All in the Palm of Your Hand:
Lessons from One School's First Steps with Handheld Technology for Literacy Assessments

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Introduction

Lewis & Clark Elementary sits on a modest street in Ohio, not far from the canal. Railroad tracks separate the surrounding neighborhood from the highway, which runs mid-way between the school and the center of town. Tall, close-set houses of World War II styling border the school in all directions. During school hours, only light traffic flows on the street outside the front door. Inside, a small group of teachers are taking important first steps with twenty-first century tools that aim to strengthen the relationship between teachers, data, and student achievement. As part of a pilot project, these teachers are using handheld computers (Palm Pilots) and the Internet to assess their students' literacy skills, view the data in graphical displays, and identify their students' needs and strengths.

This report chronicles and summarizes our glimpse into this school's exploration of new technology for literacy assessments. "Lewis & Clark" (or L&C for short) is a pseudonym, one we have chosen for the school out of respect for the pioneering spirit evident in the teachers, principal, and district staff we met there. In the spring of 2003, we were graciously invited to interview members of the L& C team who were participating in a pilot study. Conducted and evaluated by researchers at John Carroll University, that study (which we will call the "Palm/TPRI study") explored the use of Wireless Generation's TPRI (Texas Primary Reading Inventory) assessment software on the Palm handheld computer. Our independent series of interviews, overlaid on the Palm/TPRI study, gave us an opportunity to gather cutting-edge insights about potentials for handheld computers in our MacArthur group's vision of technology-based information infrastructures for schools. We would like to thank all who helped us learn from this experience, including Kathy Roskos (Ohio Dept. of Education, now returned to the faculty of John Carroll University), Cathy Rosemary (John Carroll University), Larry Berger (Wireless Generation), Monica Vincent (Wireless Generation) and the dedicated L&C adventurers.

Section 1. The Basics:
Demographics, Chronology, Description of the Tools (TRPI, Palm and Website Displays), Teacher Sketches, Professional Development, and Our Interviews

1.01 Demographics

Lewis & Clark Elementary is a small school, with 254 students in grades K – 5. There are two classrooms at each grade. The student population is generally low SES, with 50 - 60% of the children on free lunch. The students are primarily white, and there are no ELL (English Language Learners) students. The surrounding city is approximately 50 miles from Cleveland, OH.

1.02 Chronology

The principal of L & C first learned about the Palm/TPRI study in December of 2002. She and the district literacy specialist (DLS) were already involved in a literacy-coaching project, funded by the state of Ohio and run by Cathy Rosemary of John Carroll University. That project, in its third year, had introduced a new component for 2002 – 2003: the ELLCO (Early Language and Literacy Classroom Observation) kit. Using the ELLCO kit, the DLS conducted classroom observations and then met individually with teachers to help them improve their strategies for literacy. Initial observations occurred in the fall with paper-and-pencil tools for recording the observations. By December 2002, plans were already underway for the DLS to use a Palm computer and keyboard for the Spring 2003 observations. (This plan was implemented but lies outside the scope of this report.)

As we learned in our interviews, the principal of L & C is a strong proponent of new technology. During the December 2002 ELLCO meeting, when Cathy Rosemary mentioned her plans for the Palm/TPRI study, the principal became immediately interested in involving her school. She brought the idea to the L & C teachers in January 2003, and they agreed to add the Palm/TPRI study to their spring involvement with the ELLCO project.   One teacher each from kindergarten, first, and second grade classroom was eligible to participate, along with the Reading Recovery teacher and the special education teacher. (Funding limits for the Palm/TPRI study restricted participation to these five teachers from L & C Elementary. Two other schools participated in the Palm TPRI pilot study, but our interviews are limited to the L & C site.)

The L & C teachers agreed to participate with only sketchy information about plans for the Palm/TRPI study. The five teachers, principal, and the DLS were scheduled to meet with Cathy Rosemary at the beginning of February 2003 to learn more about the project. Unfortunately, harsh winter weather forced the cancellation of that meeting. Despite this cancellation, the entire L & C team (teachers, principal, and literacy specialist) drove three hours to Columbus on February 7 for an all-day training on the Palm computer and the TPRI assessment.

We had our first contact with the DLS following that training session. Cathy Rosemary arranged this contact, following several conversations we had with her and Kathy Roskos (Ohio Department of Education), beginning in Fall 2002. In those conversations, we discussed the shared interests of our MacArthur project and the Ohio investigations of Palm computers for literacy assessments. We agreed that our MacArthur group's independent lens on these initial Palm/TPRI investigations could prove valuable for the Ohio team and for us, and Cathy Rosemary chose L & C Elementary as our window onto the Ohio project.

By late February 2003, the DLS had spoken with the principal and teachers at L & C about our MacArthur project's interest in their work. The L & C team agreed to include our study on top of their already-heavy research involvement.

In March 2003, the L & C team conducted their first round of literacy assessments using the Palm/TPRI tool. They conducted their second round of assessments in May 2003.

This is the basic chronology of events that gave rise to this report. In the sections that follow, we will add more details about the timing of our interviews and other relevant events. For now, the figure below gives an overview of key events.
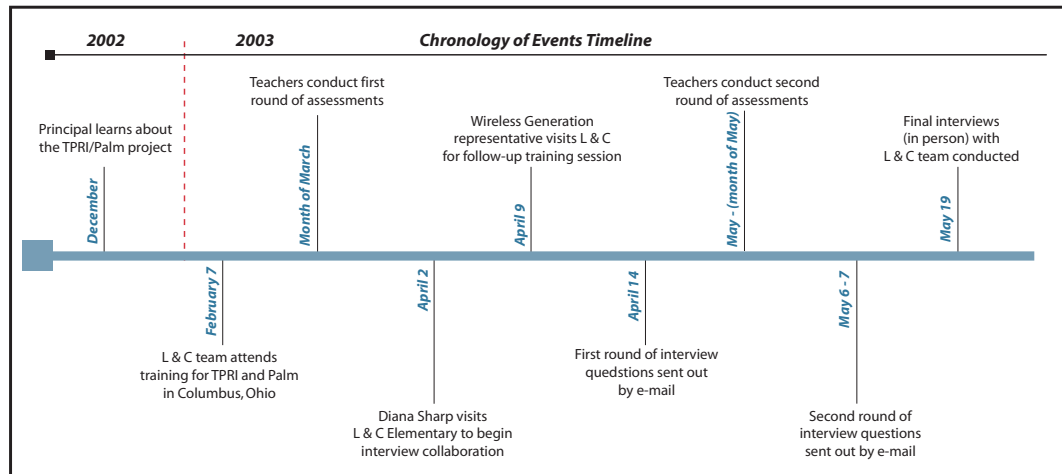
1.03 The Texas Primary Reading Inventory (TPRI)

An initial version of the Texas Primary Reading Inventory was developed in 1997 by the English and Language Arts Curriculum Department at the Texas Education Agency. The current, revised version was created by the Center for Academic Reading & Skills (CARS) at the University of Texas-Houston Health Science Center and the University of Houston. With recent federal funding from the Interagency Educational Research Initiative (IERI), CARS researchers are conducting their own studies of the TPRI administered with Wireless Generation's Palm system.

In depth information about the TPRI assessment is located at the following website: www.tpri.org. In this section, we will highlight features of the TPRI components and administration procedures that are most related to the interview responses we gathered from the L & C team.

- The TPRI is primarily designed to be administrated in a one-on-one setting. The exception to this arrangement is the administration of the second grade spelling words in the inventory portion of the test. Teachers can dictate these words to groups of students or the entire class and score them later.

- The TPRI is designed to quickly gather data from each student across several reading and spelling skill areas with a short screening test. Students who do not pass the screening are tested on additional items across selected skill areas. However, teachers can choose to

administer to the full inventory to any child. The TPRI authors (Foorman, Fletcher, Francis, Carlson, Chen, Mouzaki, Schatschneider, Wristers, & Taylor, 1998) note, " (p. 11) the screen is designed to identify children who are not likely to have reading problems. A child who can meet criteria on the screen is at low risk for reading difficulties."

- The inventory sections of the TPRI are given via a branching administration. For example, students who do not pass the rhyming section of the kindergarten inventory (Inventory 1) do not advance to Inventories 2 – 7. However, all students, regardless of whether they are given the full set of sub-tests, take either the listening comprehension or oral passage reading and comprehension tests.

- The kindergarten assessment is given at the middle and end of the school year. Fletcher et al., (1998), explain that this allows children to acclimate to school before they are assessed for potential reading difficulties. The first grade assessment is given at the beginning and end of the school year, and may also be given mid-year. The second grade assessment is given at the beginning of the school year, and may also be given mid-year and end-year.

- The TPRI is a grade-level-specific set of assessments. Teachers only have access to the particular set of test items and materials for their grade level. There is more overlap between kindergarten and first grade tests than between first grade and second grade tests. Here is an overview of the test items by grade level:

Kindergarten Screening. The kindergarten screening has 10 letter-sound identification items and 8 phonological awareness (blending task) items.

Kindergarten Inventory. These test items are grouped as follows:

Book and Print Awareness: This is a warm-up activity that is not scored on the Palm. (The kindergarten teacher in the current study skipped these test items, because she had her own Concepts about Print assessment.)

Inventory 1: Rhyming (5 items)
Inventory 2: Blending Word Parts (5 items)
Inventory 3: Blending Phonemes (5 items)
Inventory 4: Detecting Initial Sounds (5 items)
Inventory 5: Detecting Final Sounds (5 items)
Inventory 6: Letter Names (26 items)
Inventory 7: Letter Sounds (10 items)

Kindergarten Listening Comprehension. For the listening comprehension test, the teacher reads a passage, and the student responds to three questions on explicit information and two questions on implicit information.

First Grade Screening. The first grade screening changes according to when it is administered, as follows:

Screening 1: Letter Sound identification (beginning of grade 1 administration)
Screening 2: Word Reading, test 1 (beginning of grade 1 administration)

Screening 3: Blending Word Parts (beginning of grade 1 administration)

Screening 4: Word Reading, test 2 (middle and end of grade 1 administration)

Screening 5: Blending Phonemes (middle and end of grade 1 administration)

For the Word Reading tests, children look at a card with the words printed on it. The teacher reveals the printed words one at a time for children to read. The Blending tests are oral ones. For example, for the Blending Phoneme tests, the teacher tells the student, "Listen to me as I say some words very slowly. If I say 's' 'at', I know the word is 'sat'." Sample items that we saw in our interviews included the words "mellow" and "abound."

First Grade Inventory. These test items are grouped as shown below, with 5 test items per inventory.

Inventory 1: Blending Word Parts

Inventory 2: Blending Phonemes

Inventory 3: Detecting Initial Sounds.

Inventory 4: Detecting Final Sounds

Inventory 5: Initial Consonant Substitutions.

Inventory 6: Final Consonant Substitutions

Inventory 7: Middle Vowel Substitutions

Inventory 8: Initial Blending Substitutions

Inventory 9: Blends in Final Positions

As in the kindergarten inventory, Inventories 1 - 4 are oral tests. For example, for Inventory 3, the teacher says, "What is "nice" without the "n"? What is flight without the "f"? What is crest" without the "c"? For Inventories 5 – 9, the teacher and student use a magnet board (see the figure below). For example, for Inventory 5, the teacher says, "These two letters make the sound "og". Can you make the sound "fog"? Can you make the sound "dog"?
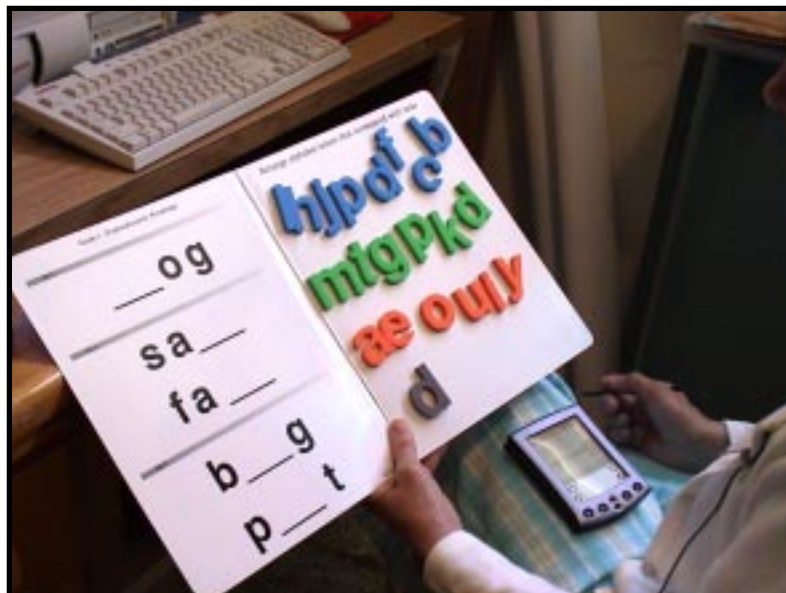
First Grade Word List, Passage Reading, and Comprehension Tests. The student's score on the word reading test determines which passage the student will get for the Passage Reading section. If the student scores below a criterion on the Word List test, then she will move to the same listening comprehension sub-test used for kindergarten students.

