Research, Consultation, & Teaching Program Training Module No. 9

RCTP

District-Wide Performance
Assessment Using Curriculum-
Based Measures

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Introduction

In the middle 1970's, research and development began on a series of performance-based measures that became known as curriculum-based measurement (CBM). These measures were designed to overcome many of the limitations of the published achievement tests, which had dominated large-scale testing practices, and which were ostensibly norm-referenced in their interpretations. Curriculum-based measures also represented an alternative to criterion-referenced tests, which tended to use selection responses (i.e., multiple choice and matching), and usually represented a narrow and stipulated relationship with instruction. CBM was based on direct and frequent measurement, and, therefore, incorporated production responses (with students actually reading, writing, and completing math problems) and were brief in duration, allowing their administration on a more frequent basis.

In the late 1980's, a raft of alternative measures appeared in the professional educational literature that were oriented much more to CBM, incorporating many of its essential features (Sugai & Tindal, 1993). These alternatives became variously known as "portfolio," "authentic," "performance-based," and "outcome-based." Although heavily emphasized as appropriate and functional, descriptions of these measurement systems were primarily conceptually, rather than empirically based. Authors touted them as a more realistic and focused way of capturing achievement.

For example, Vavrus (1990) described the portfolio as "more than just a container of stuff. It's a systematic and organized collection of evidence used by the teacher and student to monitor growth of the student's knowledge skills and attitudes in a specific subject matter" (p. 48). Newmann (1991) identified "authentic achievement" as requiring students to "engage in disciplined inquiry to produce

knowledge that has value in their lives beyond simply proving their competence in school" (p. 460). Finally, Wiggins (1990) included in his work a range of performance assessments, such as estimating physical quantities, measuring objects, role playing, and various speaking and writing activities.

Although most of these alternative assessment formats appear to be reasonable and appropriate, little research has been conducted on them. Their technical adequacy is unknown and the outcomes from their use is uncertain. In contrast, CBM has been investigated for nearly two decades, with studies conducted into various sampling plans for material development, criterion-validity for linking outcomes to other established measures, and use in making a variety of educational decisions (including screening and eligibility, instructional planning and diagnostics, and formative and summative evaluation). In general, the data that support CBM are very robust and supportive. Yet, as noted by Yell, Deno, and Mitchell (1993), one of the most frequently cited problems with CBM is the lack of face validity: The brief measures have been viewed with suspicion among general and special education teachers.

In an effort to expand CBM and expand the data base behind it, a set of "look-alike" measures was developed. These alternative measures had many of the same features as the original CBM: They were brief in duration, used standardized administration and scoring directions, and employed production responses. Yet, they also moved into some new areas that had not been investigated yet, such as story retelling, judgments of oral reading prosody, writing with editing, and a host of math problems beyond simple computation (from measurement to story problems). This training module describes these alternative CBMs, with directions for implementing them in a local district. Included in this manual are explicit directions and scoring systems; it is part of a larger package in which student

protocols and results are displayed, and it should be viewed as a beginning on the road to validation of new classroom-based measures.

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READING

Oral reading fluency (ORF) measures provide very informative evaluations of student reading ability (Fuchs 1987; Tindal & Marston, 1990; Hasbrouck & Tindal, 1991) and can be used in a number ways. For example, performance can be analyzed diagnostically to ascertain specific error types and decoding misrules; furthermore, the scores can be organized as a distribution, and student performance within a classroom, grade or district can be plotted to identify extremely (dys) fluent readers. Such scores also can be compared over time to determine whether student performance is improving.

Many criterion measures have been used in validating oral reading fluency: Close, word meaning, published achievement tests, as well as retells, and question answering (Fuchs & Deno, 1992; Deno, Mirkin, & Chiang, 1982; and Fuchs, Fuchs, & Maxwell, 1988). Such research has documented the effectiveness of oral reading fluency as a measure of student skill in reading. The work of Marston and Deno (1982) is typical of this research; they focused on student progress monitoring systems and found that oral reading fluency (e.g., number of words read correctly per minute) is both reliable and valid as a measure of student progress. In another study, Marston, Deno, and Tindal (1983) found greater "effect sizes" when measuring student progress with oral reading fluency from curriculum word lists than from standardized reading sub-tests. For these reasons, one of the two reading measures within curriculum-based assessment (CBA) is oral reading fluency.

In addition to fluency, we describe another reading measure that is related to comprehension. Irrespective of the last decade of research, which reflects a

substantially high correlation between ORF and many measures of comprehension, teachers still cite the lack of "face" validity with this measure. Therefore, to complement the ORF measure, we prefer using a "low-inference" measure, in which students summarize (or retell) a story. Although the measure may not capture everything that people intend when using the term "comprehension," it must certainly reflect an important skill within this construct; furthermore, it has all the other important characteristics of CBA (e.g., it uses a production response, it is capable of generating many alternate forms, and so forth).

In the "reading retell" measure, students silently read a story, summarize the main idea of the passage, and then complete a full retell of the story (paying attention to sequence and detail). To generate the retell, students are asked to tell back the story in writing as if they are telling it to a friend who did not get to hear or read the same story. The measure is completed in a total of 15 minutes and can be administered to students in their reading groups, usually within the classroom setting.

Second Through Fifth Grade Reading Measures

A complete description of two reading measures, procedures for administration, scoring, and training are provided in this section. As stated previously, oral reading fluency is the initial measure administered to students in second through fifth grades. All students are asked to read two passages aloud to trained administrators, with performance scored both quantitatively and qualitatively. Additionally students read a separate passage silently and write a retell describing the story in their own words. This measure is scored using several objective and subjective procedures.

Oral Reading Fluency Administration

All administrators should be carefully trained within one week prior to collection of this measure. Data collectors should use specifically prepared standardized directions, clipboards, a pencil, and stop-watch for administration of this measure. Two passages are selected for each grade level. All students are given 1 minute to read each passage, with administrators scoring each protocol as the student reads. Administrators need to listen to students read individually, away from classroom distractions.

Standard administration procedures are used for all reading assessments (see Figure 1). The directions for administration of oral reading fluency measures are specific to each passage. As can be seen in Figure 1, the administrator states the title of the story and includes a brief statement about the passage. Such directions are designed to help students prepare for reading the passage and insure that all students are administered the measure in the same manner.

