting the data is a pre-requisite for effective data use, and significantly, 70% of respondents reported that they trusted the data in the system. Also of significance is that 65% of respondents reported that very few of their colleagues had experience working with data, an indication of the extent of professional training still required (see Table 3).

Table 3

Climate for Data Use - Frequencies

Climate for data use	Percentage of respondents		
	Strongly agree/agree	Not sure	Strongly disagree/disagree
The decision makers at my school/district value the information gained from data analysis	90%	10%	0%
The decision makers at my school/district make effective decisions based on information gained from data analysis	70%	25%	5%
I can't trust the data in our school system	15%	15%	70%
It is expected at my school that we use data on a regular basis	80%	10%	10%
Very few of my colleagues have experience of working with data	65%	10%	35%
The principal encourages use of data in instructional planning	20%	15%	65%
I know where to seek help if I don't understand how to interpret student performance data	75%	15%	10%
My school provides teachers the opportunity to receive training on data based inquiry	70%	10%	20%

Respondents were also asked about the extent to which their schools and districts provided professional development and support for data use. A majority of respondents reported that data use was supported through professional development. However only a minority believed that their schools and districts had the technical support to use data effectively, and even fewer believed that their school or district had the capacity to use data effectively without such support. These results are displayed in Table 4.

Table 4

Professional Development and Support from Schools/Districts

Our school/district:	Strongly agree/ agree	Not sure	Strongly disagree/ disagree
Provides professional development support for data use.	58%	21%	23%
Has been able to get the data it needs.	56%	28%	17%
Has received professional development provided by trainers that has been helpful in using data.	58%	21%	21%
Gets the technical help we need to use data effectively.	47%	32%	16%
Has the capacity to use data independently without outside support.	37%	26%	37%

Taken as a whole, these results suggest that despite a cultural climate that is generally favorable to data use in the school districts we surveyed, reservations exist about the capacity to use it effectively. These reservations are quite commensurate with the respondents' levels of experience with numerical data beyond the spreadsheet level documented above.

Features and Functions of QSP

The core features of QSP are groups and reports (see Section 1 for a full description) and were the most frequently used by all users. In the main, respondents were using the disaggregation features in the Groups tab, and were generating reports on the performance of these groups. Although many interview and survey respondents were not fully using the longitudinal capabilities, they indicated that this was a feature they liked in QSP. Those who were using this function had examined state data over a number of years, looked at trends over time, and followed cohorts.

Our survey and interviews asked about the extent to which respondents were using the gradebook and digital portfolio functions of QSP. However, because these functions are designed for use in the first instance by teachers, and few of the latter participated in the study, data on the use of these functions is sparse. While several districts had begun to train a cohort of their teachers in the gradebook, many districts had already implemented an electronic gradebook and, because of the investment of time and money in the implementation, they were not inclined to use

the QSP gradebook. A small minority of respondents had begun to use the goals feature in QSP. Least used by our respondents was the digital portfolio. While a number of people were very positive about the inclusion of the digital portfolio to store performance data, they were not yet at the point where they had these kinds of data available, although several indicated that it was a future goal.

Significantly, a considerable majority of respondents to the short survey (those discontinuing QSP implementation) had positive comments about features of QSP that they found useful, ranging from the querying and disaggregation capabilities, to easy-to-generate reports and the clarity of their graphics, to the gradebook. A minority of the respondents found the software difficult to use and not user friendly, and several suggested that it would be easier to use if pre-determined questions and pre-built reports were included. Suggestions for improvements in the features and functionality of QSP that emerged from all data sources are included in Section 5 of this document: specifications for a 5th generation of QSP.

Types of Data

The long survey prompted users to indicate the frequency with which they used the following data: student achievement data, student background data, opportunity to learn data, and perception data.

Achievement data. State or district achievement data was used most frequently (75%), with only 10% of respondents using them on an annual basis and 15% never using them. This suggests that these large-scale achievement tests are being analyzed more frequently and that district data (for example, benchmark data, which districts are increasingly using) are being used more formatively and as predictors of achievement on statewide tests. These uses were confirmed by a number of interviewees. Student grades were used quarterly or more often by 75% of respondents, and 25% never used grades. Diagnostic or placement tests were also frequently used by 70% of respondents. The relatively frequent use of diagnostic or placement tests also suggests that these are being used formatively to plan instruction and to place students in classes or programs appropriate to their needs. Teacher-developed assessments were used quarterly or more frequently by 60% of respondents, with 25% never using them, and curriculum embedded assessments were used frequently by 55%, while 33% of respondents never used them (see Table 5).

Table 5

Data Use: Achievement Data - Frequencies

Achievement data use	Percentage of respondents Quarterly or more frequently	Percentage of respondents Annually	Percentage of respondents Never/no access
State or district achievement data	75%	10%	15%
Diagnostic or placement tests	70%	5%	25%
Curriculum-embedded	55%	5%	40%
Student grades	75%	0%	25%
Teacher-developed classroom assessments	60%	25%	15%

Background data. The survey showed that 65% of participants used student attendance data frequently, 10% used them annually, and 25% never used them. Student behavior data was used frequently by 60% of participants, annually by 10%, and never used by 25% of respondents. Sixty percent of respondents used student demographic data frequently and relative to the previous data items more respondents used them annually (25%), while a smaller number never used these data (15%). Student preschool participation was frequently used by only 15% of the respondents; 25% used them annually; and 60% never used them at all. Student post graduation plans were least used frequently (10%), 25 % used then annually and they were never used by 60% of respondents (see Table 6).

Table 6

Data Use: Background Data - Frequencies

Background data	Quarterly or more frequently	Annually	Never/no access
Student attendance	65%	10%	25%
Student demographics	60%	25%	15%
Student behavior	60%	10%	25%
Student preschool participation	15%	25%	60%
Student post graduation plans	10%	25%	65%

Opportunity to learn. Program participation data was used frequently by 45% of respondents, used annually by 25%, and never used by 21%. Thirty-four percent

of respondents used resource allocation data frequently, while 50% never used them. Course taking information was used frequently by 33% of respondents, annually by 4%, and never by 36%. Time spent on subject data were never used by 58% of respondents, used annually by only 8%, and more frequently by 17%. Similarly, content exposure data was never used by 54%, used annually by 12%, and frequently by 17% of participants. Finally, data about teachers' qualifications was never used by 46% of respondents; 25% used them annually and 12% more frequently (see Table 7).

Table 7

Data Use: Opportunity to Learn - Frequencies

Opportunity to learn	Percentage of respondents		
	Quarterly or more frequently	Annually	Never/no access
Program participation (ELL, Special Ed.)	45%	30%	25%
Resource allocation	40%	0%	60%
Courses taken	40%	5%	55%
Time spent on subjects	20%	10%	70%
Content exposure	20%	15%	65%
Teacher qualification	15%	30%	55%

Attitude and perception data. The survey showed that 50% or more of respondents never used attitude and perception data. Respondents mostly used these data on an annual basis. Student attitude and parent and teacher perception data were used annually by 40% of respondents, and 35% used student perception and administrator perception data annually. Student attitude, parent, teacher, and administrator perception data were frequently used by 10% of respondents, while 15% used student attitude data frequently. The results are displayed in Table 8 below.

Table 8

Data Use: Attitude and Perception - Frequencies

Attitude and perception data	Quarterly or more frequently	Annually	Never/no access
Student attitude	10%	40%	50%
Student perception	15%	35%	50%
Parent perception	10%	40%	50%
Teacher perception	10%	40%	50%
Administrator perception	10%	35%	55%

NCLB requirements have led to a greater focus on data, but our results suggest that many practitioners restrict themselves to analyzing student characteristics in relation to achievement data. The vast majority of examples of QSP use described by interviewees in the telephone survey also reflected the prevalence of this kind of analysis. While respondents, in conformity with the provisions of the NCLB legislation, are using QSP effectively to examine whether racial, economic, and linguistic disparities in achievement are narrowing or not, as yet they have not moved to more complex analysis of the factors that might be contributing to differential performance levels. While they may want to move beyond their current level of analysis, they may not yet understand the possibilities for creating data elements and indicators This is particularly underscored in Table 7, which shows that the majority of respondents do not use opportunity to learn data such as time spent on subjects, teacher qualifications, and content exposure, all of which could potentially influence achievement. Moreover, the majority of interview and survey respondents were using reports that embodied descriptive, rather than inferential, statistics. For example, the most frequently used report format was the bar chart. A considerable number of survey respondents indicated that they did not yet feel "comfortable" or "ready" to move to more complex analysis and reporting. Indeed one superintendent, experienced in data use, stated that members of his district management team were only using bar charts:

> They're using bar charts because, for the most part, they don't understand the correlation the way I do. They're not sure even after the training we've done. They're not all together comfortable with the kinds of analysis I do.

Who Analyzes Data?

Survey data showed that most of the data analysis was being conducted within schools or districts primarily by administrators, a fact which was further reinforced by the interview data. 72% of survey respondents indicated that school administrator did the analysis, 61% reported that the school leadership team analyzed the data and 56% responded that analysis was performed by district administrators. A combination of school administrators and teachers (50%) were the next largest group with only 44% of respondents indicating that teachers were involved in analysis (See Table 1). Although the number of teachers conducting data analysis is less than administrators, given that teachers traditionally lack training in data analysis, and that analyzing data with technology tools is relatively new to all school personnel, the fact that 44% of participants responded that teachers analyzed data can be construed as a promising sign (see Table 9) .

Table 9

Who Analyzes Student Performance Data?

Who analyzes performance data?	Percentage of respondents
School administrator	72%
School leadership team	61%
District administrator	56%
School admin/teacher collaboration	50%
Teachers	44%
We send the data out	17%
Other	11%
No data analysis	6%

To Whom Are Data Regularly Reported?

A considerable majority of participants (89%) responded that the data were regularly reported to teachers. This would suggest that the reports were intended to influence instructional practices. A number of participants in the interviews reported that they had given reports to teachers to assist them in meeting students' needs. For example, a county office consultant for data use described how one high school was looking at reports of the students' performance:

> I helped the principal at the high school generate lists for his ninth, tenth, and eleventh grade to share at a faculty meeting. We were able to print out all of the kids who were not proficient in English/Language Arts and in Math. They were a school that really wasn't accessing their Star Data very well. We were able to pull up who these kids are and what their scores are. Are they close? Are they not close? He gave that to the teachers and said, "This is a group of kids that we need to be aware of."

At another school, the principal reported that she used QSP to generate a master list of all students in her school whose performance was below standards. After she identified the students who needed help, she was able to use QSP to pull out their individual math and reading scores on state tests. Once the data set of children with specific needs for each grade level was created, the principal presented the list and the QSP reports to the teachers. The student list, their test scores, and the QSP reports provided valuable information for the classroom teachers to focus on students' needs and to plan instruction tailored to individual students. The principal stated:

> I was able to identify the children plus have their achievement level scores readily available in the list. With CTBS, all I would've been able to do is generate their scores, and then I would've had to go to our student information systems and pull out the children that fall under No Child Left Behind, and then come back and make a different list on my own…. We have to know who they are, and we have to monitor them.

The survey also showed that data were reported frequently to parents by 74% of respondents, to state agencies by 74%, with 68% reporting data to the district, and 58% to the school board. Data were reported regularly to students by 53% of respondents. Strikingly, only 26% of respondents reported data to feeder/receiver schools. Data were reported least to funding agencies (16%), and also 16% indicated that they reported data to business and community groups (see Table 10). From the open-ended question on the survey about why data were reported, among the most commonly cited reasons were showing school progress, NCLB and other reporting requirements, and guiding instructional decision making.