The students' time to read the passage and the students' word reading accuracy combine to give a score of Words Correct Per Minute (WCPM). The passage is also rated as to its difficulty for the student. For these ratings, the test uses the labels "Frustrational level", "Instructional level", or "Independent level."

Comprehension questions target information in the passage used for Oral Passage Reading. (Unless the student scored low enough to move back to a Listening Comprehension level.) There are three questions on explicit information and two questions on implicit information.

Second Grade Screening. This screening consists solely of a brief word reading task. (This test is different from the word reading test used to determine the passage for oral reading.) There is no screening for the end of the year administration.

Second Grade Inventory. Apart from the word reading, passage reading, and comprehension questions (see below), the inventory for second grade is a list of 20 words that children write down as the teacher dictates them, with a sample sentence for each word. These words are grouped into four pattern types, with five test words for each type: 1) CVC, CVCe, R-controlled vowels and Blends, 2) Long vowels, Digraphs, Orthographic Patterns, 3) Blends, Digraphs, Compounds, Past tense, Homophones…4), Plural, Digraphs, Blends, Consonant Doubling, Past tense inflectional endings…

Second Grade Word List, Passage Reading, and Comprehension Tests. The word reading, oral passage reading, and comprehension test items are as described above for first grade. The passage we saw in our interview was an expository passage about penguins.

• Note that according to the TPRI website (www.tpri.org), an updated 2003-2004 edition of the TPRI will include oral fluency passages to be administered every six weeks in grades 1 and 2. This is a major change from the two or three-time-a-year administration procedures for the current TPRI edition used by the L & C teachers. The 2003-2004 edition of the test will also include vocabulary sub-tests.

1.04   Wireless Generation's mClass Palm Tool for the TPRI

Wireless Generation's mClass Palm tool for the TPRI allows teachers to read test scripts and oral test items directly from the Palm screen. (Students still see all of the written items using the same materials described above – word cards, passage cards, and magnet board.) The tool automatically branches to the right sub-test for the right administration period, based on child performance. Most importantly, teachers score the test items directly on the Palm during the test administration. The tool calculates the results, so that at the end of each subtest, teachers can instantly see whether the child is "developed" or "not developed" on the skills tested.

After administering the test, teachers use an internet-enabled computer, with mClass software installed, to hot-sync the Palm to the password-protected TPRI website. Using the website, teachers can immediately see graphs and charts of student performance. The website also contains a TPRI activity guide with suggestions for instructional activities that

target skills on the test. (This activity guide is also available in print form with the teacher's test materials.)

Below we will outline key functionalities of screens that appear on the handheld. Afterwards, we will give an overview of data display screens from the Palm/TPRI website.
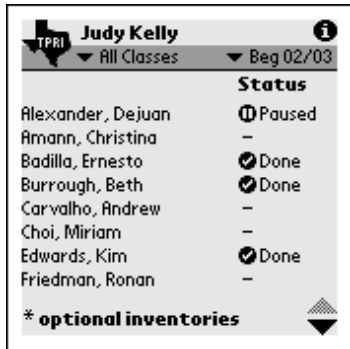
Palm screens. The Status screens on the Palm let teachers view their list of students and see which students have completed the TPRI screenings andinventories. It is possible for teachers to pause in the middle of a TPRI administration, and the Status screen will indicate when this has happened with a "paused" notation.
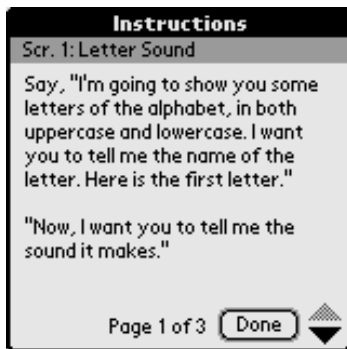
Instruction screens contain all the text that teachers need to read as they give test instructions. For example, for the letter-sound screening at first grade, teachers can read the following off the Palm screen:

Say, "I'm going to show you some letters of the alphabet, in both uppercase and lowercase. I want you to tell me the name of the letter. Here is the first letter." "Now, I want you to tell me the sound it makes."

Scoring screens for most of the screening and inventory tests contain the word or letter that children are identifying, and a place for the teacher to mark "0" if the child answers incorrectly, or "1" if the child answers correctly. These screens may also contain scoring or administration information for the teacher, such as "If the child does not know the name or sound of a letter, for the practice items only, tell the child the correct name and sound of the letter."
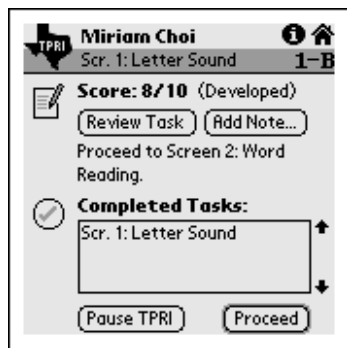
Icons at the top of each screen allow teachers to return to previous screens or return to the class list. There are arrows at the bottom of the screen that teachers can tap, using the stylus, to move to additional items. Tapping these arrows accurately proved to be difficult for some of the teachers in our study (as we will describe later); fortunately, teachers can use the Palm scroll buttons instead of the arrows on the screen to move between screens.

Teachers can change their scoring of any item during the test administration, simply by tapping the alternate scoring choice. At the end of each subtest, there is a "done" button.

Tapping the "done" button takes teachers to a Results screen. Here, teachers see the scored test result (e.g., "Score 8/10 - Developed). On this screen, they can also choose to "Review task." This choice takes them back to the scoring screens, where teachers have another change to correct scoring errors.

The Results screen also contains an "add note" button. Tapping this button takes teachers to a blank screen where they can write a note, using the stylus. Notably, the second grade teacher was the only teacher who reported using this feature, and she reported that she tried it out " just because I knew that you'd ask me that so I wanted to see how it would work." Indeed, even the manual for the mClass TPRI tool sounds somewhat ambivalent about the perceived usefulness of this feature, stating "If you have time and it won't disrupt the flow of the assessment, you may add a quick note on student performance by tapping the Add Note button the Results screen."

At the bottom of the Results screen for each subtest, there is a button marked "Proceed." Tapping this button takes teachers to the next subtest. Once teachers tap the "Proceed" button, they can no longer change the scoring of any item on the previous subtest.

Choice screens enable teachers to choose whether to give additional inventory tests to students who pass the screening, or move directly to the word list, passage reading, and comprehension subtests.

The screens for the oral reading passages contain several special features. Teachers tap a "start" button to start a timer when the student begins reading. Teachers have a copy on the Palm screen of the same text that the student reads from a passage text card. Teachers tap a word on the screen whenever the student makes omission, substitution, mispronunciation, reversal, or hesitations of longer than three seconds. Tapping a word makes a line appear through it on the screen. The screen shows the total number of errors as they are marked, next to a label of miscalls. If the child's time and errors indicate that he is reading at a frustrational level, the screen flashes a "FRU" code. At that point, the teacher taps the "done" button to go to an easier passage.

Website screens. The TPRI website contains three main sections: Analyze, Plan, and Communicate. The Plan section provides access to the TPRI intervention activities guide, and the Communicate section offers templates for letters to parents, based on individual student test data. None of the teachers at L & C used the Plan or Communicate sections of the website, so we will limit our further description to the Analyze section.

In the Analyze section of the website, teachers can choose to view data in several ways. The Class Summary page displays data in a chart format, with student names as row headers, and test names as column headers.

TexasPrimary**Reading**Inventory

TPRI

wireless generation

| TPRI HOME | ANALYZE | PLAN | COMMUNICATE |

CLASS REPORTS: Summary   Inventory Tasks   Accuracy   Fluency   Printer-Friendly

Summary

Smith

Beginning of Year   02/03

| | Phonemic Awareness | | | Graphophonemic Knowledge | | | Reading Comprehension | | |

Grade 1

Student Name	Scr. 1: Letter Sound	Scr. 2: Word Reading	Scr. 3: Blending Word Parts	Inv. 1: Blending Word Parts	Inv. 2: Blending Word Parts	Inv. 3: Detecting Initial Sounds	Inv. 4: Detecting Final Sounds	Inv. 5: Initial Consonant Substitution	Inv. 6: Final Consonant Substitution	Inv. 7: Middle Vowel Substitution	Inv. 8: Initial Blending Substitution	Inv. 9: Blends in Final Position	Story #	Grade Level	Reading Accuracy Level	Reading Fluency Rate (WPM)	Explicit Questions	Implicit Questions
Brown, John	9	0	6	5	5	4	3	5	5	5	5	4	1	1	LIS	N/A	2	2
Baker, Emily	10	6	N/A										4	1	IND	20	3	2
Dixon, Richard	10	2	2	5	4	3	0	5	5	4	4	4	4	1	IND	18	2	2
Givens, Anna	10	1	3	5	4	4	3	5	5	5	4	3	2	1	INS	10	2	2
Harrison, Megan	8	1	3	5	5	0	0	5	5	5	4	4	1	1	LIS	N/A	3	2

The students' scores appear in color. Red indicates that a skill is still developing; a green score indicates that a skill is developed. The sample page from the TPRI manual above is slightly different from the revised displays that the L & C teachers saw, in that their displays listed scores as "total correct/total possible", for example, 3/5.

Note that the display above shows scores for a single administration period (e.g., beginning of the year) only. If teachers want to look at an individual student's history for the year, they can click on the student name and go to a Student Summary page, like the one below.

TPRI

wireless generation

| TPRI HOME | ANALYZE | PLAN | COMMUNICATE |

CLASS REPORTS: Class Summary   Printer-Friendly
                                                           Student Record Sheet

Annie Walters
Smith

Annie Walters
02/03

(Intervention Activities for This Student)

Screening Summary	Beginning of Year	Middle of Year	End of Year
Screening 1: Letter Sound	10 / 10 D		
Screening 2: Word Reading	0 / 8 SD		
Screening 3: Blending Word Parts	1 / 6 SD		
Screening 4: Word Reading			
Screening 5: Blending Phonemes			

(View Component Detail)

Inventory Summary: Phonemic Awareness	Beginning of Year	Middle of Year	End of Year
Inventory Task 1: Blending Word Parts	0 / 5 SD		
Inventory Task 2: Blending Phonemes	0 / 5 SD		

Teachers can also view data in graph format. The Inventory Tasks page displays graphed data as shown below.
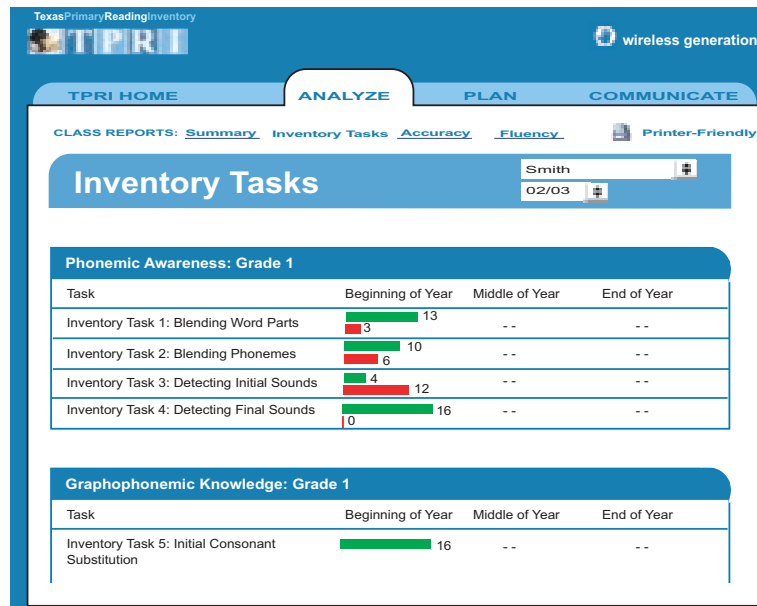
Note that this page displays data only for students given the inventory tasks. Green bars show the number of students who "pass" an inventory task, and red bars show the number of students who havenot yet mastered the task. Unlike the Class Summary page, this screen allows teachers to look at data from each testing period simultaneously.