Students are asked to read aloud to the best of their ability. As noted in the directions, students are told that if they come to a word they don't know, the administrator will tell them the word. The purpose of this procedure is to get as much reading in the 60-second period as possible. We do not want students to spend several seconds attempting to read a word they don't know. A more accurate measure of student reading skills is achieved when the student is told the unknown word. In such a case, the word is counted as an error.

Training and Scoring Oral Reading Fluency

No single measure is sufficient to make final decisions about a student or class overall performance. Likewise, one scoring procedure does not paint a complete picture of a student's skill. Oral reading fluency measures, therefore,

should be scored both quantitatively (counting specific reading behavior) and qualitatively (making judgments regarding prosodic features of oral reading).

Directions for Passage Reading

Say to the student, *You are going to read this story titled <u>King Chubby</u> out loud. This story is about a <u>king who likes to eat food</u>. <u>He liked to eat food so much that it caused him to have some trouble</u>. Read this story until I say stop and show me your best reading."*

When I say 'start,' begin reading aloud at the top of this page. <u>Read across the page</u> (DEMONSTRATE BY POINTING). *Try to read each word. If you come to a word you don't know, I'll tell it to you. Be sure to do your <u>best</u> reading. Are there any questions?*

Say, *Begin,* and start your stopwatch.

Follow along on the copy of the passage/word list in the student booklet, marking the words that are read incorrectly. A list of error types is attached.

If a student comes to the end of a passage or word list before the time is up, point to the beginning of the passage or word list and say to the student, *Begin again.*

<u>After one minute,</u> say, *Stop ,* and place a bracket ( ]) after the last word read. Then say to the student, *Thank you for reading.*

Count the number of words read correctly and incorrectly; write score at the top of the page. After student has completed reading measures, transfer the data.

Figure 1. Standard administration procedures for oral reading fluency measure.

Quantitative Scoring Procedures

Quantitative scoring in oral reading fluency specifies the exact reading behavior considered correct and in error and reflects a count of the number of words read correctly in the 1-minute timing period. Administrators should be introduced to definitions of reading errors and taught how to identify and mark errors on student protocols. Specific error types and specialized markings are listed in Figure 2. Initially, trainers should verbally present definitions and several examples of the error types by reading sentences and then paragraphs to trainees.

think ~~thick~~	**mis-identification** (student decodes word incorrectly). Slash word and if possible, write word student said.
she (had) smiled	**omission** (student leaves out word). Circle word omitted
H ~~left~~	**hesitation** (student doesn't decode word within 3 seconds) Tell student word and mark H over the word.
mom ~~mother~~	**word substitution** (student uses word or similar meaning). Slash word and write word substituted.
was said he	**reversal** (student says "was" for "saw" or "said he" for "he said"). Mark transposed part with a loop.
SC ~~dog~~	**self-correct** (student says "dot," then self-corrects and says "dog"). Write SC or C over the word.
once he ^ said	**insertion** (student adds word). Mark a carrot and write in word added.
he was very	**repetition** (student repeats word or phrase more than once). Underline word or phrase repeated with wavy line.

Figure 2. Specific error types and conventional markings used in this assessment.

In this training manual, scoring procedures include specific marks for particular error types. All administrators of student reading measures need to identify errors using the same marks; with such a uniform procedure, the data collected can be diagnostically analyzed and scores can be compared across students, classrooms, and schools.

Trainers should provide guided practice of data collection for timed passage reading by orally reading like a student. After learning the error types and specific marks, trainees then should receive a new passage, which the trainer reads with planned mistakes as trainees mark errors. After the 1-minute reading simulation, a reliability check should informally be taken and questions resolved about marks and "what-if" situations.

The final training step includes role-playing practice, in which trainees are paired off, one administering the directions and scoring while the other reads like a student. Sample passages for practice are included in the student protocols of this document (similar to the example in Figure 3). Trainers should informally check the reliability of scoring by listening to pairs of people as they practice. The trainees then can calculate the final score as described below.

At the top of each reading protocol a space is provided for the administrator to record the student's name and total number of words read correctly. For diagnostic purposes, a count of specific error types is also recorded. The protocol provides space to record a count for each of the specific error types (mis-identification, word substitution, omission, hesitation, and reversal) (see Figure 4). These data can be used by teachers to trade individual student or total class information regarding the types of reading errors that most frequently occur. Reading behaviors not subtracted from the word count (e.g., self correction, insertion, repetition) are recorded on the passage itself.

Adventure On The Rocky Ridge

Little Martha never knew that she was almost given away	10
when she was still a tiny puppy. She didn't know she was a	23
runt, the smallest puppy in a litter of twelve puppies. And she	35
didn't know that her mother was a prize hunting dog and that	47
the people who owned her mother raised the best hunting dogs	58
in North Carolina. Little Martha didn't understand that the	67
owners kept only the best puppies from each litter. Those were	78
the biggest, and the strongest. The rest were given away.	88
Little Martha's first memories were ones of great happiness	97
and terrible sadness. Her eyes were still closed when she was	108
born and they remained closed for two weeks. During the time	119
when her eyes were closed, Martha experienced great joy when	129
she snuggled next to her warm mother. She also felt great	140
despair because one of the large puppies in the litter would	151
push her away, and Martha would lie there, shivering and cold.	162
Martha would squeal little sounds of misery as she lay there,	173
but her mother couldn't do much to help her. There were just	185
too many puppies in the litter and the mother could not take	197
care of all of them. So during her first days of life, Martha spent	211
a lot of time aching from hunger and shivering from cold.	222

Figure 3. Sample oral reading fluency passage.

Student:		Fall	Winter	Spring	School:		
CWM	/ Miss/Subst.	◯ Omission		∿ Reversal		H Hesitation	

Figure 4. Scoring for specific error data.

The quantitative score for student reading is words read correctly per minute. The protocol that administrators use for marking errors and indicating the student score has a cumulative count of words for each successive line typed in the margin (see Figure 3). The purpose of this cumulative word count per line is to speed up the scoring process. Administrators need not count each word read; instead they may calculate the total number of words read (at the last complete line and any extras) and then subtract the errors for a final score. Each word read correctly receives one count, hyphenated words are counted as two words, and any numbers are counted as one word. At the completion of the timing with each individual student, administrators simply count words and errors and quickly calculate the reported score of number of words read correctly per minute.