Table 10

To Whom Are the Data Regularly Reported?

To whom are the data regularly reported?	Percentage of respondents
Teachers	89%
Parents	74%
State agencies	74%
District office	68%
School board members	58%
Students	53%
Feeder/receiver schools	26%
Funding agencies	16%
Business/community groups	16%
Other	10%

Purposes of Data Use

The survey revealed that the main purposes of data use were to measure student progress and program effectiveness, to guide curriculum and instruction, and to meet accountability reporting requirements: 68% of respondents used data to measure student progress and 68% to measure program effectiveness. The majority of respondents (74%) used data to guide curriculum development, 68% to meet accountability reporting requirements, and 63% respectively to assess instructional effectiveness and to plan individual student's learning. Fifty-eight percent of respondents used data for strategic planning. Data were least used for placing students (42%), for allocating resources (37%), and for guiding professional development (47%) (see Table 11).

Table 11

Main Purposes of Data Use

Main purposes of data use	Percentage of respondents
Measuring student progress	68%
Measuring program effectiveness	68%
Assessing instructional effectiveness	63%
Planning individual student's learning	63%
Guiding curriculum development	74%
Meeting accountability reporting requirements	68%
Student placement	42%
Showing trends	63%
Allocating resources	37%
Strategic planning	58%
Setting goals	63%
Making changes to curricula and programs	68%
Guiding professional development	47%

Purposes for using data uses that correspond to several survey items emerged from the interview data. Six interviewees stated that their sites are performing analysis with QSP for the purpose of accountability reporting requirements of individual states and NCLB. A principal commented that:

> Since No Child Left Behind, you know we have to look at data, and we have to look at achievement as it relates to anybody who is covered under No Child Left Behind. So I was able to use QSP and come up with a master list of all students in my building who fall under one or more categories of the No Child Left Behind categories. Then I was able to include in that their math and reading scores, which is what is used to determine our adequate yearly progress.

Six interviewees stated that they are using QSP to evaluate the effectiveness of programs. For example, one superintendent described how in his district they were using QSP to evaluate two reading programs:

> We have Houghton Mifflin that we have been using for the last 8 or 9 years probably. And we have one school in the district that is a Reading First school, and they are piloting Open Court. We haven't figured out how to control for all of the other services that come with Reading First, but we are looking at the amount of gain and the performance of students who are in the Open Court system versus Houghton Mifflin.

Another district administrator recounted how, by using QSP, his school district administrators were able to track students when they left middle schools to go to high schools. Student performance data in the high school was also sent back to middle schools so that middle school teachers could see the long-term impact of the intervention programs they provided:

> We're trying to do some program evaluation, and we're able to code kids that might be in that program and track them. For us, it's making a difference because we can look at it. Instead of saying, "I have a gut feeling about this," now we're actually able to look at the data.

A common theme among interviewees was using data to plan for students' learning. Four interviewees described how data analysis with QSP was leading to more differentiated instruction. For example, a principal stated:

> For the most part we were getting kids to proficiency the same way you get them to Broadway: practice, practice, practice. And we've kind of run into the brick wall of diminishing returns with that approach, so now what we're looking at is using data analysis and more online real-time testing in order to be able to differentiate instruction for those various students so that we can focus on their particular strengths and weaknesses, particularly their weaknesses, and try to remediate those so that we can bring them up to proficiency.

Another principal noted:

> We tell our teachers that they need to be grouping students by the subtests like what students need a particular reading skill. So we're able to group students by that. We're also able to know what students need more help for remedial programs, and what students just need some coaxing because they're close to the target. So I would say predicting what kind of programs or what kind of special help we need to give them. We've used it for that.

Data from another 10 interviewees showed that QSP was being used to measure students' progress and to identify students who were at risk of not meeting standards so that curriculum and instruction could be adapted to meet their needs. One principal stated:

> Basically we've been using it to determine—specifically looking at students who are not proficient, digging around and drilling down to find out what we can do as far as remediating them. That is basically where we've focused our attention.

At another school, at-risk students were identified using QSP, and the school provided extra help to those students during after school hours. A superintendent described QSP's applicability to after-school interventions:

> We have something that we call "Targeted Services." It's some things that we do after school for our students. They [building administrators] have utilized QSP to basically generate some of the lists of those who are at risk of not being successful. That has helped them to extend to parents the invitation to, "Would you like to be involved in this extra activity to help strengthen some of those skills that your children may not have?"

Some districts and school had begun to use QSP to set goals and to monitor their student progress. One superintendent revealed that he relied on QSP to initiate discussion with his staff about student improvement efforts.

> I laid that (student performance) out on that chart to say "Is this where we want our second graders to be?" Is this where we want our ninth graders to be?" We've begun to have those discussions, which I think will lead to more when we meet at a retreat with our Board for our continuous improvement processes to set different goals, and then utilize QSP to see the progress we're making on them.

None of the interview respondents reported that they had used QSP for the purposes of student placement, allocating resources, or for guiding professional development. This is broadly consistent with the survey results where the data show these purposes were least used for data analysis.

Impact of Data Use

Notwithstanding the relatively limited range of uses for data, the respondents clearly indicated that data use had significantly improved a number of facets of school and student evaluation. In particular, respondents indicated that the improved availability of data had led to a stronger focus on student performance (63%), an enhanced capacity to evaluate special programs (55%), and increased attention to the performance of student sub-groups (53%). A substantial minority also suggested that the greater availability of data had enhanced the alignment of curriculum assessment and student performance (47%), as well as the ability to revise instruction (42%) and curriculum (38%). Encouragingly, 42% stated that QSP has increased their enthusiasm for data. The results are displayed in Table 12.

Table 12

Data Use Impact on School and District

QSP has improved our school's/district's:	Strongly agree/ agree	Not sure	Strongly disagree/ disagree
Data availability	69%	17%	16%
Focus on student performance	63%	21%	16%
Ability to evaluate special programs	55%	22%	22%
Attention to performance of student sub-groups	53%	26%	21%
Alignment of curriculum assessment and student performance	47%	36%	16%
Ability to revise instruction	42%	37%	21%
Enthusiasm for data	42%	32%	26%
Ability to revise curriculum	38%	42%	21%

One superintendent noted that the impact of increased data availability had encouraged more data sharing among his staff:

> We've had to collect data before, but the problem was it was not something that everyone could actually have access to. So because people didn't have access to it, they were very reluctant to share. Now that they know that they're going to be able to have access to it, they're more open in their sharing.

One school district used QSP to investigate how well their local assessment could predict student performance on state tests. The results helped them revise their instructional planning and align local assessment with the state standards:

> We're relying on our local assessments, but we're also mindful of the impact of the state-mandated tests as well. So we're not only looking at the local assessments, but we're looking at how well the local assessments are predicting how well the kids will do on the PSSA and what we have to do....we get more data, more real-time data that we can use to start to remediate right away and address those deficiencies.

A school principal reported conducting "bi-weekly assessment with at-risk students to gauge progress over time." With the assessment information, this school offered "a before-school math tutoring program" and "sent out to the parents home support activities" to involve parents in students' learning.

Other school decision makers began to envision new ways of paying close attention to students' needs and using student data to design new school improvement plans. One school had planned to "use QSP to accumulate student

data over the years beginning from next year" so that eventually, they could "conduct longitudinal analysis to examine student trends in learning." Another school was planning to use QSP to store and share student information across grades, so that "a fifth-grade teacher could have access to the test results from the fourth grade" and plan instruction based on each individual student's performance in previous years.

Another school, in the early stages of using QSP, included administering periodic local assessments in their school improvement plan. They had set up goals to provide identification and early intervention of at-risk students by examining both student performance data from previous year and data from local assessment in the next year.

> It'll be at the beginning of next school year when we're once again hit with preparing for the year. It would be nice if a teacher could, over the summer, if they chose to go in and access their children, and start to look at things, and start to manipulate data….Then we work off of those plans. I would like to be able to do periodic checks, and so would my teachers.

Promoting Communication and Collaboration

In the study, it emerged that QSP had acted as a catalyst for collaboration among school personnel. QSP afforded opportunities for inquiry and reflection among colleagues, which can have a great impact on improving achievement for all students (Hall & Hord, 2001).

Several districts and schools had formed data use teams and participants worked together to make decisions about which data to collect or import, what questions to investigate, how to analyze data and present results, and what actions to take to improve instruction.

For example, a school principal who participated in QSP training with two, fourth-grade classroom teachers, the reading specialist and the guidance counselor, described how after the training, she and her colleagues worked collaboratively to discuss how they planned to implement QSP based on their school improvement plan:

> We came back to school, and we did talk about how we could use the program based on our school improvement plan, and kind of the goals that we have for learning here, and how we would use that for instructional purposes.

In addition to collaboration among educators, there was evidence of the importance of collaboration between information technology personnel and the decision makers. A district director of instruction highlighted that to get to the point of being able to use the data to plan for students' learning required the support of the technical department to clean the database, import the data, and offer continued support to school principals and teachers:

> I would not have been able to do that if I were just on my own…it does take sort of a technologically astute mind that's familiar with databases and how they work, and how that system works. Fortunately, I have a man who could do it. Anything I've asked for he's been able to produce in a matter of moments, but if he were to leave, I'd pretty much be back to square one.

A factor that schools recognized as important in meeting students' needs was collaboration between parents and the school. Some schools were planning to utilize web-based QSP to deliver more timely student progress reports to parents and to increase parental involvement in their students' learning. For example, one principal stated that:

> The web-based component is very important to me….We have to do the progress reports. No matter when we put them out, there are always some parents who come back and say, "If we'd only known sooner, we could have helped and done something."

Training and Professional Development

For the initial national rollout of QSP, CRESST's training program formed the core of the training given to key personnel at the district or school level. CRESST's training program was also employed to train trainers. Trainers conducted face-to-face training for a considerable majority of survey and interview respondents.

In rating the effectiveness of their training in preparing them to implement QSP, on a scale of 1-8 (with 1 as "not at all effective" and 8 as "extremely effective"), 62% of survey respondents rated it as "effective" or "very effective," while 38% regarded the training as "not very effective" or "not at all effective."

The interview data revealed that participating in the CRESST training program had changed some district and school personnel's perception of what constitute data and why data collection should be guided by research questions. For example, one principal pointed out that after participating in the training, he had a much better

understanding of what data were and how to manipulate data to answer his questions:

> It has changed the way that I've worked with data. I've actually gone from [being] an individual that didn't work with data to an individual that's now working with data. The understanding of what's going on with the data is a lot clearer now.

In another example, a district administrator revealed that he had repeatedly advised colleagues in his school district not to input all kinds of data into the district database for analysis without giving serious consideration to the questions to be investigated. He observed that QSP training was effective in making people realize the role research questions play in the cycle of investigation, and as a result, a more systematic approach to inputting data had been adopted:

> And I think finally at the training they saw the light that these were the only assessments they needed in the system and not try to put everything under the sun…So that was, I think, a benefit of the training sessions. This will give them the understanding that it depends on the type of question and not just having all of the data and dumping it in.