Two other graphical display pages focus on the data from the oral passage reading test. The Reading Accuracy page shows with pie charts how many students were labeled as reading at the frustrational, instructional, or independent level for the passages that were assigned.
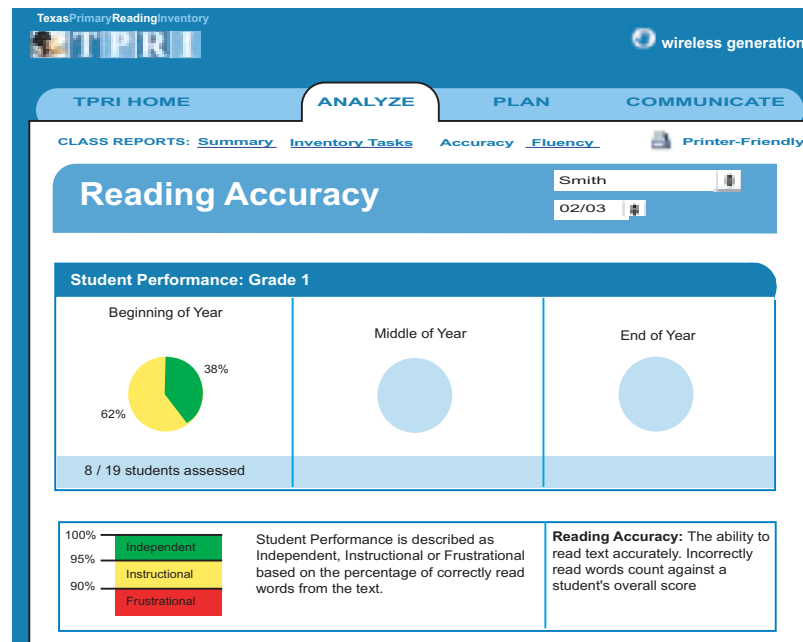
(Recall that passages are assigned based on each student's word-list reading performance.)

Pie charts are also used to display the scores for reading fluency, as shown below. (Reading fluency is defined as Word Read Correctly X 60 (seconds)/number of seconds to read the passage.
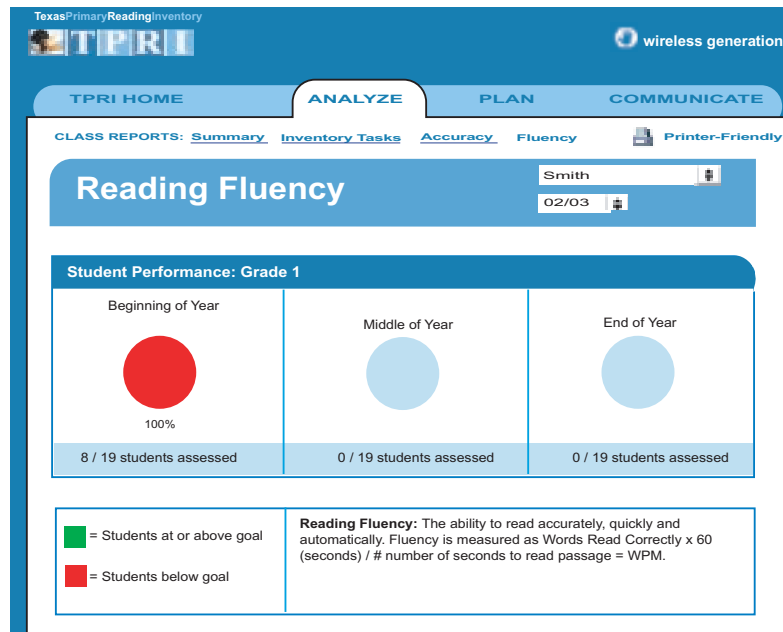
As shown in the screens above, a drop-down class menu (here labeled "Smith") would allow a principal to switch screens between different classes to compare data. The L & C principal mentioned that if she were going to compare data across classes, she would print out the separate class screens, and put the print-outs next to each other on her desk, so that she could view them simultaneously.

1.05 Teacher Sketches

- The kindergarten teacher at L & C was in her sixth year teaching at the school and her sixteenth year of teaching kindergarten.

- The first grade teacher was in her fourth year teaching at the school. She had been teaching first grade for 27 years.

- The second grade teacher was described by her colleagues as "the young one." This was her first year of teaching. The other teachers looked to her as the "technology expert."

- The Reading Recovery teacher was an experienced first grade teacher, in her fourteenth year of teaching. This was her third year of teaching Reading Recovery.

- The Special Education teacher was in her fourth year at L & C. She had been teaching Special Education in the district for twelve years.

1.06 Professional Development

> "…number one, we didn't have enough time to practice with the TPRI itself and number two, we didn't have enough time to practice on the Palm. But, you know, we put together the best we could. And then to accommodate that, they had a

person come from Wireless Generation that was trained in the Palm after all of our teachers had conducted one round." (DLS)

All of the participants in the project, including the project leaders, knew from the start that the professional development resources for this pilot implementation would not be ideal. However, the team forged ahead, so that the project could get underway during the spring of 2003. The one-day training in Columbus on February 7 was an all-day session. For the L & C teachers, principal, and DLS, that meant all-day plus six hours of driving.

Teachers spent the first part of the training day learning about the TPRI. They practiced with the TPRI, using traditional paper/pencil administration tools:

> ***Interviewer:*** *Did they do TPRI paper and pencil?*
>
> ***DLS:*** *Yes…but very quickly, not the whole thing.*

Teachers attending the training session were from three schools and three different grades (K – 2). Due to time constraints, all teachers worked with the first grade assessment.

> ***Grade 2 teacher:*** *Well, when we were doing our training in Columbus…what we went through was the first grade. Because it was kind of like in the middle. But then when I did my own, that's when it was like, 'wait a second, this is completely different.'…That's when I told (Special Ed teacher), 'OK, you're going to have a major problem with this because this is completely different than what we did in Columbus.*

Teachers spent the rest of the training day learning about the Palm and practicing with the TPRI (first grade) on the Palm.

On April 9, after the teachers had conducted their first round of assessments, the L & C teachers met for two hours with a representative from Wireless Generation.

> ***Grade 2 teacher:*** *They went through one teacher's reports on the screen. So we knew they were real and saw what to look for.*
>
> ***Grade 1 teacher:*** *I remember, though, it was helpful, but I can't remember what she did.*
>
> ***Kindergarten teacher:*** *I think she was helpful in the use of the Palm Pilot…you know, setting your stylus and that.*
>
> ***Reading Recovery Teacher:*** *She also showed me things that you could do that right now I am not doing, keeping your addresses, keeping your calendar, that kind of thing.*

In our interviews, we asked several of the participants what the most ideal professional development experience would be. The DLS suggested a two or three day experience: learning to do the TPRI with paper and pencil for half a day, learning about the Palm and playing with it for half a day, followed by a second day dedicated to doing the TPRI on the Palm.

> ***DLS:*** *If we would have role played more, we would have experienced some of those questions… Three days would be…the luxury.*

The DLS suggested that the third day be spent practicing the TPRI on the Palm with children in the classroom, with someone there to answer questions. The second grade teacher strongly echoed the need for an experienced user to be available as the teachers used the assessment, particularly when looking at their own, real data.

> **Grade 2 teacher:** *If they want us to use the data, then we need to have someone sitting with us looking at it, and not just one time, because our minds can sometime forget things. . .[We need] Almost a piece of paper that says, "You need to look at this and this and this." Because there's so much on there, it was like you didn't really know what was important. But I guess everything should have been important if it's been on a website that's sitting there.*

1.07 Our Interviews

We collected three rounds of interviews from the L & C team (five teachers, the district literacy specialist, and the principal). Before collecting the first round of interviews, the first author traveled to L & C Elementary on April 2 to meet the team and establish a personal connection to serve as a foundation of trust. At the meeting, the first author described the project, enlisted the team's partnership for the interviews, and gathered basic information about the school and the handheld pilot study already underway.

We sent out our first round of interview questions via e-mail on April 14. The interview had three major sections: 1) General social practices around the Palm TPRI tool; 2) TPRI data and data displays; and 3) Open-ended responses. Appendix A lists the questions for each of these sections.

We compiled all of the team's written (e-mailed) responses to these questions and sent out the second interview questions on May 6 and May 7. We designed Interview 2 to probe further the answers that the team members provided in Interview 1. Each interview was customized to elicit more information about:

1) Problems. If individuals mentioned a problem, we asked for further description of the problem. We also asked for any information on ways that they were trying to solve the problem, or ideas for how they might solve the problem.

2) Instructional changes in response to the data. If individuals mentioned that the data directly prompted a change in their instruction, we asked for further description of that instructional response and how the data brought it about.

3) Social contexts. If individuals mentioned meetings or conversations with others in the project, we asked for more information about the most important topics discussed in those meetings.

We also asked the school partners to elaborate their earlier responses to address:

1) What they think teachers need to know to effectively use the TPRI/Palm tool

2) What they wished they had known when starting the program.

3) Their plans for using the TPRI/Palm tool next year.

We conducted the third round of interviews in person. The first author met individually

with each member of the team for approximately 50 minutes. The final interview was cus-tomized for each member of the team, following a common template.

Each final interview focused on three strands:

1) Usefulness of the technology. (Perceived benefits, general implementation issues, work flow issues)

2) Teacher's reflection strategies with the technology; and

3) Features of the TPRI. (Including structural features that may impact how teachers reflect on the data and communicate with other teachers at the same or different grade levels).

We explored each of these strands in three different conversation contexts with teachers:

1) Sample administration of the TPRI

2) Side-by-side reflection of data displays on the website

3) Final discussion

The interviews with the DLS and principal did not include the TPRI sample administration or side-by-side reflection discussion.

For a full copy of the final interview template, see Appendix B. The template was a general guideline for the interviews, and time constraints sometimes prevented all sections from being fully explored.

All final interviews were digitally recorded, transcribed, and combined with the transcripts from teachers' written responses to the first two interviews. Based on initial impressions from the complete set of transcripts, we (the authors) created a set of categories for coding the responses. We designed the categories so that we could identify and summarize new insights about the following questions:

1) What important features of the context at this site affected how the handheld tool was used?

2) How did teachers integrate the tool into their practice?

3) What were the social practices around the tool?

4) How did the tool influence instructional practice?

5) What did teachers like about the tool?

6) What did teachers not like about the tool?

7) What are key lessons for the future use of handhelds in effective information infra-structures for schools?

The rest of this report is organized around these questions.

Section 2.
"Beneath the Surface": Important Features of the Context

In Section 1, we provided a general overview of the context for our interviews. However, schools are complicated environments. They exist inside other complicated environments – such as communities, districts, states – and they change across time. Moreover, the people at a school are unique individuals who make unique contributions to that school's successes and failures. If we have learned anything about school reform, it is that the outcome of any instructional innovation can be as dependent on a school's contextual features as it is on the innovation's inherent qualities.

Our basic descriptions in Section 1 are only the "tip of the iceberg" when it comes to fully understanding the context surrounding the L & C teachers' use of the Palm/TPRI tools. In this section, we seek to illuminate important contextual features that lie beneath the surface — features that may be critical for understanding both the limits and the strengths of this implementation. Importantly, some issues related directly to the TPRI assessment, and not to the use of the Palm handheld computer; other issues were related to the use of the Palm and not specifically to the TPRI assessment. When we are referring to the TPRI assessment alone, we will call it the "TPRI," and when we refer to the TPRI tool on the Palm, we will call it the TPRI/Palm. Similarly, when we are referring to the handheld computer itself, to Wireless Generation's Palm displays of the TPRI, or to Wireless Generation's Internet tools for displaying TPRI data, we will use the terms "Palm, " "WG TPRI displays," or "WG data displays."

We identified the following patterns within the interview data that are useful for describing the contextual features of this pilot study.

- There was a mismatch between the TPRI assessments, state-required assessments, and teachers' classroom reading indicators.

- Because of this mismatch, teachers did not view data derived from the TPRI as "authentic" or diagnostic. Moreover, due to the timing of the pilot, teachers did not expect to use these data to guide their teaching.

- The District Literacy Specialist was helpful and supportive by answering questions and providing additional information and /or support materials

- Several teachers were apprehensive about their use of the TPRI/Palm and skeptical about the continuance of this project beyond the pilot period.

In the following paragraphs, we elaborate on these patterns by providing our interpretations of the interview data and actual quotes from the data.

2.01   TPRI vs. District Requirements and Classroom Reading Indicators

One of the key strengths of the Palm is its potential to reduce teacher's workload by automating test scoring, reporting, and data entry. However, in this pilot implementation, the TPRI/Palm did not reduce teachers' workload; it added to it. This was no fault of the TPRI/Palm. Instead, it was an unavoidable mismatch between the TPRI assessment, the district assessment requirements, and the classroom reading levels currently used by the L & C teachers.

L & C teachers are required by their district to conduct and report literacy assessments on every student four times a year. (This is a reduction from the policy two years ago of reporting assessments for each child nine times a year.) These literacy assessments include separate indicators for reading level, comprehension, fluency, letter identification, dictation sentences, vocabulary, concept of print, and writing.