Two passages typically need to be read by each student with their average score reported for these two passages. This procedure is used because reading materials' predictability varies from passage to passage. By reporting an average score for student oral reading fluency, a more accurate indication of student performance can be obtained. Research from the University of Minnesota Institute for Research on Learning Disabilities has documented the need for alternate forms (passages) in measures of oral reading fluency. That is, any single passage may not adequately represent a student's reading fluency. For example, Tindal, Marston, and Deno (1983) found all other forms of reliability to be higher than alternate-form reliability; Fuchs, Deno, and Marston (1983) found that estimates of student performance can be enhanced with longer duration measures and when using more than one passage. The reading passages included in volume II of this CBA training set are from two diametrically different passages (one was basal-based and the other was literature-based). A listing by title of the passages selected is provided in Table 1.

Table 1. Table of Reading Measure Passages by Grade Level

Grade	ORF Basal Passage	ORF Literature Passage	Retell Passage
1	–	Little Red Hen	–
2	Show and Tell Surprise	Jasper the Hero	Dark Star
3	Through Grandpa's Eyes	King Chubby	Nothing Much Happened
4	A Day in the Life of a Cowboy	Annie and the Old One	The Story of Pauline
5	The Adventure of Ant and Uncle	Island of the Blue Dolphin	The Mouse that Ate Iron

Qualitative Scoring Procedures

Oral reading fluency also can be qualitatively scored. Student prosody — the ability to read with coherence, fluency, expression, and style — is measured on a rating scale immediately following each passage reading. This measure requires no special administration; rather, performance is judged immediately following each oral passage reading. Administrators however, need to be trained to attend to several oral reading features to determine a reading prosody score. These are features more closely related to auditorily pleasing qualities of a student's reading: expressiveness, attention to end marks, punctuation, and the efficiency with which the passage is read. Prosody scores are ranked on a 5-point scale, with each ranking defined as follows.

A score of one (1) indicates that the student reads single words in isolation from one another. There is no "flow" in the student's reading. The words sound telegraphic because the student is demonstrating only word-by-word reading.

A score of two (2) indicates that the student reads with phrasing of perhaps only two to three words. For the most part, reading is very hesitant. The student displays considerable pausing and drawn-out blending in an attempt to decode

the words. This level of reading demonstrates more word calling rather than fluent, comprehensive reading.

A score of three (3) indicates that, while the student pauses for ending punctuation, inflection changes may not be present from sentence to sentence. In other words, the student is reading in phrases but missing the tone considered necessary in fluent, understandable reading.

A score of four (4) indicates that, most of the time, the student demonstrates appropriate reading "flow" and phrasing. This prosody score also indicates attention to punctuation with pauses and appropriate inflection.

A score of five (5), the highest prosody score, is characterized by reading that generally flows. The student's voice changes to reflect meaning changes in the passage. Ending inflections are consistently appropriate. Reading is fluent and smooth, generally pleasing to the ear, and easy to understand.

Administrators for oral reading should be trained by using the above definitions and orally presented examples to rate oral reading on prosody. Multiple examples of student reading need to be presented during training with the administrators-in-training collectively assigning a prosody score. After several minutes of practice and reviewing definitions of number-ratings, the group can typically reach reliability in assigning a prosody score to sample passage reading.

A key of definitions is located at the top of a score sheet designed for recording oral reading fluency prosody. This sample score sheet is basically a roster of student names (organized by the teacher) with two scales by each student name for each passage the student reads (see Figure 5, next page). Administrators should have the definitions at hand while assigning prosody scores to students during this measure.

Key:

(1) Tele = Reads single words. No "flow." Telegraphic in sound. Word-by-word reading. Word calling.

(2) 2-3 Word = Some phrasing is noted (2-3 words). Very hesitant reading. Considerable pausing and drawn out blending.

(3) End/No Inflec = Pauses for ending punctuation. Inflection changes may not be present. Reading in phrases but missing the tone.

(4) Flow Most = Appropriate "flow" and phrasing is noted as well as attention to punctuation with pauses and appropriate inflection *most* of the time.

(5) Flow/Punc/Inflec = Reading generally "flows." Voice changes to reflect meaning changes. Appropriate ending inflections. Fluent and smooth.

School Name	Tele	2-3 Word	End/ No Inflec	Flow Most	Flow/ Punc/ Inflec	Tele	2-3 Word	End/ No Inflec	Flow Most	Flow/ Punc/ Inflec	School Name
Student Last Name First	1	2	3	4	5	1	2	3	4	5	Student Last Name First
	1	2	3	4	5	1	2	3	4	5	
	1	2	3	4	5	1	2	3	4	5	
	1	2	3	4	5	1	2	3	4	5	

Figure 5. Example roster of student names and scores for oral reading fluency prosody measure.

In summary, oral reading fluency measures are scored during and immediately following passage reading. Administrators score error types as the student reads and assign a prosody score for each passage immediately after it is read. Only as students transition back to the classroom from the oral reading setting should the administrator count the number of words read, subtract the errors and then calculate words read correctly per minute.

Administration Training and Scoring
Silent Reading-Written Retell

The written *retell* is designed for group administration. Students silently read a passage and summarize what they have read. Passages selected are different for each grade level and different from the oral reading fluency measures. Two factors are fundamental to passage selection. First, teachers should be asked to choose passages appropriate for the particular grade-level curriculum in terms of interest and reading ability. Second, passages should be complete stories containing most if not all of the following elements: a beginning, which includes characters, setting, time, and place; a middle, with actions and events; and an end, which reflects a resolution, conclusion, or story outcome.

Administration of this measure includes providing students basic directions and then monitoring their work as they complete the *Silent Reading-Written Retell*. Directions for this measure are given orally to the entire class and are written at the top of each student's protocol. In a period of 15 minutes students read the passage silently, briefly write the main idea, and write more detailed story retells. Specific administration directions appear in Figure 6.

This is a Reading-Written Retell Test where you silently read a story and then write down what you remember, like telling a story to a friend. On the first side of your paper, there is a passage. When I say "Begin," I want you to read this passage quickly and carefully. When you are finished put the passage on the floor and look at the second sheet: There are two places to write. In the first box you need to tell about the most important thing in the story. You will need to write one or maybe two sentences.

In the second space, you will write about the story. Pretend you are telling it to a friend who did not get to read or hear this story. This part will be longer. Tell as much of the story as you can remember. You will spend most of your time writing this part of the paper. You want to show your best work.