However, one theme clearly emerged from the interview data, perhaps best typified by a user who said, "It was helpful training, but I would have liked to receive training after implementation." Most users needed continued support to implement QSP successfully. Interview participants cited numerous examples where district employees needed to provide support to QSP users. In some cases, this involved having a district employee working with people at the school or building level after the training. For example, one district administrator stated that he makes suggestions for the types of analyses that can be conducted:

> We will typically tell them, "This is the kind of information you can get out of that," and we'll give them some suggestions, but we will also encourage them if we don't answer the questions that they have, to have them go ahead and experiment.

In another district an administrator had scheduled school visits each month during the initial stages of implementation:

> And like anything else, when we go to visit the schools just like in the classroom, the schools that have been using it, pull it up, go to this and that, and then they ask us their question. "How come this? How could I do this?" Where other schools are fumbling around it's because they haven't used it. I think the site visits have been and I think the principals will tell you that the site visits have been by far the most valuable.

Whatever, the form of continued support for implementation, it required continuous communication between users and more expert users. As one district employee put it in relation to his work with schools:

> They're all working on trying to understand. They've been in constant communication with us.

Despite the limited resources at CRESST for follow up training, CRESST personnel did manage to give most district administrators sufficient continued support by telephone and web communication to enable them to provide other district and school personnel the help they needed for implementation.

However, more than one-third of participants said that they received support from outside sources, other than personnel at CRESST. Interviewees reported that they had sought help from outside the district (mainly from QSP trainers) for help preparing and importing data and for continued help with data analysis. A few participants indicated that they had used the online training as a "refresher" after the initial training, but the data from the survey and interviews point to not only the need to shore up technical skills associated with data preparation and import, but more importantly, the need for continued training and support in data analysis skills. These data are compatible with previously reported survey data (see Table 4), which indicated that a majority of respondents did not believe that their district had either the technical support, or the capacity, to use data effectively without outside support.

Discussion

The design of QSP as a decision support tool in education is a visionary one. It invites participants at all levels of educational decision making to be players in the input and analysis of data. Though it may be a long-term process involving significant investment in intellectual capital, QSP has the potential to encourage all participants to buy into the practice of data analysis and data-based decision making.

The results of the evaluation described above represent a view of the very first uses to which QSP has been put by district and school administrators. They show first of all that QSP has been found useful and is being used by a significant proportion of the administrators who have been trained in its implementation. They also show that it is being used for a cluster of analyses that are closely related to

NCLB—disaggregation, identification of low-performing students, and prediction of scores on statewide tests. While respondents listed a variety of purposes for data use, few interviewees described activities that went beyond the identification of at-risk students. In contrast, the potential uses of QSP for examining the factors contributing to student achievement, and for formative assessment, were very much less utilized. We hope and expect that these more sophisticated uses of QSP will emerge as users' familiarity with the program increases, as additional data elements are entered into the system, and as training in QSP becomes more widespread at the classroom level.

QSP was developed and supplied at no cost to end users. However, users encountered significant front-end costs in moving forward to implementation. Our users commented extensively about the personnel time and effort in preparing, cleaning, and importing data—indeed this proved an insurmountable hurdle for some. As numerous software start-ups have shown, it is often necessary for providers to support end-users for significant periods—particularly during periods when costs appear to exceed benefits—before users can be self-sustaining and the benefits from the tool become recognized and ultimately perceived as indispensable. Many of our surveys and interviews were conducted at the pump-priming stage of this process during which users had to be trained both in the mechanics and in the value of the output, and when high costs associated with data input were being experienced.

Our users were clear that, while the CRESST training was effective, continued IT support and data analysis skills training would be important elements in continuing and expanding use of QSP. A significant minority of our users who had the resources had contracted with third-party providers for continued support and training. This underscores that considerable investment in human capital will be required to develop assessment literacy and data analysis skills that will, ideally, reach from district to classroom level.

Our results suggest that web-based QSP represents the opening salvo in a long campaign toward evidence-based decision making in schools and districts. The use of QSP to service the objectives of NCLB is an important starting point for this process, and one around which additional skills in decision making will crystallize and grow. Creating the conditions for effective data use is a necessary precursor to the widespread reality of data use as an engine of school improvement.

Objective 5: Design Requirements for the 5th Generation of Decision-Support Tools Using Results From the Foregoing Objectives.

From our research evaluation of QSP implementation, from CRESST and other research, and from the project team's ideas that arose during the development of QSP, we have identified a number of features and functions to include in a 5th generation version of QSP that would considerably expand its utility. These are presented in two sections: a) proposed changes and enhancements to the existing features and functionality of QSP, and b) new features to add to QSP.

Proposed Changes to Existing Features

Student-centric. The original conception of QSP was as a decision support tool for use at the school and district level. Therefore, the database in the current version uses a school-centric organization. This means that each student in the system is "locked" to a particular school in the state/district/school hierarchy, and that the school is the smallest unit of analysis (see Figure 2).

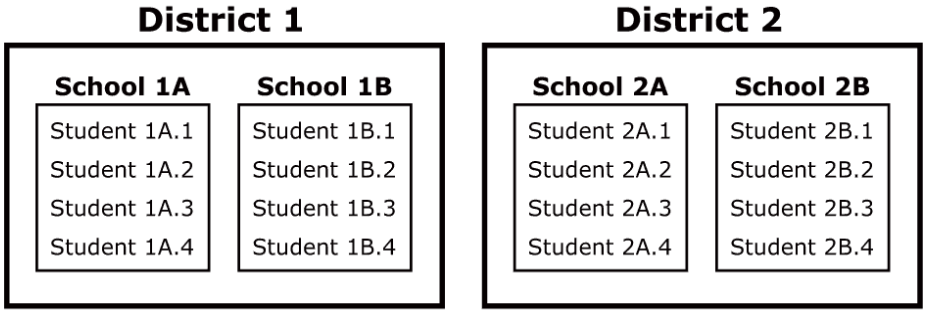


Figure 2. School-centric organization of QSP.

We would propose to change this structure in a 5th-generation version of QSP to a student-centric organization. This means that each student in the system would only be associated with a permanent ID number and would be outside the state/district/school hierarchy (see Figure 3).

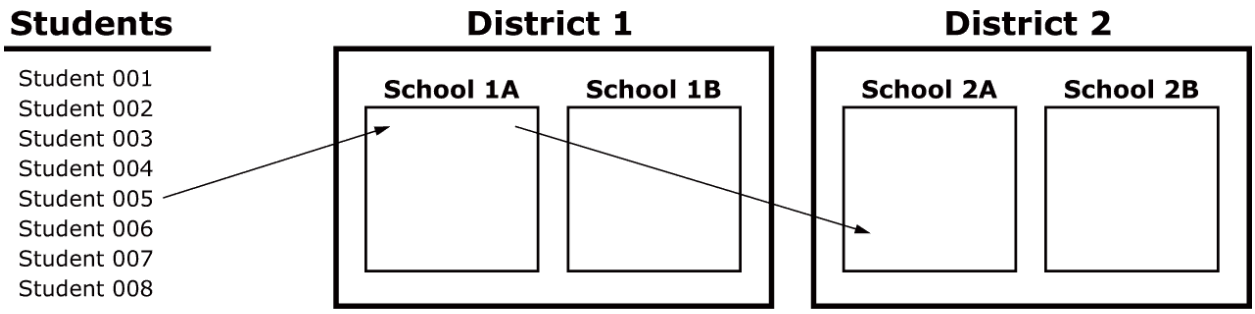


Figure 3. Student-centric organization.

The main benefits of this organization would be that duplication of students in schools or districts would be eliminated, and transferring and promoting students between and within schools or districts would be much easier. Currently, if there are any differences in the student ID, QSP will consider the difference as additional students, and system administrators must reconcile student IDs when transferring students into their system from another district using QSP. For large districts, this can be a time-consuming process. Additionally, making students active or inactive in the database would be an easier process in a student-centric system. Also, it would be simpler for administrators to back up and restore data that was organized in a student-centric way.

There would be advantages to using the gradebook from a student-centric structure. In the school-centric organization of QSP, students stay within a teacher's gradebook even after completing a class. Making QSP student-centric would enable system administrators to transfer a student's classroom-level data from the gradebook from last year's teacher(s) to next year's teacher(s).

Currently, QSP stores all portfolio items in one folder. In a student-centric version of QSP, each student would have a unique folder to save their portfolio items, which would enable students to access an individual archive of their portfolio items, and to transfer the portfolios when they moved to a new school or district.

Hybrid - Avalon

QSP was written using the latest available technology, including the .NET framework and Visual Studio .NET application-development environment. All the code resides on a server, and all processing is done on the server. Because of this, the software can slow when large numbers of users access an individual server

simultaneously, and when the server has to process a report for more than 50,000 students. A 5th-generation version would provide a solution to this by employing hybrid software, where the software is stored both on a desktop and on an Internet server. This would improve the speed of the software by offloading part of the work to the desktop when the server is busy. This would also make the process of upgrading QSP easier because the desktop portion of the software could automatically check for updates to the server and notify the user. One caveat is that a hybrid version would only work on PCs. However, Macs running Virtual PC could run this hybrid version in emulation.

Database Management Access (DBMS Access)

The QSP software includes both a database and an interface to manage and report data. When implementing the current version, system administrators are required to import all of their data into the QSP database. This database is stored on a Microsoft SQL server.

During the implementation of the current version of QSP, many system administrators noted that they wanted more options for storing their data. Most schools and districts already maintain a database and, because of time constraints, do not want to export data out of their database and import them into QSP. While many QSP sites are using SQL, a significant number are using other products that are incompatible with QSP, including Oracle and InfoMix. To resolve these issues, a 5th generation of QSP would include DBMS Access. This would enable system administrators to use the QSP interface to manage and analyze data in their existing database system.

Importing Data

With the current version of the system, QSP administrators are able to import student, teacher, and gradebook data using an In/Out tab. This tab contains wizards to take administrators through the step-by-step process of conducting an import or export of data.

Many users of the QSP software have expressed that they would like the data import process to be speeded up. To accomplish this, a 5th generation version of QSP would include an alpha-numeric command structure. A command structure is a set of programming commands that enable a computer to communicate with a server.

With the inclusion of alpha-numeric characters (e.g., letters and numbers), large data sets would be partitioned into smaller files to improve the accuracy and speed of importing data, and administrators would be able to import data from other software, such as Excel and SPSS.

Within the current version of QSP, data is imported using a top-down method. In other words, you can only view data at the level imported or lower (e.g., district data can be viewed at the district or school level). By updating the QSP database to use a bottom-up method, student- and school-level data would be accessible at the district level.

Default Variables

All data in QSP are stored according to variables. These variables describe a characteristic that a student may have. For example, the variable "LEP" tells you whether a student is Limited English Proficient or Fluent English Proficient.

Within the original desktop version of QSP, system administrators were limited in the number of variables that they were allowed to create. This included some default variables for use with all users of QSP. Once system administrators used their allotment of variables, they were required to delete old variables before creating new ones. In the web version, to allow for a larger number of custom variables, the number of default variables was reduced so that system administrators could create new variables whenever needed. A 5th generation of QSP would increase the number of default and non-default variables. This would permit default variables to be easily mapped to School's Interoperability Framework (SIF) variables as the SIF specifications change. With default variables mapped to SIF variables, users would be able to enter data once and propagate data between QSP and other software.