Teachers in the handheld implementation were not exempt from this requirement. They were conducting the TPRI assessment rounds in addition to their district assessments.

> **Kindergarten teacher:** *And another thing, if I was, you know, if this were my only assessment, I would have spent a lot more time looking at it, and I would have given it more than twice…. This tool would be a more useful part of my instruction if my district's assessment were a part of the program.*

> **Grade 1 teacher:** *We never really got to the (TPRI) intervention activities a whole lot, so I didn't do a whole lot with that because we were also doing our own assessment….*

> **DLS:** *We have a fluency rubric that rates prosody and accuracy. TPRI scores word per minute (rate). We use the Fountas and Pinnell reading levels. TPRI doesn't correlate with these…. so finding the reading level on the TPRI didn't help the teacher with an authentic reading level in the classroom…. TPRI has a phonemic awareness piece; our district does not.*

> **Principal:** *Since we were really not using this as our assessment, it was not helpful to me.*

Several times during the course of our interview rounds, teachers apologized for not having more to report about their use of the TPRI/Palm. The most telling remark came from the kindergarten teacher, who noted perceptively at the close of her final interview, "I think this would have been better for you if it had been more real for us."

Understanding this limitation of the implementation is obviously important, but we also argue that it does not prevent the implementation from yielding valuable insights. Indeed, it makes the positive attributes that teachers made about the TPRI/Palm seem all the more remarkable, given this scenario. It also helps to explain some of the areas where teachers were most dissatisfied with the TPRI/Palm. And it serves to caution us against interpreting the relatively little impact on instruction –both from the Palm and the TPRI – that we observed (as we will describe later) as indicative of the impact that might occur under other circumstances.

2.02 Spring Use of the TPRI Meant Few Surprises

We noted earlier that the teachers did their first round of assessments with the TPRI in March. This timing factor no doubt limited the extent to which teachers perceived the TPRI as informing them about their current students' literacy development.

> **Grade 2 teacher:** *I think it did not help me see a pattern that I did not know already about the reading development. That is because we did not start this at the beginning of the year, when we knew nothing about the child. Those that are high are high, and those that are low, are low.*

> **Special Ed teacher:** *Seeing the test data just supported what I knew was a weak area for several students.*

2.03 Large Role Played by District Literacy Specialist

Throughout the interviews, teachers noted that they had received extensive support from the district literacy specialist. The DLS played both a responsive role – getting answers to teacher's questions– and a proactive role to ensure that teachers could view their assessment analyses. When teachers had a question, the DLS called either the TPRI support team or the Wireless Generation Support team, and got the answers back to the teachers in a week or less.

> **DLS:** *Really when we started it, it was the blind leading the blind. … The (Principal) would call, I'd try to get the answer and rather than talk to each teacher separately I'd say, " (Principal), I'll be over at such and such a time. She'd say, "I'll have the teachers down."*

The DLS also printed out the teachers' data analysis pages from the website after their first round of assessments, knowing that the school's internet connection was slow and often unreliable, and knowing that the school did not have its own color printer.

2.04 Not Your Typical "Early Adopters"

Many pilot evaluations of new educational technologies suffer from being limited to volunteers who are naturally drawn to new technologies. When these pilot implementations are successful, it can be difficult to know how much of the enthusiasm shown by these early adopters will spread to later users who are less-enamored by gadgetry.

The L & C handheld implementation did not suffer from such a limitation. In later sections, when we describe teachers' views on the potential benefits of handhelds, it is important to remember that several of them were inexperienced with technology.

> **DLS: (Grade 1 teacher)** *was scared to death of technology. (Special Ed teacher) was scared to death of technology.*

> **Reading Recovery teacher:** *I was a little apprehensive at first and worried that I would lose my information or not be able to retrieve it…As I told you, I just found out that I could answer an e-mail within an e-mail.*

> **Special Ed teacher:** *I initially felt anxious about everything.*

It is equally important to keep in mind that at L & C, the principal and second grade teacher had enough experience and comfort with technology to encourage and support those who were hesitant.

> **Principal:** *There's so much out there that we don't know…anything that could help a teacher or help a student, we're a fool not to try it.*

> **S*pecial Ed teacher: (Grade 2 Teacher)** *was really nice as our 'techie' person, you know. She just seemed so comfortable with all of it…. she would stop (and say), 'OK, I can show you how to do this.' Which … made me feel a lot better.*

2.05 Skepticism Existed: "Will Funding and Support Continue?"

The L & C team did not have a strong belief that their school would get funding and support for using the tool after the pilot study. At our first meeting with the team (April 2), the kindergarten teacher stated that, due to the state's budget crisis, she did not believe she would

have continued funding for the $15/child cost to house the TPRI data at the Wireless Generation site. Ohio has federal funding from the Reading First program, but this funding is limited to districts that qualify based on low student achievement. L & C Elementary by itself would qualify, but the district's achievement scores have recently risen to the point where the district as a whole does not qualify. L & C Elementary is now, ironically, adversely affected by the district's overall success, and ineligible for Reading First funds to raise its own achievement. Our field notes from that first meeting indicate that there was clear discouragement among the teachers about the lack of a plan to sustain the program, given the effort required learn it.

> **DLS:** *You know, when this happens over and over, that you get excited about something new, but then there's nothing to sustain it, you can get defeated about the whole thing.*

It is unclear how much this skepticism affected the implementation. What *is* clear is that the teachers were remarkably dedicated to persist in their use of the TPRI/Palm, given that they shared this skepticism.

Section 3. How Did the Teachers Integrate the Tool Into Their Practice?

We identified three patterns in the data related to how the teachers integrated the testing tool into their practices.

• The assessment administration was context-specific; context of the grade level impacted administration procedures, and the context of the test requirements produced different forms (e.g., whole group vs. individual) of administration procedures across grades.

• For individual testing, there was a need for private spaces to prevent unfair advantages for children who heard in advance the testing material.

• Teachers reported little time spent reflecting on the data to inform their teaching.

3.01   How Did Administration of the TPRI Differ Across Classes?

Of the three grade-level teachers (K, 1, 2), only the kindergarten teacher administered the assessment in the typical fashion. On the first administration, she gave the screening to each of the nineteen children in her class. Six of those children scored low enough to take the inventory, and only those six children took the inventory. In contrast, the first and second grade teachers administered the inventory to all children in the class. Notably, the kindergarten teacher remarked several times in the interviews that she would have preferred to give the inventory to everyone:

> ***Kindergarten teacher:*** *If I felt that I was going to be using this for sure next year and the first grade teacher was going to use it, I would do the inventory on everybody.*

During the first round of assessments, the Reading Recovery teacher administered the test to four of her students, all of whom were in the first grade classroom taught by the other first grade teacher – the one not participating in the pilot implementation.   The Reading Recovery teacher used the first-grade level tests. The Special Education teacher was in a difficult position, because she could only have access to one grade-level set of tests. Her children were from the following homeroom grades: four students from fourth grade, six from third grade, three from second grade.

> ***Special Education teacher:*** *The second grade test was the only thing that I thought I had available to me on there and, of course, with some of the kids that was too hard….*

Most of the teachers were still conducting the second round of assessments when our final interview took place.

3.02   How Did Teachers Administer the Assessment During the Classroom Day?

The kindergarten and first grade teacher had classroom aides who could take charge of the classroom while the teacher administered the individual assessments.

> ***Kindergarten teacher:*** *I found that the noise level in the kindergarten room…it's just to loud, you know, for them…especially for the reading compre-*

*hension. The other ones, 'Tell me the letter, tell me the sound" – that was OK.
But for that reading comprehension, I had to take them out into the hall.*

Interviewer: *So that would be an extra problem for somebody who didn't have an aide?*

Kindergarten teacher: *Oh, yeah…and I'm not one that believes kindergarten
should be real quiet….*

The first grade teacher did note any difficulties in the logistics of administering the test. She reported that, after she became more comfortable with the magnet board, administration time of the full test dropped from about 30 minutes per child to about 20 minutes.

The Special Education teacher also had a classroom aide, so individual administration was not a problem for her. The Reading Recovery teacher, who works only with children individually, faced no logistical problems for administration.

The second grade teacher, like the kindergarten teacher, initially encountered a noise level problem, but this one was different. She discovered that the other students in the classroom were listening-in as she gave the assessment.

Second grade teacher: *I also ran into problems because many of my students
read the same penguin story out loud, and students heard it. So it got old after
awhile.*

Unlike the kindergarten teacher, she did not have aide, so she could not use the hallway as a solution to the problem. However, by the second administration she had created a workable solution:

Second grade teacher: *I did solve the part of other students hearing it by having
the student do the assessment at my desk, where it is more private and other
students can not hear it. I usually do my assessments at the reading table.*

She also discovered the whole-class administration option that the TPRI offers for the second grade spelling sections, and she used this option during her second round of administration.

Second grade teacher: *I learned that I can give my spelling to everyone at one
time then grade them at home later. That cut out about 10 minutes per student
time…. I took it home, and during* <u>American Idol</u>*, I sat there and typed in the
things. …. So then I came to school and…. they had to read the word list and
they had to read the stories. So it took me, like less than two days….*

3.03 How Did Teachers Handle the Tool's Hot-syncing and Battery Charging Requirements?

All of the teachers reported that keeping the battery charged and hot-syncing the data posed no difficulties. None of the teachers ever lost any data.

Kindergarten teacher: *The hot-syncing is really easy and it takes about a
minute. Charging the battery was, that was real easy too. The battery doesn't
need a lot of charging, and I charged it at home.*

Most of the other teachers also chose the option of charging the battery at home; only the first grade teacher reported charging the battery at school during the day. The Reading

Recovery teacher also did her hot-syncing at home, but the other teachers reported that they hot-synced at school, at the end of the day, without any problems.

3.04 When Did Teachers Look at the Data?

One of our major insights from the interviews was that teachers gathered some of *their* major insights about children's performance while giving the assessment.   The data displays on the website served more as a reminder of these insights than as a source of them. This has major implications for decisions about whether the classroom teacher or someone else gives the assessment.

> **First grade teacher:** *I think I reflected the most about the data while giving the test…. because you have that child right there…. They miss something, and you think, "I thought they knew that…but then, as you go on and keep testing children, all that gets jumbled, so you really need the display to remind you…. I like giving my own tests…I know each test is given the same way, and I know I didn't help them along with stuff. And you do, you make mental notes.*
> **Interviewer:** *So when you thought about the data, it was really – when?*
> **Second grade teacher:** *Like, during it (the assessment)…. I would just put it in my mind.*
>
> **Special Ed teacher:** *I like having been the person that gave it, because a lot of what I get, the feedback I get, is…. just seeing how difficult it was, or how close the person came to getting something correct when they were trying to even sound it out — or whether they didn't try to sound it out at all…. I can only, you know, detect that by working with the child… (I) discovered which students had a lot of trouble with implicit questions. I realized this as I was giving the test….*
>
> **Reading Recovery teacher:** *You pick up on what they're doing, you know, so many different ways with their eyes…. You know how they're coming up with the answers, or if they're going back. Those things aren't shown when you're just looking at the results, so the really the true value…. I would have to say, would be to be the one giving the test.*

Only the kindergarten teacher responded that she thought she could get sufficient information from the website's data displays alone, if someone else gave the test.

> **Kindergarten teacher:** *I really do, because I think it's real straightforward. You know, you either know that sound or you don't…and with the phonemic awareness – either you knew the word I sounded out or you didn't.*

However, even she responded that she reflected on the student's performance while giving the assessment:

> **Interviewer:** *Did you find yourself, as you gave the test, able to sort of process the information?*
>
> **Kindergarten teacher:** *O yeah, yes, yes.*
>
> **Interviewer:** *So it wasn't that you waited to do all your thinking about it till you saw the displays?*

Kindergarten teacher: *Right.*

Teachers found it difficult to spend much time looking at the website's data displays. Some attributed this to their lack of access to a computer with a fast Internet connection.

Second grade teacher: *I believe that it (the data displays) helps me reflect on the reading development if and when I have time to sit at the computer and go through all of the pages on the web site. We would not have enough time to do this without doing it on my own time at home. Because you need a fast Internet connection to download the reports and our school does not have that.*

All of the teachers did report looking at the printouts of the data displays that the DLS printed and distributed, although none reported spending much time on this.

Special Education teacher: *I reflected on the data very briefly after I received it.*

Most likely the time teachers spent on this was limited by several factors that we outlined in Section 2, including competing demands from their district literacy assessments, misalignment between the TPRI and their classroom reading indicators, and their belief that the program would not receive continued support beyond this year. We included the following comment in Section 2, but it bears repeating here:

Kindergarten teacher:*… if this were my only assessment, I would have spent a lot more time looking at it.*

Section 4. What Were the Social Practices Around the Tool?