You will have 15 minutes to finish both the reading and the writing. I will tell about the time as you are working. You can also look at the board to see how many minutes are left. If you need more writing space raise your hand, we'll bring you another sheet of paper. If you finish early please sit quietly at your desk so others can finish without being disturbed. Remember to do your best work, think about the story and tell it in your best writing.

Are there any questions? .... Turn to page 1 *and* <u>*begin reading*</u>.

Start the stop watch.

Figure 6. Silent reading-written retell administration directions.

All three portions of the written retell measures (silent reading, main idea summary, and full retell depiction) are completed in the allocated 15-minute period. To assist students in monitoring the passage of time, administrators should erase marks visible to everyone from a chalkboard in the following manner: At the beginning of the measurement period, 15 marks are written on the board. After giving the directions and telling students to begin, the administrator erases each mark at 1-minute intervals. Additionally, the administrator's directions need to include reminder statements at intervals of 5 minutes and 8 minutes to guide the students as to what portion of the retell

measure they should be working on at that point, and to be aware of the remaining time (see Figure 7).

Write the following on the board in large lines and easily visible to all:

TIME:

| | | | | | | | | | | | | | | |

Start the stop watch.

Administrator:

REMEMBER TO ERASE MINUTES OF ELAPSED TIMES ON THE BOARD!

Administrator:

At 5 minutes announce:

Five minutes are over, you should be finishing reading the story and writing about the most important parts of the story in the first box. Remember write one or two sentences about the most important part of the story.

REMEMBER TO ERASE MINUTES OF ELAPSED TIMES ON THE BOARD!

At 8 minutes announce:

Eight minutes are over, you should be writing on the second part, as if you were telling the story to a friend who did not get to hear or read it. Remember, tell as much of the story as you can. You have seven more minutes.

REMEMBER TO ERASE MINUTES OF ELAPSED TIMES ON THE BOARD!

At 15 minutes announce:

Stop, put your pencils down. Fifteen minutes are over and we are finished with this paper. Please turn it in. Thank you for working hard and following directions.

Figure 7. Silent reading-written retell: Time prompts for administrator.

Both components of the retell protocols (main idea and full retell) are scored using quantitative and qualitative methods. The quantitative procedures include a count of the number of words written and total number of thought units, while two different qualitative measures are used for the main idea summary and the full retell.

Main Idea Scoring

Although the main idea portion of the silent reading written retell is brief, important information can be derived from the student's writing. All scorers need to read all passages that students have read prior to scoring the retell for the main idea. Scorers also should be provided with a model of main idea statements for each grade-level passage.

Quantitative Scoring. The number of words written for the Main Idea simply reflects a count of every word (excluding numbers) that students have written in the space at the top of the page. This quantitative measure can be completed very quickly, given that students have been directed to write only one or two sentences.

Qualitative Scoring. Two strategies can be used to subjectively rate the Main Idea. First, scores can be anchored off a brief summary of each story, depicting several main ideas about which the student might have written. Any one of these summaries, or summaries that are similar, should be considered correct to varying degrees. Second, a numerical rating can be assigned to the main idea summary using a generic 0- to 3-point scale. Definitions or meanings for these scores are presented in Table 2. The 0-3 point rubrics for main idea retells need to encompass the full range of student writing behavior. At the most proficient end of the scale, a "3" demonstrates a clear presentation of the

main idea. On the opposite end of the scale, a "0" represents no behavior: The student (though present during this task) wrote nothing in the space for the main idea. Scores of 1 and 2 are rated for correct identification of the main idea and reflect the presence of some information, but are accompanied by a failure to communicate the main idea completely (see anchors below).

During training, the scorers should be provided with brief samples of student writing, which serve as examples of varying point values on this rating scale. The group can then practice collectively with actual protocols, until reliability is established.

Table 2. Key to Main Idea Rubrics for Silent Reading-Written Retell

Score	MEANING
0	Nothing was written in the space provided for Main Idea.
1	The student did not correctly identify the Main Idea. Few or no events related to the story are provided. Information that is presented mostly is irrelevant or incorrect.
2	The student presents one or two events or details related to the story. The information that is presented may pertain to a minor detail of the story but fails to communicate the gist of the Main Idea. Some inaccuracies or irrelevancies may be included.
3	The student correctly identified the Main Idea of the story. The information presented mostly pertains to the Main Idea and little or no irrelevant or incorrect information is presented.

Full Retell Scoring

As in the Main Idea scoring, the Full Retell is also scored using both quantitative and qualitative procedures. The Full Retell is the main body of the student's writing and, therefore, a more intricate system of scoring is employed.

Quantitative Scoring. Two quantitative measures of the Full Retell need to be considered: (a) the *number of words written*, again simply representing a cumulative count of each word included in the retell, and (b) the *number of thought units,* representing a count of every independent, grammatically-structured phrase (containing a subject-verb and possibly an object). Occasionally, it is difficult to read a student's handwriting, especially under timed conditions. Word count is scored independently of student spelling, punctuation, and the mechanical aspects of writing. Scorers are then directed to count "word salads" (defined as a collection of letters spaced similarly to the words the student has written) as well as words that can be clearly read.

Scoring thought units requires additional training and practice prior to scoring student work. A thought unit is a complete expression of a thought, usually a clause, that can be considered independent of other expressions of thought. When identifying a thought unit in the student's writing, attention should be directed to the subject/verb (S-V) patterns: The scorer is trained to look for units of expression that can stand alone. Thought units do not need to be grammatically correct; they simply have to represent a "stand-alone" phrase relating to the story. For example, the following sentence contains one thought unit with a "S-V, which V" pattern: "The walls rattled which caused the fall." A two thought unit sentence is "Harold went to the movie, but Shirley stayed home," both of which reflect the "S-V pattern." A guide for determining thought units is provided in Figure 8.

Each of the following counts as one t-unit

S-V	S-V, which S-V
S-V, which V	S-V, that S-V
S-V, that V	S-V, when
When S-V	Because S-V
S-V because S-V	S-V, if
If, S-V	

Each of the following contains two or more t-units:

S-V, and S-V
S-V, but S-V
S-V, so S-V
S-V, whereas S-V
S-V, or S-V
S-V; S-V
S-V, then S-V

Figure 8. Guide for determining thought units.