To allow for maximum flexibility in querying and analyzing data, in QSP version 4.0, users have to identify the elements of the report before it can be generated. Adding more default variables would enable the next generation of QSP to include pre-built reports**.** Many users have requested this feature, especially for NCLB reporting and for more novice users of the system. Reports that are required for NCLB reporting could be pre-built in the system. Other pre-built reports could include a series of existing reports that answer specific, pre-determined questions. To answer the question, "What is the achievement of our students in math?" QSP

would generate a series of reports. These would include pie, floating bar, score range, etc., reports that used default or custom variables from the system (e.g., math norm-referenced test, the state math assessment, the district math assessment), broken out by certain subgroups.

Accessibility

QSP 4.0 includes 10 types of school level accounts. These provide differing levels of access for QSP state, district, and local users, who include administrators, principals, program coordinators, teachers, counselors, office staff, students, and parents. Different functions are provided using tabs for each of these school-level accounts. For example, teacher-level users have exclusive access to the Gradebook tab.

During the implementation of QSP 4.0, it became clear that the current system of accounts needs to be modified. The current system assumes that all users at a certain level will have the same skills and needs when using QSP to analyze student data. The users of QSP vary considerably in their abilities involving technology and data analysis. In the original QSP design we had planned to customize access to QSP. For example, a principal account could have access to the In/Out tab in addition to their tabs designed for principal use. However, this was not technically feasible during the development of version 4.0. In the current version, users are assigned a primary role and the possibility of two sub-roles. When the user logs in to the system they have a choice of roles, but if they want to change roles, they have to log out and log back into the system. A 5th generation would permit users to combine all the roles into one.

Report Options

With the current system, users are required to manually select the format for each report. As the research team found during interviews with QSP users, this can be a difficult process for those who are less experienced with analysis. Not only do they need to be able to follow the step-by-step process in creating the report, but also they need to be able to match the report back to their research questions.

A 5th generation of the Reports tab would scaffold users in determining which report best fits their analysis. Users would be given the option of utilizing a report wizard, which would ask users about their research question, groups, variables, and

time periods. Once the questions were answered, it would provide a list of appropriate reports.

An additional report would be included in a 5th generation—the explore report. This would be an interactive report that lets users query the database about a particular group and use the explorer (a decision tree), to investigate indicators about the group. The explorer would allow a user to disaggregate according to a categorical variable. For example, users could go to a list view (see Figure 4) where they select a variable from the pre-determined common indicators and could see a pie chart of the distribution.

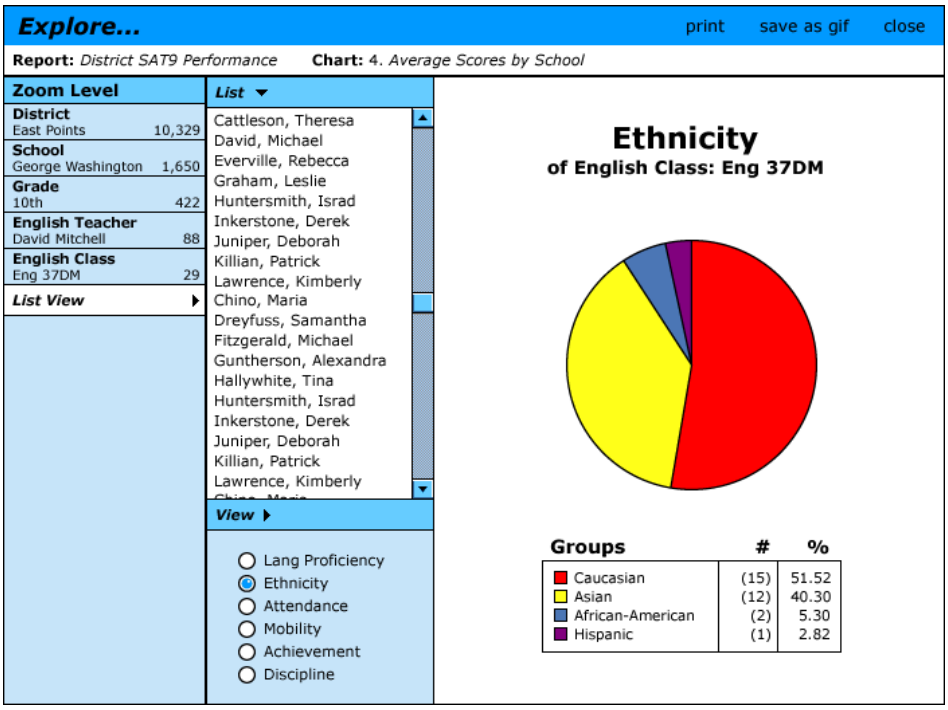


Figure 4. Explore report.

Flexibility for School Type

The online version of QSP is currently designed to organize data according to traditional school types. Whenever a QSP administrator creates a new school, they must select elementary school, middle school, or high school.

Some schools in our study did not fit into traditional grade-level categories. This supports findings by the National Center for Education Statistics (2002) that shows a shift in the structure of public schools in the United States. For example, during the 2000-2001 school year, 18% of all elementary schools included grades

traditionally considered both elementary and middle school. Furthermore, 6% of all public schools were classified as combined elementary and secondary schools.

Increased flexibility for school type would be included in a 5th generation of QSP. Modification would be made to the School tab to enable system administrators to assign alternative school types to elementary school (K-6), middle school (7-8), and high school (9-12). To accomplish this, a wizard will be provided in which administrators can set the grade levels to be included in an individual school.

Standards Tab

Using this tab, system administrators can define grading standards for subjects and domains. Teachers can show progress toward state, district, or school standards. In a 5th generation of QSP, this function would be adapted so that standards can be tied directly to a cohort of students for a given school year. This would provide the benefit of accounting for changes in standards as students' progress through school, so that student performance can be measured against the standards that were in place when they entered the school as well as any standards that were subsequently introduced. This was a feature that districts in several states requested. Changes would also need to be made to the Gradebook tab so that teachers could monitor progress against the range of standards.

Additional Features and Possibilities

Value-added analysis. CRESST researchers have been developing value-added models that could be incorporated into QSP. Using a value-added system, the emphasis is switched from measuring current proficiency to measuring gains. In value-added gains or growth, the status at a certain point of time (i.e., initial status) can be a strong and important factor. For example, Figure 5 shows the growth trajectories of students with differential starting levels at a given time point (t) and with varying gains at a later time point (t+1).

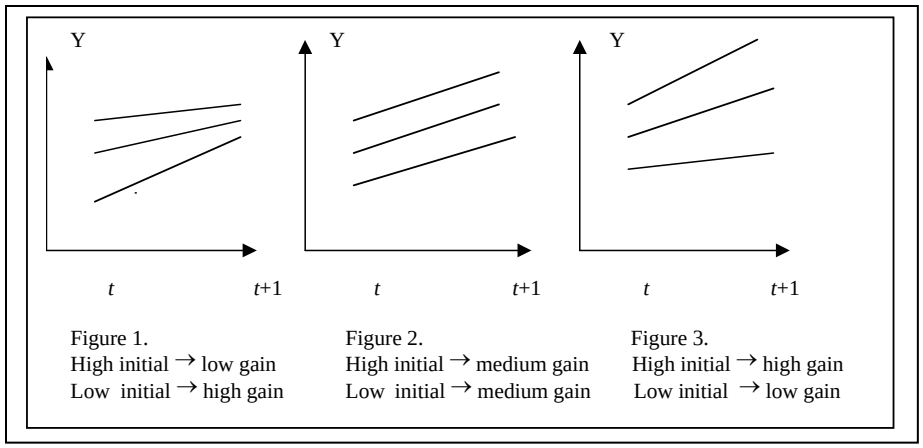


Figure 5. Distribution of student achievement (Choi, Seltzer, Herman, & Yamashiro, 2004).

The first graph in the figure shows the achievement gap closing—from a high initial status the gains were low, whereas from a low initial status the gains were high. The second graph shows medium gains from both the high and low initial status. The third graph shows high gains from high initial status and a low gain from a low initial status—a widening of the achievement gap. These growth trajectories would not be shown if only measuring the current proficiency levels of students. The CRESST value-added model enables schools and districts to monitor growth trajectories for each school. Figure 6 shows the individual growth trajectories in math for 16 schools in a district.

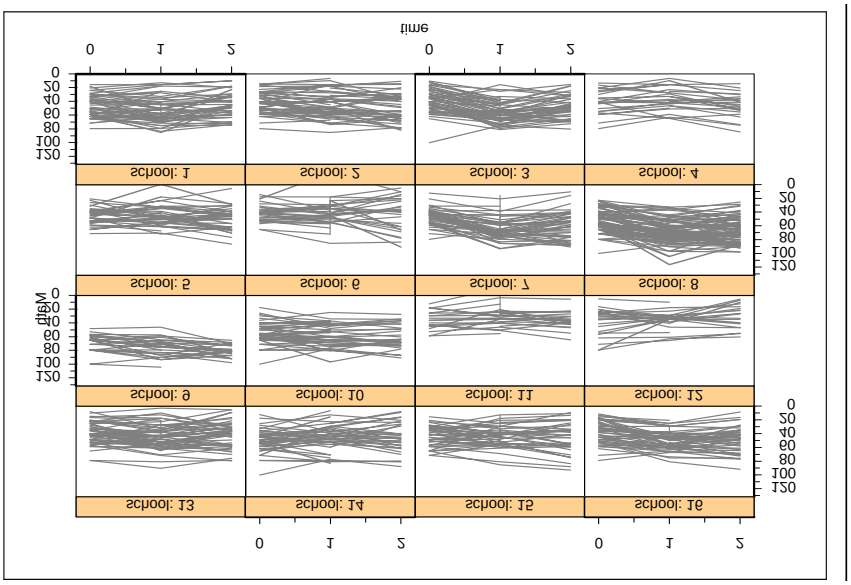


Figure 6. Growth trajectories in math for 16 schools. (Choi et al., 2004).

A value-added analysis capability in QSP could answer questions such as:

- Are students with high initial status growing faster than students with low initial status?
- Are schools with high initial status growing faster than schools with low initial status?
- Are there any schools that start low initially but grow faster compared to others?

A 5th generation of QSP would include value-added analysis capabilities and specific report formats to display the initial status as well as the gains in student achievement from the initial status.

Financial Data Analysis

Data through which program expenditures have been evaluated are most often aggregated at the district level or above and typically averaged over a range of students and programs. For more than 10 years, researchers have argued that data disaggregated at the student level are more useful for evaluating resource effectiveness than data averaged at the district level (e.g., Berne & Stiefel, 1995; King & MacPhail-Wilcox, 1994; Monk, 1992), and that longitudinal evaluation of student progress is a more sensitive means of addressing product function questions than traditional annualized measures. A 5th generation of QSP would give educators the capacity to use longitudinal financial data linked to individual students to analyze the impact of resource allocation on student achievement.

Fiscal variables would be included and QSP would perform multiple regression analyses to determine a causal relationship between critical financial variables and student outcomes. To accomplish this, we would add an expenditures wizard that enables users to easily allocate financial resources, a tool for statistical analysis of financial data, and new reports to display the data. The expenditure wizard would have three components: selection of a students' group, selection of fiscal variables, and an entry for financial cost (see Figure 7).