Several of the contextual features that we outlined in Section 2 likely contributed to the fact that few social practices around the tool emerged in this initial pilot study.

Before the first round of assessments, the teachers met as a group with the DLS whenever she had tracked down the answer to one of their questions. There were about seven of these meetings. Questions that were addressed during these meetings included the following, as related to us by the DLS:

1. How do I enter my students? Response - they are already entered and I showed them how to set up their classrooms.

2. After doing a screening can I go into the inventories? What if I make a mistake and go on to the next section - how do I go back without trashing everything? I am not seeing how the word list appropriately identifies which level of story I go into. Response -These questions were addressed when we had a representative from Wireless Generation come and spend several hours with us.

3. How do I synch? Response - I gave directions to them in a memo as well as discussed the procedure verbally during a meeting.

4. My palm was stolen what do I do?

Aside from those meetings and the meeting with Wireless on April 9, no other formal meetings took place. Teachers also reported few or no informal conversations about the TPRI/Palm.

However, teacher's responses in our interviews were enlightening about the kind of social practices around the tool that teachers believed would be valuable in the future.

Two patterns characterized the teachers' recommendations:

• Teachers recommended scheduled meeting times for them to collaborate on their testing data; grade level meetings were preferred for tests that have few common elements across grade levels.

• A link between a school culture that promotes trust and respect for each other seems to be necessary for achieving successful collaboration on students' assessment data.

4.01 Scheduled Time to Reflect with Same-Grade Teachers

The kindergarten, first, and second grade teachers stressed their desire for scheduled meetings in which teachers would discuss their data.

> **Kindergarten teacher:** *I have spent some limited time reflecting on the TPRI data. I did this on my own personal time. The school could have arranged a meeting during school hours in which the teachers could discuss and reflect on the data.*

> **Second grade teacher:** *It would be nice to be able to reflect with another second grade teacher to compare data.*

During the course of the interviews, we noted that teachers primarily mentioned reflecting with teachers of the same grade level. This made sense, given the many differences in the TPRI subtests and terminology across grade levels. We probed this issue further in conversations with the first and second grade teacher. Both indicated a strong preference for reflecting with teachers of the same grade level.

> ***Interviewer:*** *We're thinking about small schools, where there might be only one teacher per grade – and thinking about whether it would be helpful to talk across grades at all. Or, if it really just needs to be within the same grade. What do you really think about that?*

> ***First grade teacher:*** *Actually, I don't know what K or 2 tests on this. It'd be OK to talk them about…maybe activities. Things you could do. But I think it would really help if you had the same grade level.*

> ***Second grade teacher:*** *I would prefer to reflect with the same grade. Our tests are so different – theirs phonics based, ours spelling.*

Their responses suggest that an assessment with more commonality across grades than is apparent in the TPRI might be better suited for cross-grade conversations. Alternatively, professional development to help teachers see the common grounds for discourse in the TPRI across grades may be necessary for teachers to value discourse about TPRI data across grade-levels.

4.02 Comfort Level for Sharing and Discussing Data

Although teachers at L & C did not share and discuss their data in this pilot implementation, we suspect that their experiences with the district literacy specialist in the ongoing literacy-coaching project may have built a school culture where teachers would be comfortable with such discussions in the future.

> ***Interviewer:*** *Would you be comfortable, then, with more meetings with other teachers where you share data from your class and talked about it? Would that be a helpful part to you of this whole thing?*

> ***First grade teacher:*** *I think it would be if I had, you know another first grade teacher to do it with.*

> ***Interviewer:*** *I can imagine at some schools it would be uncomfortable for teachers to do that but you don't think that would necessarily be the case here?*

> ***First grade teacher:*** *No. No.*

Comments by the literacy specialist illuminate the kind of culture that may be necessary for such discussions to take place at other schools.

> ***Interviewer:*** *I can imagine that in some schools it would be uncomfortable for teachers to pass out data on their kids and talk about it. Is that the case at L & C, do you feel, or not?*

> ***DLS:*** *I think that it was the case but I think they're over that now. …With (Principal's) help, I think that the teachers now have a trust in me…And I think*

*there is a rapport that we could do these kinds of things and they would realize
I'm not saying to you, "you're a bad teacher."   I'm saying to you, "let's look at what
we have here and how can we work together."*

Section 5. How Did the Tool Influence Instructional Practice?

As with the influence on social practices, the influence of the TPRI/Palm on teachers' instructional practice was small in this initial pilot study. We did not collect many reports of ways in which teachers changed their instructional practices after reflecting on the assessment data. Again, the contextual factors of the study described earlier no doubt played a role in limiting instructional change. However, it may still be valuable to understand how teachers made small, initial changes in this pilot study, in the face of overwhelming demands on their time. This understanding may help us know how to support teachers in making larger changes under more conducive circumstances. In this section, we will describe several small instructional changes that teachers reported in our interviews. We were particularly interested in how teachers used the data to make instructional decisions and how they chose the new instructional activities for their practice.

These patterns characterize how the TPRI/Palm influenced the teachers' instruction:

- At each grade level (K,1, 2), the teacher adjusted at least one aspect of instruction based on information learned either during the TPRI assessment or after the analysis of the WG data displays.

- The special teachers (Reading Recovery, Special Education) did not use the TPRI data to influence their decisions; these teachers had multiple data sources from their own testing programs and the TPRI measures did not deepen their knowledge about their students' performance.

5.01   Kindergarten Teacher: Added Implicit Comprehension Questions

The kindergarten teacher initially reported that she used the data from the phonemic awareness assignments to add new phonemic awareness activities to her instruction.

> **Kindergarten teacher:** *A teaching decision I made as a result of this data was to work in small groups with the children that were still developing in the phonemic awareness area.*

However, in the final interview, as we looked at her data together, she reported that this change was most likely a result of her work with the DLS on phonemic awareness as part of the literacy-coaching project. The data from the TPRI did not play much of a role in her instructional decisions for these phonemic awareness activities.

> **Interviewer:** *(Looking at the Class Summary page). What was it that led you to say, OK, I know, I'm going to do more phonemic awareness activities with my kids, is it…?*

> **Kindergarten teacher:** *Well…when I saw those red markers…and you know what, those are the same kids that I would have done with it anyhow.*

> **Interviewer:** *So this wasn't a surprise to you?*

> **Kindergarten teacher:** *Oh no…see, I'm in this ELLCO (literacy-coaching) project too, OK, which phonemic awareness was one of the areas that I was working on with that too…so it all kind of went together.*

Interviewer:…You sent me a lot of great descriptions of the particular phonemic awareness that you did, but…because of the ELLCO project, would you have probably done them anyway?

Kindergarten teacher: *(nods)*

Interviewer: *Yeah? OK. How did you pick those particular (instructional activities)?*

Kindergarten teacher:*…Basically just different resources, some books from (DLS)…just different manuals I have.*

Interviewer: *Was there anything about this test (TPRI) that influenced which activities you chose? Or not really?*

Kindergarten teacher: *Not really.*

The kindergarten teacher also reported that her children's poor performance on implicit questions in the comprehension subtest led her to include more implicit questions in her instruction. Interestingly, she reported that she made this decision from insights she got while administering the test – the insight did not come from looking at data displays afterwards. Her instructional change was primarily limited to asking implicit questions like those that appeared on the test, when she read stories aloud in class. However, she did not think that this small change would likely result in any improved performance on the test during the second administration:

Kindergarten teacher: *Well I don't think I ask enough questions…enough implicit questions.*

Interviewer: *OK.*

Kindergarten teacher: *There are some books that lend themselves to that more than other books too. So I'm kind of thinking them up out of my head sometimes….*

Interviewer: *…You're saying about how you realized that you needed (more) implicit stuff – was this really more from just giving the test and seeing those implicit questions … than seeing a (data) display?*

Kindergarten teacher: *Right, it was more while I was testing them that I realized they, the higher level thinking, the reasoning they weren't very strong on.*

Interviewer: *OK and you just, you saw a difference between those questions and the ones that you tended to do?*

Kindergarten teacher: *Exactly.*

Interviewer: *OK and so when …you said (in an earlier interview) "During story time I tried to ask questions that required inferential thinking," — did you just kind of think about what these questions (on the test) were like, to help you do that?*

Kindergarten teacher: *It was just, you know… making sure I was doing it.*

Interviewer: *OK.*

Kindergarten teacher: *But, I don't think they're going to do a whole lot better on the test.*

5.02 First Grade Teacher: Created Phonemic Awareness Activities

Just as the kindergarten teacher reported patterning her implicit questions on the ones used in the TPPI test, so the first grade teacher reported that she invented phonemic awareness activities to look like the ones on the TPRI. Unlike the kindergarten teacher, she reported that her decision *was* influenced by the data displays.

> **First grade teacher:** *I could see from info on the Class Summary that numerous children had trouble with blending phonemes…. As a result of this pattern, I tried to incorporate more blending of the phonemes into class time….*
>
> **Interviewer***…How did you go about picking those particular activities? You said that you didn't use the (TPRI) activity guide…?*
>
> **First grade teacher:** *Basically because (the activities) followed the testing pattern on the TPRI. So, I figured, if that's on the test, that's probably a good way to practice activities.*
>
> **Interviewer:** *So you thought about activities that were similar to the test items?*
>
> **First grade teacher:** *Right.*
>
> **Interviewer:** *OK, and were those ones that you had done in the past…?*
>
> **First grade teacher:** *I had not done any of this in the past….*
>
> **Interviewer:** *So, how did you know what to do?*
>
> **First grade teacher:** *Well, it was like what was in the test. So I figured…*
>
> **Interviewer:** *So you just, you constructed activities from that?*
>
> **First grade teacher:** *Yeah, I just patterned on it. Right.*

The first grade teacher thought that with more time to reflect, the data displays could have helped her customize her instruction for students. She noted again the difficulty of using this tool over and above her district testing requirements.

> **Interviewer:** *(looking at an individual student's display) If you still now had another quarter to work with him, would this help you know what to do, particularly, for him? And how would you think about that?*
>
> **First grade teacher:** *I think this shows it really in a good way, because you can see the areas over here, and see whether he's developed or not. And obviously he still needs help in blending phonemes and the initial and final sounds, and blends still. I think it does.*

Interviewer: So what would you – what kind of things then would you do?

First grade teacher: Well, we could use this little – I'm not sure what they call them.

Interviewer: The counter things. OK.

First grade teacher: Right. With the sounds for up here. I could work more with magnets with him. I just wish that – it would have been easier if we would have been just doing this, or doing our testing. Because, you know, you concentrate on your (district) testing, not on this.

5.03 Second Grade Teacher: Added Spelling Activities

The second grade teacher, like the kindergarten teacher, used insights that she got while administering the test, not from the data displays, to plan her instruction. The interesting point from her experience is that the insight she got would not have been evident in the displays, even if she had had more time to use them. Instead, her insight was about particular letter patterns – like 'ch' and 'sh.' In the website data displays, performance on these individual letter patterns is grouped in with other patterns. Data on individual letter patterns is not displayed.

Second grade teacher: I saw that many of my students were still not hearing the 'ch' and 'sh' sound. So I taught that in a group for the students who missed that sound. I also needed to teach the whole group adding s, ed, and ing again….

Interviewer: …(looking at the data display) Well, let's go back and talk about that a bit…you mentioned that (you) saw they weren't doing, like' sh.' So, but, you must have gotten that insight not from looking at the data itself?

Second grade teacher: No, I didn't. I honestly did not get that from there. As I just said, I have hardly looked at that data. Like, the data doesn't mean as much to me as…. When I was giving the test individually, it was killing me that they weren't…. I'd say the word (with 'sh'), and I'd see them write down…'chr' – which is a common mistake. But it was just killing me that they couldn't…. So. I'd put a note in my head that was saying, "Oh my gosh, we've got to practice that. We've got to do the 'ch' and 'sh' and all the sounds like that. Or the suffixes – adding suffixes on there was…also the same ting that I saw that from there, and not from data or anything.

When we asked her how she chose the instructional activities that she did, in response to her insights from giving the test, she reported constructing them on the fly, in what sounded like an organic process, rather than using manuals.

Second grade teacher: We just, you know, we just made words that had 'ch' in them and, you know, different sounds that they make…

Interviewer: …how did you know what activities to do…?

Second grade teacher:…I don't know…we don't have manuals. We don't have that kind of stuff, so…you're just on your own and your own brain…. I mean, half the time…. in the morning you know you're going to teach a certain something today, but you don't exactly know how you're teaching it until you start

teaching it. … I know it's probably not the best thing, but for me, that's just how – it works for them. I start it some way, and you see what kids are doing. Like…well, maybe it should turn into a writing activity, instead of just a – because they're not paying attention right now.