Prior to scoring student measures, scorers should practice with examples and non-examples from other student writing. Such scoring of thought units on writing samples can give scorers practice with feedback of the types of writing they may encounter while scoring actual protocols.

Qualitative scoring. Finally, a qualitative measure can be used to rate the student's skill in capturing and communicating the essence of a passage. Once again, guidelines are provided to assist scorers in attaching a numerical qualitative value to the student's full retell. While the following rubrics can be used to score the Full Retells, individual anchor papers also may need to be used to help make specific point awards.

The five-point scale should loosely guide scorers in assigning a numerical score to each student's writing (see Figure 9). This scale describes characteristics of what a retell must include to receive a numerical score. The lowest score possible (1)

represents extremely poor quality–little or no detail, inaccuracies in the retell, or nonsensical phrases. The highest score possible (5) characterizes a complete retell, including the main idea of the story and supporting details, well ordered with clear information from the story. The intermediary scores (2-4) represent a range of quality in expressing the gist and details of the passage.

Three steps are recommended in qualitative scoring of Full Retells. First, individual papers are rated as low (1), middle (3), and high (5), based on the 5-point scale. Second, scorers re-read the pile in the middle (rated 3), which is usually largest, and determine which are low and high (assign 2 and 4 level scores). Finally, scorers should read all protocols in each pile to determine if the retells are similar within the level, or if a retell should be moved up or down across the 5-point scale. A score of 0 is assigned only if there is no writing in the space provided for the student in the Full Retell protocol.

<u>5 points</u>
- Complete retell; includes both the main idea and supporting detail.
- Retell is substantially in the same order as the story.
- Much elaboration, minor details that embellish the story are included; reporting of finer points that do not really support main idea, but enrich the context of the story.

<u>4 points</u>
- Gist of the story is present and the retell generally is in same sequence as story.
- Substantial elaboration (more so than 3-point response); most detail is present.
- May contain some errors, but they are very minor (i.e., use of different adjectives).

<u>3 points</u>
- More details than 2-point retell, but generally following the same guidelines as the 4-points score, with the modifications noted in the 2-point score.
- May contain brief discussion of major points, but no supporting detail or elaboration.
- May be incomplete (does not mention all major points, but does include substantial elaboration of points mentioned).
- May contain some minor inaccuracies.
- May be reported out of sequence.

<u>2 points</u>
- May contain brief discussion of major points, but no supporting detail or elaboration.
- May be incomplete (does not mention all major points, but does include some elaboration of points mentioned).
- May be incomplete, but has gist of story (unlike 1-point retell).
- May discuss main idea.
- May contain some minor inaccuracies.
- Significant inaccuracy coupled with very brief response turns a 2-point response into a 1- point response.

<u>1 point</u>
- A few brief statements about the story.
- Contains some inaccuracies.
- May focus on just one aspect of the story.
- Not sequenced, nonsensical.

Figure 9. Five-point scale for full retell scoring.

First Grade Reading Measures Description

Reading measures for first grade are designed, administered, and scored quite differently than those of the second through fifth, primarily because first graders have very different reading skills: The primary interest in first grade is to measure reading skills that are just emerging. The ability of student reading in fall of first grade varies greatly from student to student as well as from grade to grade. Oral reading fluency measures are not sensitive to these skill differences. In other words, many first graders at the beginning of the school year are able to read perhaps only two or three words. Any oral reading fluency scores for these students would not be instructionally informative to teachers.

Six subsections of a reading measure are available for first grade beginning reading. Because of students' young age and given the nature of early skill development, all first-grade reading measures should be administered individually. A description of each subsection of the first grade reading measures is provided, followed by decision rules about which subsections to administer using student performance as the guide. As depicted in Figure 10 (page 27), this flow chart allows adequate opportunity for students to display emerging skills when present but avoids putting students through tasks for which they have no prerequisite skills.

Training First Grade Reading Measures

Administrators of the first grade reading measures definitely must receive additional training to that provided for second through fifth grade measures. These administrators must be proficient in fairly complex assessment interactions with students (e.g., hear and pronounce the phonic sounds represented by the symbols of the alphabet). As can be seen on several of the

subsections, many skills are essential to appropriately evaluate first graders' performance on this pre-reading measure.

Additional training for appropriate administration of this measure includes the use of the flow chart pictured in Figure 10 and criteria for each subsection of the entire measure. Clearly, not every student is required to take each of the six subsections of this measure. Administration of subsections is a performance-based decision, beginning with the Names task.