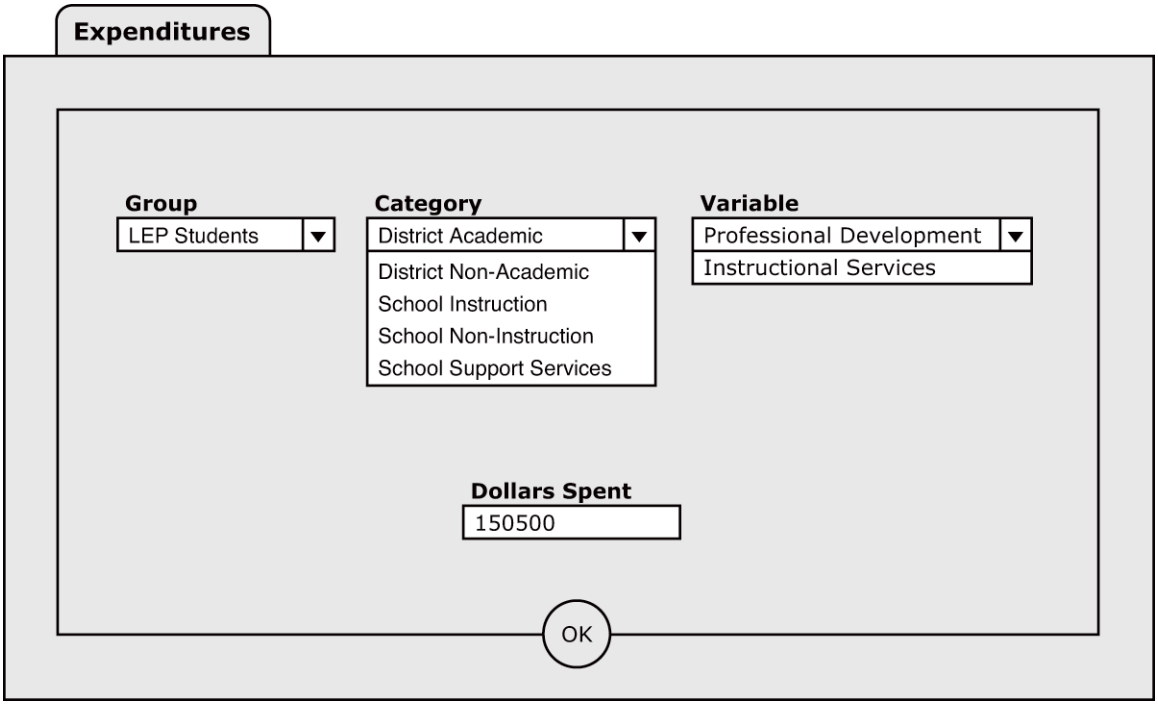


Figure 7. Expenditures wizard.

Integrating QSP and the Education Data Exchange Network (EDEN)

While first and foremost a tool for supporting school improvement, QSP has the potential to be integrated with EDEN and become an essential part of the education information system. QSP could serve as the baseline data engine feeding school and classroom level data into the information pipeline up to the district, state, and federal levels. Integrating QSP with EDEN would provide education program evaluators at all levels of the system with a network to capture, aggregate, and upload student-, classroom-, and school-level data and make them useful across all districts and states in the nation.

A 5th generation of QSP would include an EDEN tab and EDEN elements would be included as system variables. Specific functionality would be added so that reports on common data elements required at the school, district, state, and federal level could be generated. At each information transfer point in the system, the data from the prior level would be aggregated and mapped to the relevant standards. Existing QSP reports could be used with the level of aggregation highlighted (see Figure 8).

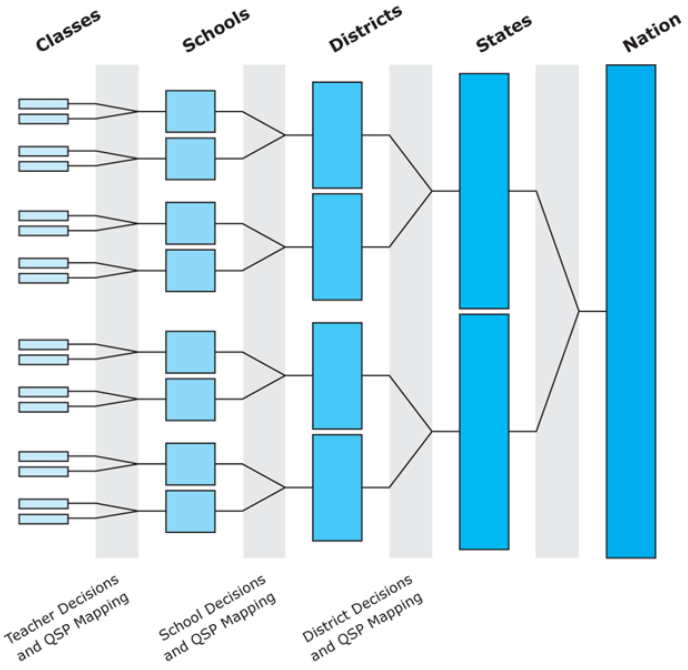


Figure 8. Model of data aggregation through the information system.

Assessment Builder

To improve teachers' assessment capabilities and the quality of classroom assessments, CRESST has developed an online authoring system that can be used to design complex performance assessments across subject areas and grade levels. The system enables teachers to access a database of reusable assessment objects that "know" what they are useful for and the purposes and contexts for which they are most likely to be valid. The assessment objects contained in the system database include information sources such as text descriptions, graphic illustrations, and animations of physical phenomena, and interactive simulations permitting investigation of phenomena. Teachers can combine these information sources with a variety of prompts and questions to create assessments covering a wide range of domain independent knowledge types and skills; e.g., explanation, recall, and application of conceptual and factual knowledge; problem solving; understanding of relations among concepts, facts, and skills; and transfer of knowledge to novel situations and problems. Assessments can also be structured to capture domain specific knowledge such as facts or concepts particular to the domain (see Figure 9).

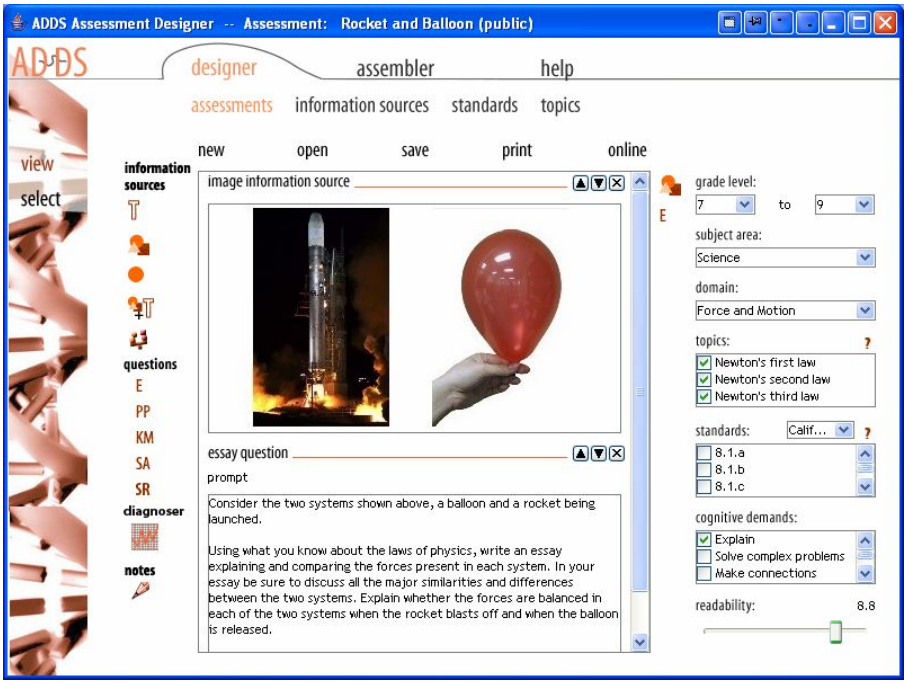


Figure 9. Interface for assessment builder.

In a 5th-generation tool the assessment builder could be incorporated into QSP. Classroom-based assessment data could be stored in the database and queried, analyzed, and reported on along with other data types in the system.

Lesson Planner

In a 5th generation of QSP there is the potential to add a planning tool for both teachers and students. Figure 10 shows the structure of the planning tool and its relationship to other elements in QSP. The planner would provide teachers with easy access to a number of resources for instructional planning: content and performance standards, goal setting capacity, the assessment builder, an archive of opportunity to learn (OTL) and lesson plan information, and an interactive community board. For students the planner enables students to engage in monitoring and evaluating their own learning. This practice is increasingly advocated as a means to developing metacognitive skills—skills students use to better understand their own thinking and learning processes (Black & Wiliam, 2004; NRC 2001; Sadler, 2001). An additional benefit of the planner is that teachers and student would have increased communication opportunities to frequently give and access feedback outside the instructional time of the classroom (see Figure 10).

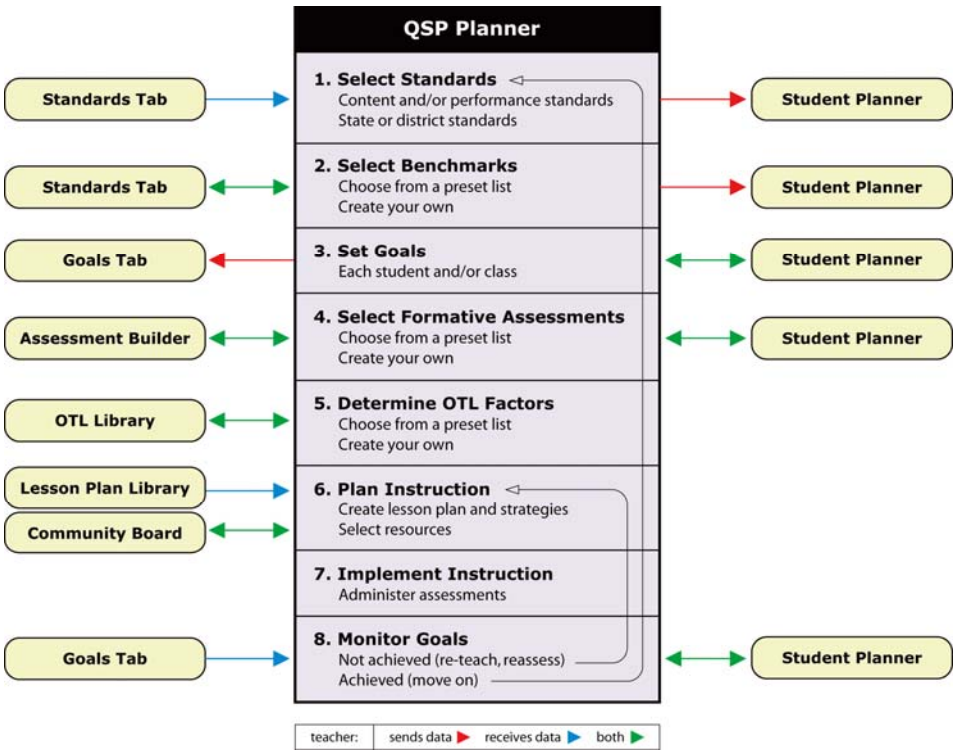


Figure 10. The teacher and student planning tool.

From the Standards tab in the gradebook, teachers would first identify the standards that the period of instruction is going to address and then determine benchmarks toward those standards. This information would be communicated to each student through the student planner, along with the goals that the teacher has created via the Goals tab for each student and/or the class as a whole. The students would be able to give feedback to the teacher about the goals and add some goals of their own.