Interviewer: *A kind of organic view.*

Second grade teacher: *Oh yeah.*

This teacher also stressed that she needed more knowledge about the meaning of numbers on the data displays before they could be helpful for her. She did not feel sufficiently prepared by the professional development to interpret the data, particularly from the oral reading sections.

Second grade teacher: *(looking at data display for fluency) See, I had zero miscues, and fluency is 115 though. I don't know what that means. Like, fluency 115 out of how much? I mean, I don't know what the total…. that doesn't mean anything to me.*

Interviewer: *It's a number that doesn't….*

Second grade teacher: *That's what I'm saying, this whole thing doesn't mean anything to me.*

5.04   Reading Recovery and Special Ed Teachers: Reported No Changes

The Reading Recovery teacher was working with prescribed Reading Recovery activities, so she was not able to change those activities in any way during this pilot implementation.

Reading Recovery teacher: *As a Reading Recovery teacher, I can't say that I made a specific teaching decision based on the TPRI results*

Interviewer: *Do you think that if you continue to use it, along with the other reading recovery tests, that this …might prompt some changes in what you do, that your other assessments don't? Or is it really sort of a confirming kind of thing?*

Reading Recovery teacher: *It's more of a confirming.*

Interviewer: *OK*

Reading Recovery teacher: *Because what we do in Reading Recovery – there is a set structure to the lesson. And you kind of follow the child depending on what he does that lesson…so the assessment is just kind of off to the side.*

Interviewer: *Right*

Reading Recovery teacher: *…and so I can't say that it really changes.*

This teacher noted that she would rather have her own assessment on the Palm, and that having it there would be valuable for her.

Reading Recovery teacher: *Honestly, I get what I need for Reading Recovery from the Observation Survey….*

Interviewer: *So, if you didn't do this (TPRI), you wouldn't miss it terribly?*

Reading Recovery teacher: *No, no, but again, I'll say if I could get the Reading Recovery (assessments on the Palm)…*

Interviewer: *…you see the value of that.*

Reading Recovery teacher: *Yeah, that would definitely help.*

The Special Education teacher reported that this semester she did not change her instruction based on her use of the tool, but that she might in the future use the activity guide to do so.

Interviewer: *…Is there anything that you did differently you think….*

Special Ed teacher: *Because of the testing?*

Interviewer: *…with this. Or would you have done the same thing without it, do you think?*

Special Ed teacher: *I think that the (activity) book that goes along with it, which I know also appears on the website…will show you 'OK, this child has a problem with this, and here are some activities you do" – that those are valuable. I just haven't used a lot of them. I have used a few of the things, but they're basically things that I used anyway…. But I think there are some other activities – and primarily for some of those sound activities – that probably would be beneficial. So I can't, I mean, I'm not saying that it's not (valuable) - - it's just that I haven't used it to its fullest extent.*

Section 6. What Did Teachers Like About the Tool?

In this section, and in Section 7 (*What Did Teachers Not Like About the Tool?)* we will separate teachers' views about the TPRI assessment from their views about the Palm and WG displays (both the WG Palm displays and the WG website displays.) Here we will concentrate on the strengths of each. Three patterns of strengths were identified:

• The Palm and WG displays are easy to use, no paper mess.

• The Palm and WG displays provide automatic scoring and immediate access to assessment results.

• The TPRI is useful for identifying students' code knowledge

6.01 Strengths of the Palm and WG Displays

Easy to use, No paper mess. Teachers were unanimously enthusiastic about their Palms as easy-to-use and more efficient assessment tools than traditional paper-and-pencil tools.

> **Second grade teacher:** *It alleviates the paper mess you have by the end of the year. This paper then gets passed on to the next year's teacher. Wouldn't it be great to get your new students' records all on a Palm instead of a file folder filled with papers?*
>
> **Special Ed teacher:** *Speed of assessment is a great advantage…I would have saved myself a lot of anxiety if I had realized that using the Palm for testing would be as easy as it turned out to be…. I liked the simplicity of it…. They told us it would be (easy), and it was like, "Sure, OK." But actually, …like halfway through it… it's like "OK, this is really easy to use."*
>
> **Kindergarten teacher:** *I think the tool is very useful and effective one you know what you are doing. It makes assessment more time efficient.*
>
> **First grade teacher:** *Having all the information in one place and not on six different pieces of paper made it easier to see the results . . .. I like the Palm . . . I really do. I mean, I had never used one before, but at least everything is right here. Of course, if you lose it, you're in big trouble.*
> **Interviewer:** *So…it's kind of the paper shuffling you get rid of?*
> **First grade teacher:** *Yeah, and you just have to keep track basically of your test materials.*
>
> **Reading Recovery teacher:** *With some initial training and a little experience, administering the test is not difficult, and it's like any other technology…the more you use it, the easier it becomes.*
> **Interviewer:** *Is there anything that you'd like to see improved, just about the way that you mark the data and then go through the test?*
> **Reading Recovery teacher:** *No, that I found fairly easy to do . . . It wasn't difficult….*
> **Interviewer:** *Are there other assessments that you do, that you would like to be able to do on the Palm? That would make it easier than the way you have to give them now?*
> **Reading Recovery teacher:** *It would be.*

Automatic scoring, immediate access to assessment results. Although limitations of this pilot implementation made it difficult for teachers to take much advantage of the data they collected, the L & C team liked how the Palm and website automatically scored and displayed the data.

> **Special Ed teacher:** …the thing I liked best about the Palm is that it tabulates everything for you, and you don't now have to go back through and spend your time doing that.

> **Principal:** The main thing is that . . . the data can be reviewed quickly. It is very easy to obtain.

> **First grade teacher:** It was great to be able to mark the answers on the handheld and transfer the results to the computer and then be able to see the summary and graphs…. I like the way it would generate reports…if we (could) do our vocabulary testing and you could bring that up, and show which kids are where, or how many kids have mastered it, I think that would be great…much easier than going through all the scores yourself.
> **Interviewer:** Because of the way they color code it here? Or what makes it easier here?
> **First grade teacher:** Well, just the fact that they do it, you know. And the color-coding helps.

> **District Literacy Coach:** It is extremely convenient to have the results immediately. Decisions can be made and reflected upon immediately, while the thoughts are still present in their minds…. The data displays appear clear and easy to read. I have looked at them and decided that the data will help me plan for coaching decisions.

6.02 TPRI Strengths

Useful for code knowledge: phonemic awareness, phonics, and spelling. Most of the teachers mentioned the word-code skills of phonemic awareness, phonics, and spelling as the most useful parts of the TPRI assessment:

> **Kindergarten teacher:** I think the TPRI phonics assessment is very useful because is assesses necessary pre-reading skills…(The) Phonics assessment was very useful because it covers many areas of phonemic awareness that we don't have in our district's assessment.

> **First grade teacher:** I thought the inventory did a good job gathering info on phonics . . .
> **Interviewer:** Was there any aspect of phonics that you didn't feel got covered . . . that you would have liked to have seen?
> **First grade teacher:** No, I really can't think of any.

> **Second grade teacher:** I do like to see what types of words the students need help spelling . . . I did like the spelling tasks. I thought they gave you information that you might not realize for awhile, because it takes so much time to get to all those types of words . . . For example, we do dictation sentences (on the district assessment), but what does that tell you unless you analyze thoroughly all your student's papers?. . . The spelling section lets you see what words students need help with.

> **Reading Recovery teacher:** *I think the phonics assessment has been useful in that it has given more evidence of specific areas of need for each child . . . (it's) useful as a comparison with what I am seeing in Reading Recovery lessons.*

Only one teacher specifically mentioned the comprehension measures as useful.

> **Kindergarten teacher:** *The comprehension measures were useful because I got some insight on where my instruction was weak.*

As we noted in the previous section, the kindergarten teacher used this information to add more inferential questions to her storytime reading.

Section 7. What Did Teachers Not Like About the Tool?

In this section we outline teachers' concerns, along with their ideas for new and improved features of the TPRI/Palm. The patterns organizing this set of information are below:

- Concerns about the Palm and WG displays were minor (e.g., theft worries, problems associated with using the stylus for screen changes), and more focused on suggestions for added features (e.g., the need for data displays linked to suggestions for grouping students for instruction and the inclusion of normative databases for comparison to their class data).

- Concerns about the TPRI tool varied across teachers (due, in part, to the teachers' use of different subtests per grade level) but the teachers did express major concerns with the content, organization, and diagnostic capabilities.

Section 7.01 Concerns and Ideas for Improvement Related to the Palm and WG Displays.

Theft worries. The Palm's small size has great advantages for portability. Unfortunately, this advantage can also invite theft. During this pilot implementation at L & C Elementary, the Special Education teacher had her Palm stolen after the first round of assessment. The Palm was taken from a shelf in the back of the classroom.

> *Interviewer:* *What do you know now that you wish you had known when you started using the tool?*
> *Special Education teacher:* *I wish I would have kept the Palm Pilot with me at all times so that it wouldn't have been stolen.*
>
> *Grade 2 teacher:* *I would like to share that for some schools, this is going to cause a concern where stealing is concerned. It added an extra stress about "where is my Palm right now?"*
> *Interviewer:* *Have you or the other teachers come up with any new ways to solve this problem?*
> *Grade 2 teacher:* *No, we have not. But my solution is to worry about where it is all of the time. I keep it in my pocket if taking a break from using it. All other times it is at home . . .. One day last week, I left it on my desk…I meant to take it to go and charge it, take it home with me . . . and I was running out the building, and "Oh my gosh I've left it on my desk!" . . . I knew it was hidden underneath, so I didn't feel like I had to go back in and get it, but it really bothered me.*
>
> *Interviewer:* *Did you worry about security at all, with your Palm?*
> *Reading Recovery teacher:* *Yes, I did. I kept it in my book bag at all times . . . and yeah, I did, I did worry. Not so much that one of the kids would take it, since I have so few children, but that I would be out of my classroom with it and lay it down . . .. When they first passed them out, that's what I thought – "If anybody's going to lose it, it's going to be me."*

The theft at L & C also indicates the need for an advance plan to replace the Palms — or to allow teachers to share Palms until replacements can be made. The L & C team was unsure of how to deal with the problem.

Special Ed teacher: *I'm the sad story of the stolen Palm. And the way I'm going to do the second testing is (to borrow) (Second grade teacher's), who's already finished her second testing. Oh, no, actually, I was going to use hers, and then (Principal), I guess, is going to let me use hers. And we tried to do something with it this morning, but until we can figure out how to take (Principal's) name off, and put mine, and then put my class list on….*

Sensitivity of screen arrows vs. up/down buttons. Two of the teachers mentioned problems in using the stylus to accurately hit the small arrows at the bottom of the screen. These arrows change the text to a new screen.

Kindergarten teacher: *And the sensitivity, sometimes when you're testing is tricky, you know, because…especially when I do the reading comprehension. I read them a story and I'm clicking to go to the next screen, and the screen's not coming up. And so you have that pause in the story – and with their attention span, it's gone . . . I still have trouble with the stylus a little bit . . .If you don't get it right straight down, or if you're slanted sometimes it doesn't seem to go to the next screen . . . I didn't have any trouble with the stylus with the scoring.*
Interviewer: *So the sensitivity is more in just changing screens on that reading stuff?*
Kindergarten teacher: *Right, that's what, that's what I found.*

Special Ed teacher: *One of the problem with the Palm is that sometimes I would tap and the reading wouldn't come up as fast, so I would feel like I was . . . slowing my reader down . . . And that only happened to maybe one person . . . I don't know if it was me getting used to the tapping.*

However, we learned from the second grade teacher that this problem can be solved by using the up/down arrow keys on the Palm, instead of using the stylus on the screen. This was a feature that the other teachers had seen in the training but not remembered for their own use. This suggests that future professional development should stress this feature.

Ideas for grouping, links to normative databases. Overall, teachers were extremely satisfied with the WG Palm and website interfaces. However, one teacher noted that she would like the tool to provide more features for grouping students.

Kindergarten teacher: *A data display that would be helpful would show ways to group individual children. This would really be beneficial if all children were given the inventory . . . I would like to give the whole test to everybody, and the be able to click on the whole thing and say, "OK, this is a group for this (skill)" . . . to me, that would be the ideal way to do it. Now, when we were at our meeting (in Columbus), they showed us how we could group, you know.*

Interviewer: *How did they tell you?*

Kindergarten teacher: *Oh, they had a chart and . . . she said, "Well, but we're not going to do it all for you. I'm like, 'Well, why wouldn't you? Because in every other profession, the best, the quickest, easiest, you know, that's what you want to do; you want to get it done . . ..*

Interviewer: *So what did they tell you that you should do if you wanted a group?*

Kindergarten teacher: *They gave us – it's another printout . . .. They showed us .*

. . you know, "Look at this child, they're in this, this, and this." examples of different groups . . .. Of course, it wasn't with our own kids. (They) showed us different ways to group.