Administration and Scoring of the First Grade Reading Measures

A total of six tasks have been developed to measure various pre-reading and reading skills for first grade. As with the second through fifth grade measures, administration directions are standardized and clearly specified. Each subsection of this measure is designed to evaluate specific reading skills and requires separate administration and immediate scoring. In this way, the administrator, using the flow chart, is able to determine which subsection is appropriate to administer next, or if the assessment should be terminated. All scoring must take place as the student completes the reading tasks.
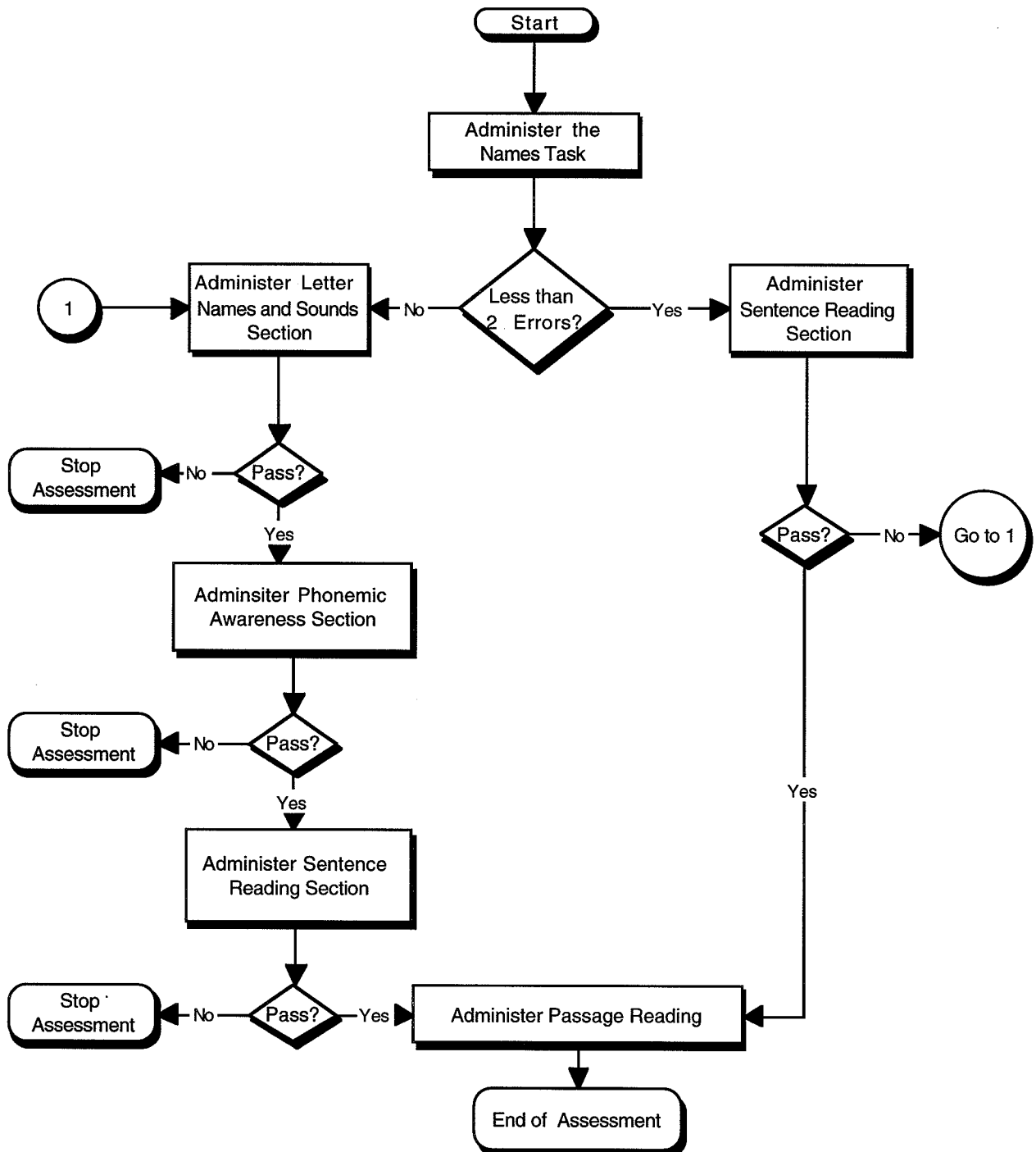
Figure 10. Flow chart for determining which subsection to administer based on student performance.

Names Task Subsection Scoring and Criterion

To address the need for authentic, functional, and meaningful activities to motivate students to read (Parker, Hernandez, & Hasbrouck, 1993), all first grade students are first asked to orally read a list of student names ("...pretending to help your teacher with the lunch count..."). Cunningham, (1990) first wrote about a Names Test for quick assessment of decoding ability. In this procedure, she created a list of first and last names which, in the form of a classroom list, met specified criteria to validly measure reading skills. The Names Task in this manual extends her work and builds from the empirical research of Parker, et al. (1993). Although research supports the need for beginning readers to demonstrate a basic understanding of letter-sound relationships (Adams, 1991; Stanovich, 1980), most phonics tests merely infer decoding abilities from students reading nonsense syllables or sight words (Parker et al., 1993).

The names for this list include fully decodable words containing high frequency consonants, vowel names and sounds, letter blends, letter combinations, word rules (i.e. final 'e' and soft 'c' or 'g'), and common English spelling patterns. At the same time, the names are not common names that students may have memorized. Ten first and last names, for a total of 20 words, comprise this subsection. A correct score is given when both first and last names are read correctly. Errors marked on the score sheet indicate exactly what a student said when reading the 10 names. With this information, teachers can review student responses and diagnostically evaluate a student's phonics skills.

The names task is the first of the six sub-sections of this measure. Performance on this sub-section of less than two errors would move the student to the sentence reading section; students who make two or more errors are administered the letter names task. Decision rules are listed on the flow chart (Figure 10).

Letter Names and Sounds Scoring and Criterion

All 26 letters of the alphabet in both upper and lower case are measured using the following procedure: Students are asked to identify the letter by name and by sound. In order to avoid recitation of the alphabet, the letters are organized into two columns with no particular order. High frequency letters are typed in bold-face print. If the student has difficulty with either task, the administrator is directed to have the student attempt only those letters in bold face, versus all 26 alphabetic symbols. A total of 104 tasks are possible in this subsection, and a criterion of 80% accuracy is the cut-off point in determining if the student would move on to the next subsection, or stop assessment. Eighty percent accuracy translates to 83 correct responses or an allowed 21 errors. If a student makes fewer than 21 errors, the next subsection, Phonemic Awareness, is administered.

Phonemic Awareness Subsection Scoring and Criterion

This subsection of the first-grade reading measure is designed to evaluate student skill in using the pre-reading phonemic skills of telescoping and segmenting (Carnine, Silbert, & Kameenui, 1990). An example of each task is modeled for the student prior to requesting the student to answer on their own.

Telescoping is defined as the process in which the student hears the word spoken at a slow pace, recognizes the slowly stated sounds as a word, and says the word at a normal rate. This measure includes six words that the administrator verbally presents at a slow rate for the students to repeat as words. The words are regular consonant-vowel-consonant (CVC) words. The composition of the consonants includes continuous and stop sounds, in both initial and final positions of the words. The selected words reflect a high probability of being a part of the student's speaking vocabulary and being used in beginning-level reading materials.

Segmenting is the opposite of telescoping. Again, six CVC highly regular words with continuous and stop sounds are used. The student in this task hears the administrator state the word at a normal rate and is then asked to say each sound heard in the word. For example the teacher says the word "rat." The student should say, "rrr-aaa-t."

In scoring either of these tasks, only quantitative procedures are employed. Correctly stated sounds and completely correctly stated words are counted in the telescoping task. For example, if the student says "an" for the word "tan," the student would receive a count of two for correctly stating two of the three sounds when saying the word at a normal rate. In the segmenting task, the number of correctly stated sounds within each word is counted. For example, if the student says, "iii-lll," from the word "sill," the student would receive a score of two. Scores are recorded for number of complete words stated correctly, and for number of sounds stated appropriately within a word (see Figure 11).