Each student would be able to upload work drafts, homework, reflections, and questions for the teacher to the digital portfolio and through the student planner would be able to give evaluations of their work and ask questions of the teacher. Teachers could provide feedback to suggest improvements, to guide or redirect the students' thinking, and to correct misconceptions. Therefore, students would not always need to meet directly with teachers and could receive feedback in different locations at different times.

With the assessment builder, teachers could decide which assessments they will use to give them formative feedback that will guide their instruction to meet the standards. When the teachers have administered and interpreted the formative assessments, teachers would give individual feedback to each student via the

student planner, and students would be able to monitor and evaluate their own progress and goals and communicate their evaluation and plans to the teacher. To plan their instruction to meet the standards and goals, teachers may want to draw from the opportunity to learn (OTL) library, an archive of programs and strategies accumulated by them and their colleagues, as well as a similar archive of lessons. They may also use the community board, an interactive forum to ask questions and receive suggestions and advice from their colleagues about their instructional plans. During the period of instruction, teachers would administer formative assessments to determine student progress toward their objectives and to adjust curriculum and pedagogy if needed.

At the end of the instructional sequence, teachers and students would determine if the goals have been met and decide if further instruction is needed or if it is appropriate to move on to another set of standards and objectives. The planner feature would make QSP a comprehensive tool for instructional planning.

Speech Recognition Technology

Adult speech recognition technology is widely used in the commercial sector. Currently, with NSF funding, CRESST is collaborating with the computer science and electrical engineering departments to develop child speech recognition technology for use with literacy assessments.

A 5th generation of QSP could utilize both adult and child speech recognition technology. For example, rather than entering data manually, teachers could record student scores and their observations of student performance in the classroom. Students could directly record audio data into their portfolios. This could benefit all students, but particularly younger students who may not yet have the technology skills to include their data in the system.

Conclusion

QSP is a visionary tool that affords educators the opportunity to use data effectively for school improvement. From the outset of the project our intention, although ambitious, was to examine the impact of QSP on student learning. However, we were prevented from doing this by a number of factors. First, the time taken by districts to implement QSP was more extensive than originally anticipated because of the factors described earlier in this report. Second, school districts had an

urgent need to allow all willing schools to participate, which meant that there were considerable variations in schools' readiness to utilize QSP. Third, the instability of tests in many of our districts made comparisons difficult. Nonetheless, the study of the impact of QSP on student learning remains a future goal.

Although we were not able to examine the effect of QSP use on student learning, our implementation study showed that most participants had found QSP useful in performing data analysis and that many of them could see the potential of the tool beyond their current practices. Indeed, for the most part, those participants who were no longer using QSP thought that QSP's features and functions were useful. Our study also revealed that NCLB had provided the impetus for data analysis for most of our users, and with only a small number of exceptions, their analysis consisted of descriptive statistics of the performance of sub-groups of students. This may prove to be a useful starting point for focusing on data as a vehicle to improve student achievement, and may lead users to more sophisticated uses of data in the long run, but at present, we have concluded that the full complement of the features and functions of QSP is not being used.

Consider this scenario: At an end-of-the-year meeting, a group of fourth-grade teachers use QSP to begin an investigation that will help them make plans for their incoming class next school year. They begin by disaggregating the statewide reading scores by the subscales of the test. The teachers discuss the profile of strengths and weaknesses they see in the data and decide to see if the same strengths and weaknesses show up on the district-wide reading inventory. They choose a line graph to display the quarterly scores, by subscales, of the district reading inventory that the third-grade teachers conducted with all their students. Next, they use the scatterplot report to examine the relationship between the state and district reading scores and find that they are positively correlated.

However, they want more specific information. They use the score range report to show the ranges for the district-wide test. Beginning with the students who scored less than 30, they identify the specific students who comprise this group. They open up the digital portfolio and watch video of individual children reading a graded passage aloud, followed by the child's retelling of the narrative. They do this for several students, and they begin to see some patterns in performance, especially in the area of fluency and in the ability of the students to recall the narrative sequentially. For some of the students of particular concern, the teachers want to examine the rate of progress and go to the students' individual history to see the

scores from the state and local assessments in reading for the past 3 years. Some teachers decide to access the standards-based student profiles and progress reports from the third-grade teachers to see how students' performance was rated in third grade.

With the accumulated information, they begin to make plans for the incoming students. Using the Goals tab they identify specific goals for the year, establish the targets to achieve the goals, how often the targets will be assessed and how, and decide on the specific strategies they will employ to realize the targets. They will use the goals report to monitor progress toward meeting the goal.

The current uses of QSP that were identified in Section 4 of this report are at some considerable distance from the above scenario. While QSP users may appreciate the potential of the tool to perform the kind of analysis described in the scenario, essentially, the capacity of QSP is beyond the current capacity of most of its users.

Modifications to the tool to "scaffold" users have been identified in Section 5. Primarily, these would involve pre-determined questions and pre-built reports and would help those who are inexperienced in data use to get started. Nevertheless, longer-term considerations remain. Although most of our users thought the training they received was useful, it did not make up the shortfall between their data skills and the capacity of QSP. To achieve a better match between the skills of users and the capacity of the tool will require much more sustained support for training at all levels of the profession. In our study, we saw some promising examples of support beyond the initial training from both consultants and district personnel.

There are clearly areas where QSP's functionality can be improved, especially the speed of importing the data, the compatibility with other databases, and the speed of the software when the server is accessed by a large number of users simultaneously. All of these are described in Section 5. Additionally, there are a number of features that would expand the capacity of QSP. These features include value-added analysis and financial data analysis capabilities. Yet, before the benefits of a 5th generation can be fully utilized to improve student performance, the skills of the education professionals must be shored up through increased training and support in data use at all levels of the profession. Without this, the capacity of QSP will remain underutilized, and the potential benefits of the tool for students will not fully accrue.

References

Anderson, B., & Postl, B. (2001, April). *Using large data sets as a basis for school improvement*. Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA.

Baker, E. L. (2003). *From usable to useful assessment knowledge: A design problem* (CSE Tech. Rep. No. 612). National Center for Research on Evaluation, Standards, and Student Testing. Los Angeles: University of California.

Berne, R., & Stiefel, L. (1995). Student-level school resource measures. National Center for Education Statistics. Retrieved December 13, 2004, from http://nces.ed.gov/pubs97/web/97536-4.asp.

Black, P., & Wiliam, D. (2004). The formative purpose: assessment must first promote learning. In M. Wilson (Ed.), *Towards coherence between classroom assessment and accountability: Part II. 103rd yearbook of the National Society for the Study of Education* (1st ed., pp. 20-50). Chicago: University of Chicago Press.

Cawelti, G., & Protheroe, N. (2001). *High student achievement: How six school districts changed into high-performance systems*. Arlington, VA: Educational Research Service.

Choi, K., Seltzer, M., Herman, J., & Yamashiro, K. (2004). Children left behind in AYP and non-AYP schools: Using student progress and the distribution of student gains to validate AYP. National Center for Research on Evaluation, Standards, and Student Testing (CRESST). Los Angeles: University of California.

Cizek, G. J. (2000). Pockets of resistance in the assessment revolution. *Educational Measurement: Issues and Practices, 19*(2), 16-23, 22.

Choppin, J. (2002, April). *Data use in practice: Examples from the school level.* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA. Retrieved April 22, 2002, from http://www.wcer.wisc.edu/mps/AERA2002/data_use_in_practice.html

Cromey, A. (2000). Using student assessment data: What can we learn from schools? *Policy Issues, Issue 6.* (ERIC Document Reproduction Service No. ED452593)

Cotton, K. (1992). *Site-based management*. School Improvement Research

Series. (SIRS) (http://www.nwrel.org/scpd/sirs/7/topsyn6.html).

Glickman, C. (1998). *Renewing America's schools: A guide for school-based action*.

Jossey Base Education Series.

Herman, J., & Gribbons, B., (2001). *Lessons learned in using data to support school inquiry and continuous improvement: Final report to the Stuart Foundation* (CSE Tech. Rep. No. 535). Los Angeles: University of California, National Center for Research on Evaluation, Standards, and Student Testing.

Johnson, J. H. (1997). *Data-driven school improvement* (Report No. EDO-EA-97-1).

ERIC Digest, Number 109. University of Oregon: ERIC Clearinghouse on Educational Management. (ERIC Document Reproduction Service No. ED401595).

Khanna, R., Trousdale, D., Penuel, W. R., Kell, J. (1999, April). *Supporting data use*

among administrators: Results from a data planning model. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada.

King, R. A., & MacPhail-Wilcox, B. (1994, Summer). Unraveling the production equation: The continuing quest for resources that make a difference. Journal of Education Finance, *20,* 47-65.

Lee, J., Herman, J. & Mitchell, D. (2001). *Final report to the Stuart Foundation: Quality School Portfolio training initiative.* CSE report.

Mastergeorge, M., Hammersley, D., Fennell, B.,& Barela E., *Final report to the Stuart Foundation: Quality School Portfolio training initiative.* CSE report.

Monk, D. H. (1992, Winter). Education productivity research: An update and assessment of its role in education finance reform. Educational Evaluation and Policy Analysis, *14,* 307-332.

National Research Council. (2001). *Knowing what students know: The science and design of educational assessment.* Committee on the Foundations of Assessment. J. Pellegrino, N. Chudowsky, & R. Glaser (Eds.). Washington, DC: National Academies Press.

North Central Regional Educational Laboratory. *Using data to bring about positive results in school improvement efforts*. Oakbrook, Illinois: Author, December 2000.

Rubenstein, M.C., & Wodatch, J. K. (2000). *Stepping up to the challenge: Case studies of educational improvement in title I secondary schools.* U.S. Department of Education, Office of the Under Secretary, Planning, and Evaluation Service, Elementary and Secondary Education Division, Washington, DC.

Snipes, J., Doolittle, F., & Herlihy, C. (2002). Foundations for success: Case studies of how urban school systems improve student achievement. Washington, DC: Council of the Great City Schools. Retrieved January 18, 2005, from http://www.cgcs.org/pdfs/Foundations.pdf

Stiggins, R. J. (2002, June). Assessment crisis: The absence of assessment for learning. *Phi Delta Kappan, 83*(10), 758-765. Retrieved August 25, 2004, from http://www.pdkintl.org/kappan/k0206sti.htm

Teddlie, C., & Reynolds, D. (2000). *The international handbook of school effectiveness research.* London: Falmer.

Thorn, C. A. (2001, November 19). Knowledge management for educational information systems: What is the state of the field? *Education Policy Analysis Archives, 9*(47). Retrieved August 25, 2004, from http://epaa.asu.edu/epaa/v9n47/

Tognieri, W., & Anderson, S. E. (2003). *Beyond islands of excellence: What districts can do to improve instruction and achievement in all schools.* Washington, DC: Learning First Alliance. Available from Learning First Alliance Web site, http://www.learningfirst.org/publications/districts/

Wade, H. H. (2001). *Data inquiry and analysis for educational reform* (Report No. EDO-EA-01-10). ERIC Digest, University of Oregon: ERIC Clearinghouse on Educational Management. (ERIC Document Reproduction Service No. ED461911).