Interviewer: *But you would essentially have to. . use some paper to put your groups together?*

Kindergarten teacher: *Oh, yeah. See, I think a computer program could probably do that for me.*

Another teacher mentioned that she would like the tool to offer more ways of comparing her students with other classrooms at different times of the year.

Second grade teacher: *I would have liked to see scores at that time of year in a second grade classroom – maybe an average. It would help you figure out who are on track.*

7.02 TPRI Concerns and Ideas for Improvement

Before beginning this section, we want to stress that the TPRI is a widely used assessment with a strong research base. The Institute for the Development of Educational Achievement convened a committee to conduct an extensive analysis of reading assessments instruments for K – 3 (Kame'enui, 2002, http://idea.uoregon.edu/assessment/final_report.pdf), and this committee identified the TPRI as an assessment with sufficient evidence for use in the following areas:

• Phonemic awareness (Screening, Diagnosis, and Progress monitoring for grades K, 1)

• Phonics (Screening, Diagnosis, and Progress Monitoring for grades K – 2)

• Fluency (Screening, Diagnosis and Progress Monitoring for grades 1, 2)

• Vocabulary (Screening, Diagnosis, and Progress Monitoring for grade K)

• Reading Comprehension (Screening, Diagnosis, and Progress Monitoring for grades 1, 2).

However, no assessment is right for every teacher, school, and purpose. The teachers' concerns here are interesting because they point to features that may limit the success of the TPRI in certain contexts. Some of the teachers' concerns may be ones that could be addressed and overcome through further professional development. Others may suggest the need for additional or alternate literacy assessments in schools like L & C Elementary.

Concerns related to guiding all students forward in their literacy development. Many of the teachers' concerns appeared to stem from a mismatch between the primary purposes of the TPRI and the teachers' desire for comprehensive literacy information about all of their students (including higher-performing students).

As stated on the TPRI website (www.TPRI.org), "The primary purposes of the TPRI are to facilitate a teacher's capacity to a) identify children at-risk for reading difficulties, including dyslexia, in Grades K-2; and b) set learning objectives and develop instructional plans for these at-risk children."

The authors of the assessment (Foorman et al., 1998) note that the screening measure, used for the initial identification of at-risk children, was designed to minimize the probability that a child needing assistance would not be identified. As a result, the screening is better interpreted as an indicator of which children are *unlikely* to be at risk of school failure —because they pass the screening — than an indicator of which children are likely to be at risk for school failure by virtue of failing the screening. False positive rates, which the authors deem less serious than false negative ones, are above 40% for Kindergarten and Grade 1, and around 15% for second grade. However, the TPRI has very low false negative rates: it fails to identify as "at-risk" less that 10% of children who show below-grade level reading performance at the end of Grades 1 and 2.

The inventory sections of the TPRI are designed to help teachers further determine which students actually need intensive help in their reading. The inventory tests also provides more detailed information on the areas of reading that teachers should focus on for these students.

Understanding the nature of the TPRI is important for understanding several of the teachers' concerns. As we analyzed these concerns, we realized that the teachers wanted the assessment to provide them with information they could use to better understand *all* of their students, with detailed information about *all* students' reading performance. They were concerned that the TPRI did not meet this need.

For example, we have already noted (in Section 3) that the first and second grade teachers chose to give the entire inventory to all of their students, instead of only those who did not pass the screening, and that the kindergarten teacher strongly wished she had done the same.

> ***Kindergarten teacher:*** *I felt all the phonics subtests were useful, but all of these subtests should be available to use with any student . . . It is important to give the inventory section to most of the students if you want the data to guide instruction . . . If I ever use this again, I would do the inventory on every student . . .. because I think it really, especially for phonemic awareness, I think it gives you a clue.*

The kindergarten teacher particularly wished that the branching feature of the assessment would not limit her in the number of assessments she could give:

> ***Kindergarten teacher:*** *I do think you should be able to give the entire inventory, even when a student hasn't developed in an area enough to move on. I haven't found the hierarchy of these phonemic awareness skills to be absolute.. . I mean they can, there's so many reasons why a five or six year old isn't going to rhyme that word.*

The kindergarten teacher was also dissatisfied with the fact that the TPRI waits until the middle of the year to test kindergartners — even though this feature did not impact her use this spring.

> ***Kindergarten teacher:*** *(The middle of the year) is the first time you test kindergarten according to this test, but that's another thing. I would test them at the beginning of the year. I don't know why you would wait till the middle of the year . . . because you need to know what they know. It's nicer to know in September than in January.*

The authors of the TPRI (Foorman et al., 1998) state that their reason for this design feature is to give kindergarten children a chance to adjust to the school environment, and to avoid

overly identifying children as at-risk. This is another example of the mismatch between the TPRI's purposes and the teachers' wish for a comprehensive literacy assessment to help them guide instruction for all of their students, right from the beginning of the year.

We also noted earlier that the L & C teachers give running records, which collect miscue information, as part of their other literacy assessments. The kindergarten, first, and second grade teacher all noted their preference for collecting miscue information, which they could not do with the TPRI. (Recall that the TPRI records reading rate and errors only for the oral reading passages, and that the kindergarten TPRI does not include an oral reading section.)

> ***Kindergarten:*** *The analysis of oral miscues is useful for instructional planning*
> *First grade teacher: I think analysis of miscues is helpful in planning instruction because it gives you clues to what the child needs to work on, such as vowel sounds, substitution of words ("it" for "at", etc) . . . Just recording the number of errors doesn't give much information to go on. Without seeing what miscue the child made, it isn't very helpful. I don't think the rate is especially helpful.*

> ***Second grade teacher:*** *I did not feel that it (rate) was useful in planning as much . . . .I do not like the reading accuracy because it does not measure enough*

Again, these concerns appear to highlight the teachers' wish for an assessment that would give them more in-depth information about the reading performance of all their students.

Related to this concern, several teachers felt limited by only having access to one grade level of tests. The kindergarten teacher noted that she could not collect oral reading data on her high readers. Similarly, the first grade teacher noted that some of her children could have gone on to second grade stories, while the second grade teacher said she would like the option to give some of the first grade assessments to her lower-skilled children. We noted earlier that the Special Ed teacher also wished she had been able to use more than one level (the second grade level) of tests with her students.

Concerns about the mapping to "real book" reading. Some of the teachers' concerns appeared to reflect their wish that the TPRI's assessment procedures and student data would more closely map onto the kind of reading that students do in their classrooms.

For example, teachers' most common and strongest objections related to the story cards used in the oral reading test. These story cards are text-only cards.

> ***First grade teacher:*** *I did not like the reading passages. Our children are used to reading from guided reading books, and I felt there was too much print on the page for them. It was hard for them to follow the passages. I would prefer a book form with pictures . . . The stories bother me, because so many of them, even in the middle of the year, even in the end of the year, they're still on story number one. And I would just like to see some connection there with what I'm doing on my level, so I would know why.*

> ***Second grade teacher:*** *I did not care for the passages because they were too hard for my students – partly because they were a straight page with no pictures to look at. This is not a real world story for 2nd graders. Students were bored with it, and even if I covered the words as the student read, and they only looked at one sentence at a time, it was still frustrating.*

> **Reading Recovery teacher:** *I am not currently satisfied with the passages on the reading accuracy and the listening subtests. I don't feel they are anything like what the children are used to. There is too much text on one page. They should be in book form with a few colorful illustrations. My children became overwhelmed at the sight of the story card . . . I think it would be beneficial to present the passages in book form, with less text per page. I think the format should be as similar to what children are familiar with in the classroom, as much as possible.*

> **Special Ed teacher:** *I think the passages were difficult because they were read "cold," with no prior preparation . . . the stories had too much text, with no illustrations or break in the print.*

If the purpose for using the TPRI is strictly as a means for identifying children who have difficulty with text decoding, then these teachers' concerns mean only that the test may over-identify some children. However, if one interprets these concerns as indicating that teachers want an assessment to inform them about children's reading performance with real books — then these concerns suggest that the TPRI is not appropriate for this need.

Comprehension concerns. Teachers concerns about the TPRI stories extended to concerns about the comprehension measures, including the listening comprehension measures. Like the concerns above, some these concerns appear to relate to the teachers' impression that TPRI stories did not closely resemble the motivating stories children experienced in their classrooms.

> **Kindergarten teacher:** *I wasn't real keen on the stories . . . My top, top student who reads anything – she reads on l, like, level sixteen – I was reading her this story . . . and I could tell she's no more interested in this story . . . I tried to use my voice to make it, you know, interesting, but . . . Is it comprehension, or is it just attention on any given day? And I think with this age group, it's probably be better to do that more than once . . . because their attention span is so . . . I mean, (even with) the wind going by, you know, they lost it.*

Other concerns related to teachers' wish that the assessment would be less subject to students' prior knowledge. Teachers felt that some students could use prior knowledge to answer the questions, even if they had not comprehended the passages.

> **Second grade teacher:** *Comprehension was too easy for the penguin story. Students know where penguins live and how they walk. I would have liked a better measurement of their comprehension than that . . . (reading the comprehension question) – "So where do penguins live?"*
> **Interviewer:** *So here's what you're saying, they didn't need to have read (the passage) to know this?*
> **Second grade teacher:** *No. Where do penguins live? They're going to tell me it's a cold place.*
> **Interviewer**: *OK*
> **Second grade teacher:** *So they always got that one.*

> **Special Ed teacher:** *. . . many of the comprehension questions could be answered by the student's prior knowledge of the subject matter.*

Two of the teachers mentioned that they thought the comprehension questions were either difficult to score or confusing to the students.

> **First grade teacher:** *I thought the answers to some questions were confusing . . . Does a child have to have both answers listed in order to get a point, or is just one part sufficient?*

> **Kindergarten teacher:** *Oh, this is for the frog story. OK, it's about these frogs that have this problem, and the dad's got to do something, (because) they're (the children frogs) driving (him) crazy . . .. (Then later) the frogs sneak out through the garbage can . . . 'This is the problem," said Dad. There was a hole in the garbage can.*

Then the first question, though, is 'why were the frogs a problem?' They say 'problem' but they're referring back to the first part of the story (where the frogs are driving the dad crazy, not the problem of them sneaking out of the hole in the garbage can.)

Once again, these concerns appear to matter less if the purpose of the TPRI is to maximize the chance that students with reading problems will show their difficulties by failing the test items. These concerns matter more if teachers want an assessment to give them a highly realistic picture of how students will perform with real stories in their classroom.

Concerns about the definition of fluency. As part of their district assessments, the L & C teachers rate students on fluency using a rubric related to prosody (e.g., "reads word-by-word," "reads in phrases," etc.). This conception of fluency did not match the TPRI's definition of fluency, as measured solely by rate and errors. This mismatch caused the L & C team some concern.

> **District Literacy Specialist:** *I think fluency is something that —you know when you're looking at the TPR,I you're looking at that accuracy –well, words per minute. But it's like I explained to the teachers there — there's more than that. . . we'd look at more of the prosody here …*

> **Second grade teacher:** *I did not care about the fluency rate because I do not feel that is "fluency".…..good fluency is when you are reading and entertaining the reader…So I was confused when I saw that part… I do not like the reading accuracy because it does not measure enough.*

Phonemic awareness vs. vocabulary knowledge. The authors of the TPRI note that the screening items intentionally start out as more difficult than the inventory items, since their main purpose is to identify children who are unlikely to have reading problems, and who do not need to take the inventory. This feature did not match the expectations of the kindergarten teacher, who was concerned that the difficult phonemic awareness items confounded phonemic awareness with vocabulary, giving her a less true picture of students' abilities:

> **Kindergarten teacher:** *. . . on this one phonemic awareness part which I have practiced a lot with my (students) . . . they're having trouble with it in the test, though, that words are so unfamiliar to them. Now, . . . are you checking their vocabulary, or are you checking their phonemic awareness? They don't know what a 'mast' is . . .. Now, when I sound out 'table' or 'chair' or 'snack' or one of their names or a toy, they're fine . . . I mean, to me that would be very advanced phonemic awareness if you could . . . listen to a word that you may have never heard before.*

Concerns about frustration with special education students. The Special Ed teacher noted her concern about how the TPRI assigns the oral reading passages.

Special Ed teacher: *Other tests have started students on easier levels and allowed them to work their way up to the more difficult levels. The TPRI places you, according to vocabulary recognition, on the highest level possible and determines as you read . . . whether you should go down to another level or levels. This might be discouraging to my L.D. students who may become frustrated and not receive that confidence boost from first reading something on their independent level . . . I think to avoid discouragement you work your way up from a reading level that is comfortable to that which is frustrating – not the other way around. The TPRI on the Palm would have to include many other reading selections to do this.*

We close this section by acknowledging that our knowledge about the TPRI is fairly limited. Neither of this report's authors have used the TPRI or attended professional training sessions. Therefore, we are not in a position to defend the TPRI from these concerns. We hope that our reporting of them is helpful to those involved with TPRI in understanding what concerns *can* arise. That way, the concerns listed here that could be addressed and defended with additional professional development should be better addressed in future implementations.