TEACHER SAYS	STUDENT RESPONSE	CORRECT?	Sounds Correct		
fat	/f/ /a/ /t/		1	2	3
met	/m/ /e/ /t/		1	2	3
sill	/s/ /i/ /ll/		1	2	3
putt	/p/ /u/ /tt/		1	2	3
run	/r/ /u/ /n/		1	2	3
can	/c/ /a/ /n/		1	2	3
		Total Correct			

Figure 11. Phonemic awareness segmenting task.

Word/Sentence Reading Subsection Scoring and Criterion

If students make less than two errors on the names task, administrators need to direct them to read selected words in isolation and then within carefully composed sentences. This task also may be administered if students pass the Phonemic Awareness task with 80% or better accuracy. The Word/Sentence subsection is designed not only to provide teachers with a quantitative score of each student's performance, but also to serve as a diagnostic tool. This subsection includes 12 three to four-letter words. In these measures, nearly all short vowel sounds and high frequency consonants are utilized in single-syllable words. The words also contain consonant blends but no letter combinations. If students read nine or more words correctly, they are instructed to read sentences.

Three sentences are included in this next subsection, with each sentence composed of high-frequency words (Carnine, Silbert, & Kameenui, 1990). The sentences, for the most part, contain regular, single-syllable, short-vowel-sound words. There are also common sight irregular words ("is," "a," "the," "little"); one word requires the silent-e rule ("lake").

In both tasks of this subsection, scoring is a quantitative count of the number of correctly read words. Nine of the 12 words must be read correctly to move to the sentences. The three sentences contain 21 total words. The student must achieve 80% accuracy or better ($\geq$ 16) to move on to the final subsection of the first grade reading measure.

Passage Reading Subsection Scoring and Criterion

This measure is administered in the same manner as the oral reading fluency measure for second through fifth graders. Students are told the title of the passage and asked to do their best reading. Specific errors are marked in a 1-minute oral reading sample. The reported score is correct words per minute. In the fall data collection for this measure, prosody scores are not usually included for first grade passage reading. However, both winter and spring measures may

include the qualitative prosody measure as described in reading tasks for second through fifth graders.

Summary of Reading Measures

In summary, using these reading measures (oral reading fluency, retells, and a range of beginning reading tasks for first graders) teachers can more appropriately place students into groups, verify instructional decisions, and determine if students are progressing at a satisfactory rate. Additionally, teachers can diagnostically evaluate student reading skills based on the types of errors noted in the children's reading.

WRITTEN EXPRESSION

The procedures used to evaluate students' writing skills involve direct measures, in which actual examples of students' writing are scored. These methods involve "real-world" writing context and provide teachers with several measures of different writing skills. Students in first through fifth grades are measured using the same procedures for administration of specific tasks and scoring of their written products. These measures vary only in the prompts given to students to write.

Administration of Written Expression Measures

Similar to writing assignments in classrooms, students completing this measure have several opportunities to develop their writing. Initially, the students are presented an Idea Sheet. This portion of the measure allows students 10 minutes (grades 2-5, 15 minutes for first graders) to make notes, draw idea pictures, write an outline, write words, engage in a group brainstorm, or think about the prompting idea. This preparation phase is designed to help students organize their thoughts and develop an approach prior to any actually writing. Directions are written at the top of the idea sheet, over a blank box for writing and/or drawing (see Figure 12).

Each grade level is given a different stimulus to generate writing. To be effective, these "story starters" need to get the students writing about something which is appropriate to their appropriate age and interest level. The oral directions provided for the administrators are designed to be stated the same way and therefore can be used for all levels and at all administration times to ensure consistency. Figure 12 depicts a shell used for second through fifth grade directions. The only difference in directions between grade levels is the actual

stimulus about which students are asked to write. The specific grade level starters for each of the three measurement periods are listed in Table 3.
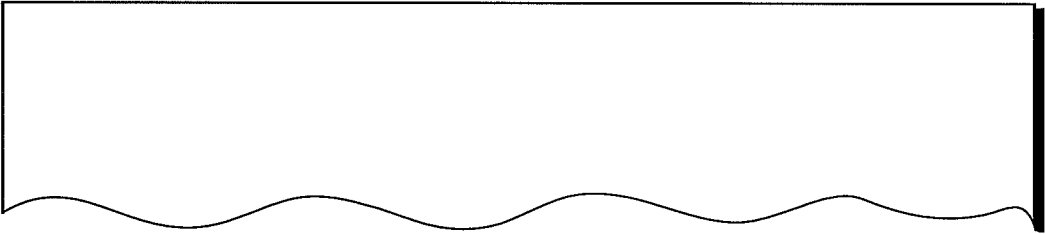
IDEA SHEET

Write about something that happened to you with a friend. Make sure you tell what you and your friend did, how it happened, where it took place, who was there, what you and your friend thought about it, and anything else that describes what happened. Use this page to help you organize what you will write. Make some notes, think of some important words, or draw a picture. For the next 10 minutes, work out an idea on this sheet. Then you will write a first draft on a lined piece of paper.

Write about a _____. You need to think about that _____, what does it _____, where it _____, what it _____, how it _____, ...and anything else that _____. Use this page to help organize what you will write. Make some notes, think of some important words, or draw a picture. For the next 10 minutes, work out an idea on this sheet. Then you will write a first draft on a lined piece of paper.

Figure 12. Example idea sheet and direction shell for written expression (fourth grade).

Table 3. Suggested Story for Three Administrating Periods

	Fall Measure	Winter Measure	Spring Measure
Grade 1	*Draw a picture of an animal and write a story to describe the animal.*	*Write about a monster.*	*Write about something that surprised you one time.*
Grade 2	*Write about a monster.*	*Write about something that is special to you.*	*Draw a picture of an animal and write a story to describe the animal.*
Grade 3	*Write about something that is special to you.*	*Draw a picture of an animal and write a story to describe the animal.*	*Write about something that happened to a friend.*
Grade 4	*Write about something that happened to a friend.*	*Write about something that surprised you one time.*	*Write about something that is special to you.*
Grade 5	*Write about something that surprised you one time.*	*Write about something that happened to a friend.*	*Write about a monster.*

During planning time, students are directed to develop ideas for their story writing and to use the idea sheet to prepare notes and thoughts. Drawing, doodling, outlining, sketching, etc. are acceptable behaviors during this period. The idea sheet continues to be available as a reminder of important structure, words, or ideas. Students should be encouraged to work in brainstorming groups or alone, if preferred, during this portion of the measure.