Ward, M. (1998, April). *A systems approach to middle school evaluation: Guilford county schools' formative approach*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

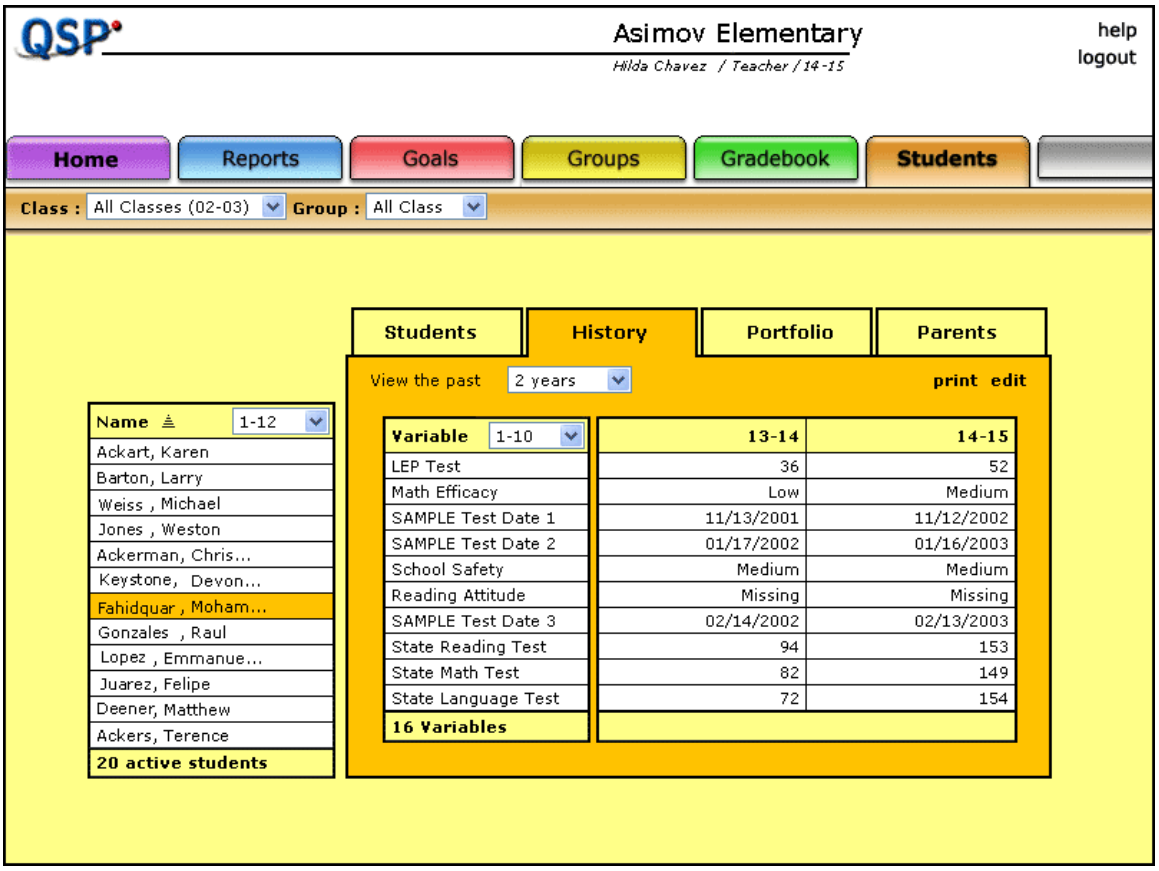
Wayman, J. C., Stringfield, S., & Yakimowski, M. (2004). *Software enabling school improvement through analysis of student data* (Rep. No. 67). Baltimore: Johns

Hopkins University, Center for Research on the Education of Students Placed at Risk (CRESPAR).

Webb, N. L., Mason, S., Choppin, J., Green, L., Thorn, C., & Watson, J.,(2001). Study of electronic information systems in Milwaukee Public Schools. Second-Year Report. Technical Report to the Joyce Foundation. Madison: Wisconsin Center for Education Research.