Section 8. Lessons for Future Use

As we expected, our extended conversations with the L & C team provided us with many valuable insights about the use of handheld computers for literacy assessments. We also developed an even greater respect for the complexity of contextual features that surround pilot implementations like this one. Although these contextual features can limit the instructional impact of a tool's initial use, our increased understanding of them can prevent us from making simplistic generalizations about the effectiveness of tools across schools and across circumstances. They can also highlight the changes in contexts that are most likely to maximize a tool's effectiveness.

Summarizing the lessons learned from an experience as rich as this one is difficult at best. We believe that the teachers' highly positive reaction to the Palms, in spite of difficult circumstances, indicates a great potential for them to be a valuable component of an information infrastructure like the one that our MacArthur project envisions. In this section we will attempt to list major lessons for the future use of handhelds as literacy assessment tools within such an infrastructure.

- **Consider the relationship of the Palm assessments to other district testing requirements**. If possible, make the Palm assessments consistent with these requirements, in order to reduce teachers' workload.

- **Consider the relationship of the Palm assessments to teachers' implicit assessment goals**. The L & C team clearly wanted their Palm assessments to help them better understand all of their students, from the beginning of the year, and provide information to help move all students forward in their literacy. They also wanted the assessments to map onto children's reading performance with real books in their classrooms. Mismatches between these implicit goals and the TPRI's primary purposes caused many concerns in this implementation.

- **Consider that teachers may need access to more than one grade-level set of tests.** If the teachers' goal is to know the literacy stage of each of their students, and know how to move each student forward, then one grade level of tests may not be enough. Having one grade level of tests (second grade) was particularly problematic for the Special Education teacher in this implementation, but it also limited the kindergarten, first, and second grade teachers from getting a complete picture of literacy development for students in the lowest and/or highest ranges.

- **Provide opportunities for teachers to talk with each other about their data.** Also, be aware of how features of the test may limit the value of cross-grade conversations, if the tests differ markedly across grade level. Teachers' initial reaction to the TPRI was that it would be difficult to have cross-grade conversations about it. It is unclear whether further professional development would enable this reaction to change. Other assessments that have more similarities across grade levels may be more useful for cases where cross-grade conversations are important, as in small schools with only one teacher per grade level.

- **Be aware that teachers will gain many of their insights about students' literacy while giving the assessments**. Do not assume that teachers will get all of their insights from the data displays; in many cases the data displays may serve more as reminders to their

insights. Also, do not make the mistake of assigning others to give the assessments, assuming that teachers can get all of their insights from the data displays.

• **Consider how well the teachers' prior knowledge about concepts map onto the assessments' definitions for those concepts**. In this instance, mismatches between the teachers' definition of fluency, as a construct that included prosody, and the TPRI's definition of fluency, which featured errors and rate but not prosody, raised concerns.

• **Create a plan for how teachers will get their questions answered as they begin to implement the tool**. In this case, the district literacy specialist played a large role.

• **Provide an experienced data coach to sit with teachers as they reflect on their own data.** The L & C team clearly needed this type of support, and they suggested that such a data coach would help them make more use of the data.

• **Look for ways that the data displays can make it easier for teachers to group children for instruction.** The L & C teachers believed that there could be improvements in the current data displays, to feature more automatic grouping suggestions.

• **Create an advance plan for dealing with the possibility of theft or loss of the handhelds.** Prepare teachers for this possibility and encourage them to guard against it. Provide means for replacing Palms or sharing Palms as necessary so that assessments can continue without delays and further problems.

We would like to thank the L & C team again for sharing their insights, delights, and concerns with us during their exploration of the TPRI/Palm tool. We will end this report with their advice for other schools embarking on new adventures with this tool or similar handheld literacy tools:

> **Kindergarten teacher:** *My advice for other teachers and schools who may be considering using the TPRI handheld tool would be to be sure and read the TPRI Teacher's guide completely.*

> **First grade teacher:** *Have a really good in-service and make sure you practice the test with someone before trying to give it.*

> **Second grade teacher:** *You need to have a lot of training for teachers. It is not fair to put something on them and expect them to have it done and mastered without adequate training.*

> **Reading Recover teacher:** *My experience with the TPRI is very limited, but my advice would be not to be afraid to use it. It's like all other technology, the more you are familiar with it the easier it becomes and the more comfortable you are using it.*

> **Special Education teacher:** *I believe the Palm Pilot along with the TPRI provides a quick way of assessing students to decide where to begin reading intervention. The activities included in the book that accompanies the program, or the specific activities suggested on the screen for each student could be an excellent teaching resource.*

> **District Literacy Specialist:** *Hold general meetings where everyone is attendance; the only way this can be mandated is to hold the meetings during their school day*

where everyone hears the same message and misconceptions or preconceptions can be clarified. Having the principal support the project is also crucial – when teachers can see that the administration is supporting their efforts – I feel the teachers are more willing to give it the extra effort. Having a principal that responds to the needs of the teachers has been a plus…. Time needs to be built in to have instructional conversation around this tool and its content.

Principal: *Be involved with the teachers using it. Make them know that you are interested in what they are doing and are there for them.*

References

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Appendix A
Interview Questions for First Round Interviews (Via E-mail)

(Questions for Teachers)

Section 1: General social practices around the Palm TPRI tool:

Have you had time yet to reflect on the TPRI data? When do you have time to reflect on the TPRI data? What else could the school do to make it easier for you to spend time on this reflection?

Tell us about any interactions you have had with the literacy specialists and other teachers in which you discussed the TPRI data

Has the TPRI been valuable to you yet in discussing problems with other teachers and getting help from them? Why or why not?

Are there particular social practices (e.g., particular kinds of meetings) that you think are important for this tool to be successfully used in a school?

Section II: TPRI data and data displays

If you have looked at your students' data from the TRPI, tell us about what you looked at. (If it's helpful, you can refer to pages in the "mCLASS TPRI User Guide" to describe different views of the data that you have used.)

What particular displays of the data have been most helpful for you?

Can you describe how the views of the data have helped you see a pattern in a child's reading development?

Can you describe a teaching decision that you made as a result of seeing this pattern?

What other kinds of data displays might be helpful for you?

Before using the TPRI, did you collect oral reading data (e.g., running records or others)? What format did you use? How does it differ from the way you collect oral reading data on the TPRI?

If you did collect oral reading data previously, did you analyze students' oral miscues . . . for example, the kinds of substitutions made, the phonics sounds students use to sound out words, the students' ability to self correct, students' rereading, and so on?

(If yes to above) Was the analysis of students' oral miscues (as described above) useful for instructional planning? Why or Why not?

With the TPRI, you are recording errors and rate. Is this form of analysis useful for your instructional planning. Why or Why not?

The TPRI phonics assessment inventory has several parts. Are these useful for evaluating your students' knowledge of phonics? Why or why not?

Are some subtests more useful than others? If so, what makes them more useful?

Is the display of the phonics scores useful for your instruction? Why or Why not?

Are you currently satisfied with the passages on the reading accuracy and listening subtests. Why or Why not?

What is your current evaluation of the comprehension measures. Are they useful? Why or why not?

Please describe any other ways that the data from the TPRI (Texas Primary Reading Inventory) seems different from reading data you have collected in the past.

Section III. Open-ended responses:

Based on your experience to date, what is your advice for other teachers and schools who are considering the TPRI handheld tool?

Is there anything else about your experience with this tool that you would like to share with us, to help us make decisions about its possible role in an information infrastructure?

What do you need to make this tool a more useful and effective part of your instruction?

Are there any other ways that the handheld technology affects your ability to reflect on the reading development of students at this school?

(Questions For Literacy Specialist, Principal)

Section 1: General social practices around the Palm TPRI tool:

About how many conversations have you had to date with teachers about the TPRI data?

To date, has the TPRI data helped to facilitate your conversations with teachers about ways to tailor instruction for students?

What are your hopes for ways that this tool could facilitate your conversations with teachers in the future?

Are there particular social practices (e.g., particular kinds of meetings) that you think are important for this tool to be successfully used in a school?

Section II: TPRI data and data displays

Have you looked at data from the TPRI? Tell us about what you looked at. (If it's helpful, you can refer to pages in the "mCLASS TPRI User Guide" to describe different views of the data that you have used.)

How have the displays of the data been helpful for you? Tell us about any decisions you have made after viewing the data.

What other kinds of data displays might be helpful for you?

What are your hopes for ways that this tool could facilitate your decision-making in the future?

Please describe any important ways that the TPRI data is different from other reading data you have used in your decision-making in the past.

Section III. Open-ended responses:

Based on your experience to date, what is your advice for other principals/literacy specialists who are considering the TPRI handheld tool?

Is there anything else about your experience with this tool that you would like to share with us, to help us make decisions about its possible role in an information infrastructure?

What do you need to make this tool a more useful and effective part of the decision making that you do?

Are there any other ways that the handheld technology affects your ability to reflect on students' reading development at your school?

Appendix B
Final Interview Template

The final interviews will focus on three strands:

• Usefulness of the technology. (Perceived benefits, general implementation issues, work flow issues)

• Teacher's reflection strategies with the technology

• Features of the TPRI. (Including structural features that may impact how teachers reflect on the data and communicate with other teachers at the same or different grade levels).

Each of these strands will be explored in three different conversation contexts with teachers:

• Sample administration of the TPRI

• Side-by-side reflection of data displays on the website

• Final discussion

Part I. Sample Administration of the TPRI

(15 - 20 minutes)

In this part of the interview, I will ask teachers to walk me through an administration of the TPRI. I will elicit information about the following:

• Usefulness of the technology.

  How do the mechanics of the administration (saving, hot-syncing, etc) affect the teachers' work flow?

  How do teachers manage to work one-on-one with a child for the assessments? Which teachers had aides to manage the rest of the class? What did teachers without aides do?

• Teacher's reflection strategies with the technology.

  Do teachers reflect about the assessment after administering it, before looking at the data on the website?

• Features of the TPRI.

  What are the content differences between the screening and the inventory?

  What are sample items for each subtest at each grade level?

Part II. Side-by-Side reflection with data on the website

(15 - 20 minutes)

In this part of the interview, I will ask the teacher to walk me through a sample session of looking at their data and talk with them about how they interpret the displays. Questions

for each strand will include the following:

- Usefulness of the technology.

    When, where, and how often did they look at data on the website?

- Teacher's reflection strategies with the technology.

    How do teachers understand the displays? How do they interpret displays that show whether a student a "strong" or "weak" in an area.   Do the displays tell them what to do next in their practice? Why and how do teachers choose the activities they do in responding to the data?

    What surprises have teachers had from the data? Can teachers further describe instances where the data disconfirmed their beliefs about a student's literacy development.

Importantly, I will further probe their responses about insights from the data. Did they get these insights from the displays, or did they form these insights internally, directly from their experience of administering the assessments? This issue can help inform us about the implications of having aides — or technology activities — capture the data without the teacher present.

- Features of the TPRI.

    Would other ways of displaying scores at either more general or more specific levels be useful? How did — or how might — teachers combine numeric score information with observations and notes?

Part III. Final discussion

- Usefulness of the technology.

In this part of the interview, I'll talk with each participant to confirm important dates and events, including:

    -When they first heard of the project

    -When they agreed to participate (and why)

    -The first training session (and what it entailed)

    -The second training session (and what it entailed)

    -The first assessment cycle (including estimated time per child, number of children given the screening vs full inventory)

    -The second assessment cycle

To date, teachers have primarily commented on the efficiency that the tool provides. Follow-up questions to these responses will include:

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Please tell me more about why the tool makes your work more efficient.

Besides efficiency, can you describe other ways the tool is useful?

What can the schools do to help you make the handheld technology useful?

What are particular problems in your teaching practice that this tool is useful — or could be useful — for? What are other literacy-related problems of practice that this tool does not address?

- Teacher's reflection strategies with the technology (individual, social)

How much experience with data have these teachers had, before this project?

Here we will also discuss follow-up questions to teachers' e-mail responses about their conversations with other teachers (across grades, or with teachers of the same grade not involved in the project), principal, and the literacy specialist. Any other reflection-related comments not clarified earlier will also be discussed here.

We will also talk about their current use of historical data (from previous years) and their views on how this tool might change their use of historical data.

- Features of the TPRI (follow-up)

Questions in this section will further probe teachers' comments about the usefulness of particular TPRI subtests, and also on the way that the TPRI (compared to other assessments) groups and displays scores for different categories of skills.

We will also talk about whether other kinds of literacy measures, not currently part of the TPRI, would be useful as additional handheld tools.