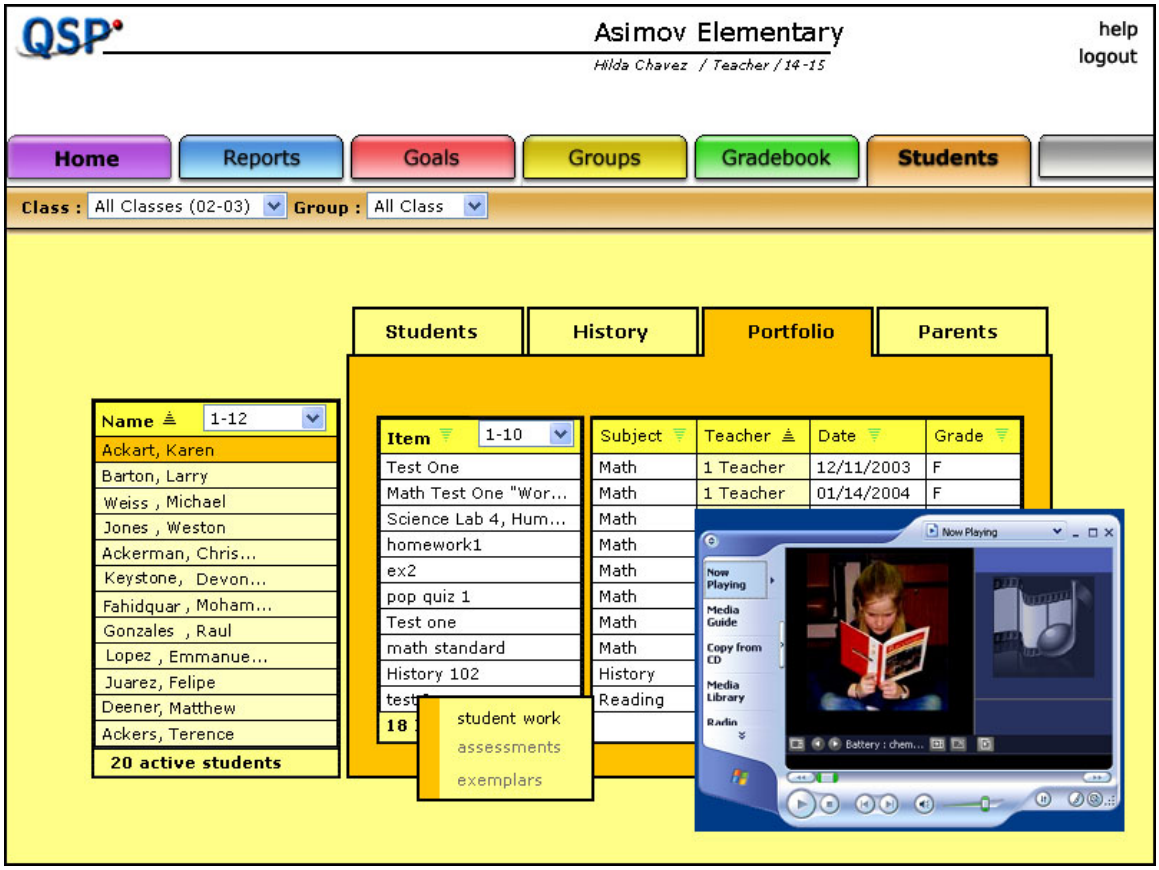
APPENDIX A

HISTORY SUBTAB OF THE STUDENTS TAB



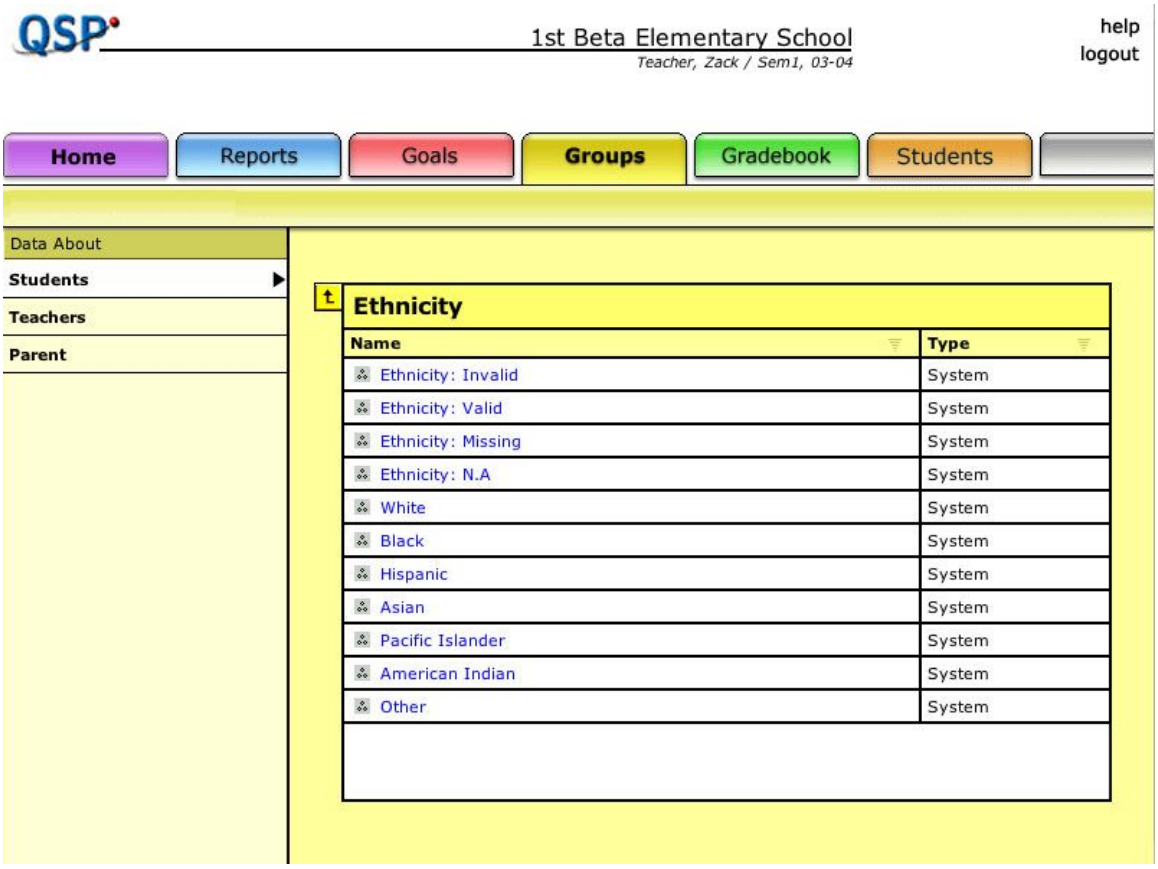
APPENDIX B

DIGITAL PORTFOLIO



APPENDIX C

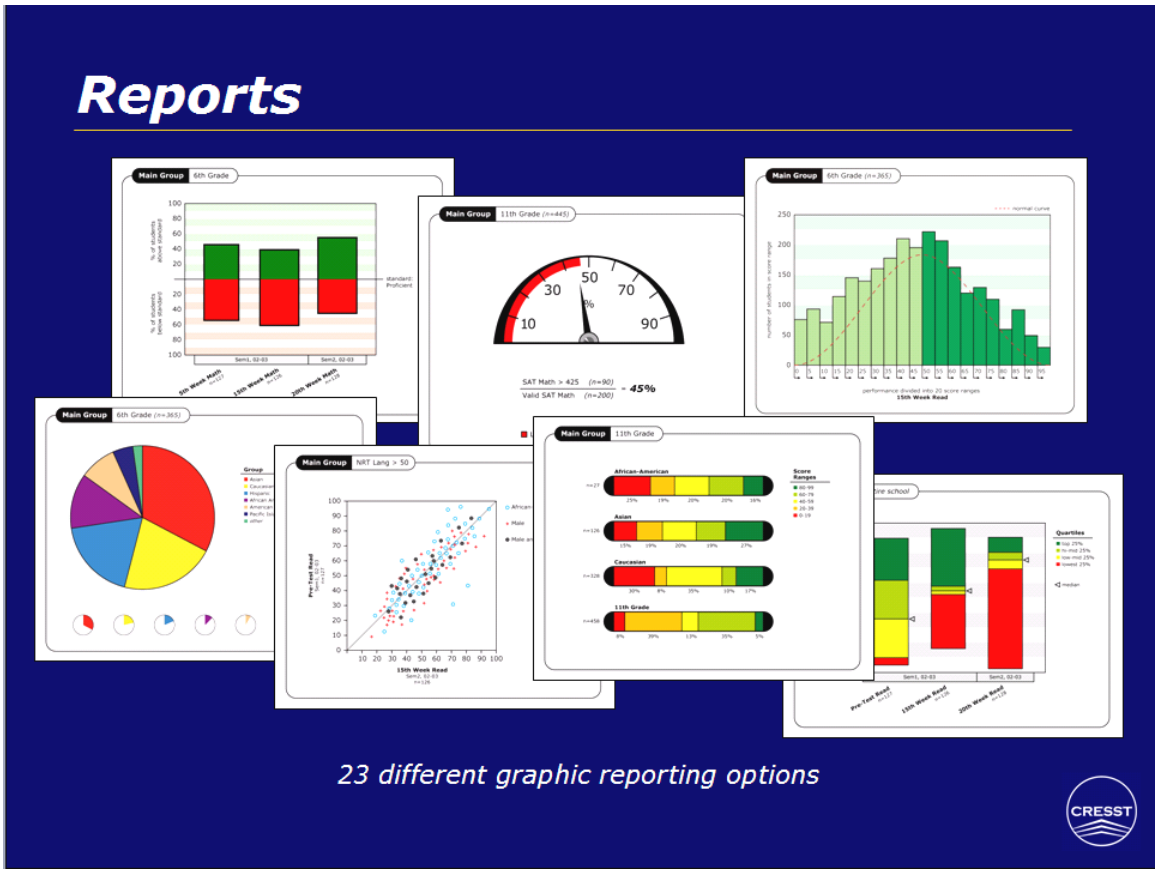
GROUPS TAB



APPENDIX D

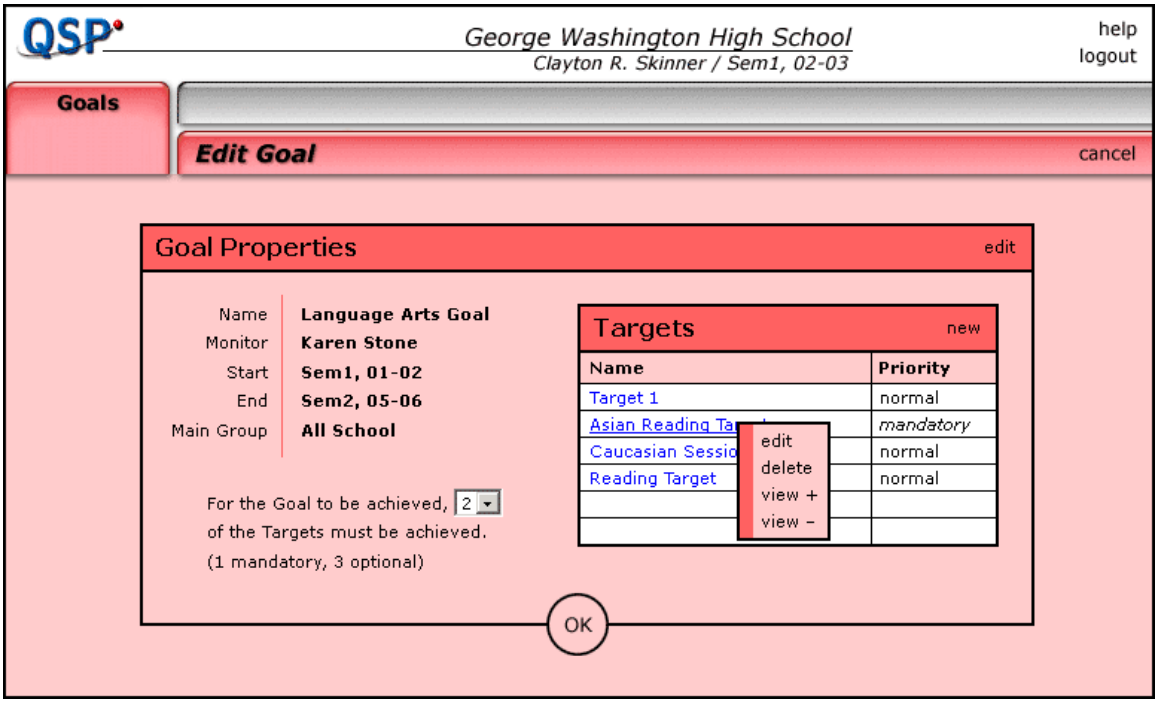
SAMPLE REPORTS FROM 24

REPORTING OPTIONS



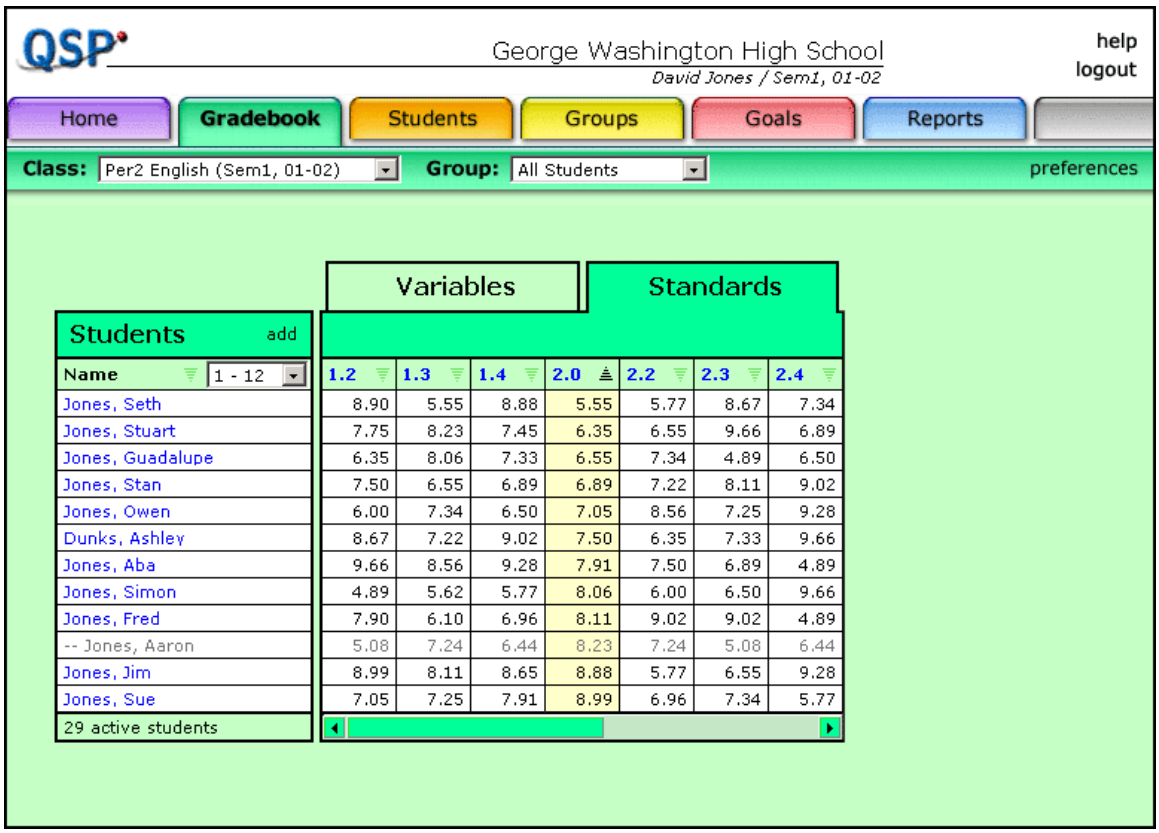
APPENDIX E

GOALS TAB



APPENDIX F

STANDARDS SUBTAB OF THE GRADEBOOK



Publications from this Award

Chen, E., Heritage, H. M., & Lee, J. (July, 2005). Identifying and monitoring students' needs with technology. *Journal of Education of Students Placed at Risk.* University of Louisville, KY.

Heritage, H. M. (2004). Digital portfolios for accountability. Insight, 4. The Institute for the Advancement of Emerging Technologies. Available from www.laete.org/insight/

Heritage, H. M., & Chen, E. (May, 2005). Why data skills matter in school improvement. *Phi Delta Kappan*.

Heritage, H.M., & Yeagley, R. (2005). Data Use and School Improvement: Challenges and Prospects in Herman, J.L., & Haertel, E., (eds.). *104th yearbook of the National Society for the Study of Education.* Chicago: University of Chicago Press.

Conference Presentations

Heritage, H. M., & Lee, J. J. (2004, March). *The Quality School Portfolio: A new web-based system to support data informed decisions*. Secretary's No Child Left Behind Leadership Summit. St. Louis, MO.

Heritage, H. M., & Yeagley, R., (2004, March) *Creating a network for data: The integration of the Quality School Portfolio (QSP) and the performance-based data management initiative (PDBMI).* Secretary's No Child Left Behind Leadership Summit. St. Louis, MO.

Heritage, H. M., & Yeagley, R., (2004, February) *Creating a network for data: The integration of the Quality School Portfolio (QSP) and the performance-based data management initiative (PDBMI).* Presentation at the MIS - National Center on Education Statistics Conference, Portsmouth, VA.

Heritage, H. M., & Lee, J. J., (2003, September). *The Quality School Portfolio: A new web-based system to support data informed decisions.* Presentation at the Ministry of Education, Mexico City, Mexico.

Heritage, H. M. (2003, July). *New technology and new skills.* Keynote address, National Forum on Education Statistics, Washington, DC.

Heritage, H. M., & Lee, J. J. (2002, June). *The Quality School Portfolio: A new web-based system to support data informed decisions*. Presentation to American Association of School Administrators Annual Conference, Denver, CO.

Lee, J. J. (2004, September). *Technology tools and what they tell us.* Presentation at the annual CRESST conference. National Center for Research on Evaluation, Standards, and Student Testing (CRESST). Los Angeles: University of California.

Lee, J. J. (2004, June). *The Quality School Portfolio: A web-based decision support tool.* Presentation at the Colorado Consortium on Data-Driven Decision (C2D3) Conference. Denver, CO.

Lee, J. J. (2005, January). *The Quality School Portfolio decision support tool.* Presentation at the Alaska State Department of Education Annual NCLB Conference, Anchorage, AK.

Heritage, H. M. & Lee, J. J. (2004, January). *The Quality School Portfolio: A web-based decision support tool.* Presentation at the Alaska State Department of Education NCLB Conference, Anchorage, AK.

Heritage, & Lee, J. J. (2003, September). *The Quality School Portfolio: A new web-based system to support data informed decisions.* Presentation at the NCES Summer Forum and Data Conference, Washington, DC.