Following idea development, students are given another series of directions to prepare them for the actual writing task (see Figure 13). Students are expected to work quietly at their writing place. Students in second through fifth grades are given fifteen minutes to complete this task; first graders are allowed a ten minute writing period. Lined paper is provided for all students; if anyone runs out of space on the paper provided, they need to be given more. As the students write their stories, the administrators need to

monitor the class, providing writing tools and paper as necessary. Administrators also may encourage students to stay on-task. However, no further directions, instructions, or assistance with the writing task should be provided.

ROUGH DRAFT DIRECTIONS

After 9 minutes, hand out the lined sheets of paper.
Say:

When you get the lined paper, you may begin writing your story. You will have 15 minutes to write your story. Make your story organized and use the words and ideas you developed on the Idea Sheet. You will have 15 minutes to finish your story. Remember, just try to write a good story; we will have time to edit this draft tomorrow.

Begin timing (15 minutes).
After 15 minutes say:

Please put your pencils down and look up here. We will pick up your stories--both the Idea Sheet and rough drafts. I will return the rough draft to you tomorrow. At that time you can edit your story.

When collecting the Idea Sheets and rough draft pages, make sure the student's names are on the top. Please check that they have included their last name.

Figure 13. Oral directions for written expression writing period.

All students, regardless of grade level, should be notified through the directions, that the second day of writing is set aside for editing their drafts. At the completion of the allocated writing time, all Idea Sheets and writing papers need to be collected by the administrator and redistributed the following day. At that time, students are given directions for editing their papers and given a colored pencil with which to make the edit marks. Only the rough draft sheets are returned to each student for editing; their idea sheets need not be redistributed on the second (editing) day. Directions for this portion of the measure should provide students with information as to how they can edit. For example, as shown in Figure 14, the administrator's directions recommend that students check each sentence for spelling and writing mechanics. The editing

```
┌─────────────────────────────────────────────────────────────┐
│                    EDITING  DIRECTIONS                        │
│                                                               │
│  Hand out the stories on the Rough Draft Sheet only (lined    │
│  paper).                                                      │
│                                                               │
│  Say:                                                         │
│                                                               │
│  Here is your story from yesterday.  I want you to edit your  │
│  writing.  You can check how you used sentences to express    │
│  your ideas.  You can check your capitalization and           │
│  punctuation.                                                 │
│                                                               │
│  Circle or underline words that you think you misspelled.     │
│  We will not get dictionaries to correct spelling--just       │
│  circle or underline the word.                                │
│                                                               │
│  You will have 10 minutes to edit this story.                 │
│                                                               │
│                                                               │
│  After 10 minutes say:                                        │
│                                                               │
│  Please put your pencils down.  I will come around and        │
│  collect your stories.  We won't take time to re-write this   │
│  "sloppy copy".  Please make sure your first and last names   │
│  are on the top.                                              │
└─────────────────────────────────────────────────────────────┘
```

Figure 14. Oral directions for written expression editing period.

directions further specify how to mark the papers for spelling and basic writing mechanics. Students are not re-writing a new draft of the written expression story but need to mark directly on the draft papers completed on the first measurement day. This is not a teaching time, so no instructions or rules are provided by the directions or verbally by administrators. All grade levels should be allowed a fixed time (i.e., 10 minutes) to edit their writing.

Training and Scoring Written Expression

Two training sessions may needed for scoring written expression scoring. In the first session, which should occur prior to administration of all measures, scorers need to be introduced to general administration procedures, particularly as they impact the quantity and quality of a student's writing. In a second session, more complete training can be provided on the quantitative and qualitative scoring of performance.

The quantitative scoring procedures are derived from the work of Tindal and Marston (1990), Deno, Marston, and Mirkin, (1982), and Videen, Deno, and Marston, (1982) and include (a) an estimated word count, (b) a percentage of correct word sequences, and (c) a count of the number of editing marks the student has made on the second day. The qualitative measures are analytic judgments made at each grade level. These procedures are derived from several sources, including three dimensions from Jentzsch and Tindal (1991) and the Oregon State-Wide Assessment for Written Expression (Spandel, Stiggins, Nickel, & Lippert, 1989). In the final rubrics included in this series, student writing is judged on a rating scale of one to five using three concepts: Cohesion, Coherence, and Conventions. These scoring procedures are described in detail in the following sections.

Quantitative Measures

Three quantitative measures may be used in scoring a student's composition: (a) an estimated count of total words written, (b) a count of correct word sequences, and (c) a count of the edit marks used.

Estimate of Total Words Written

An estimation of words written is used to expedite the scoring process. First a count is made of the number of words on two (randomly sampled) written lines, averaging them; then, this number is multiplied by the number of lines written. This estimated number of words should be calculated for students in all grade levels in the same manner. Using this procedure, a close to exact word count can be derived in less time than it would take scorers to count every word each student had written in the allotted time. The score is an *estimate* of the total number of words written, which in combination with other quantitative scores, serves as a marker description of students' writing fluency and accuracy.

Correct Word Sequences

The second quantitative scoring procedure used for expressive writing is Correct Word Sequences (CWS), defined as the connection of two words within a sentence in which both words are spelled correctly and are grammatically correct. This scoring procedure also considers punctuation at the beginning and end of sentences, and the capitalization of both the beginning of sentences and all proper nouns.

To assure better consistency and accuracy among scorers four steps should be considered in training them to count the number of correct word sequences. These steps are stated briefly in Figure 15 and are elaborated as follows:

First, the scorer must read the entire composition in an attempt to understand what the student has written as a story. At this time, the scorer (reader) may begin to see problems, misspelled words, and run-on sentences. Second, the scores must force endings to run-on sentences (one run-on sentence per paper is commonly allowed). This step is accomplished by placing a period at an appropriate sentence ending, which eventually lowers the CWS. The third step requires the scorer to carefully check each word for correct spelling, including capitalization of proper nouns. If a word is found to be misspelled, the scorer circles the word. In the case of step two, in which the scorer forces the ending of any run-on sentence, the beginning word of the new sentence is considered incorrectly spelled due to failure to capitalize the first letter of the word. The only caveat in counting misspellings is to focus on all edited words. As you recall, students have been instructed to circle misspelled words in their editing. Scorers need to check the words students circle in addition to all other words. If a word circled by the student is spelled incorrectly, the scorer circles the word also. If the word is correctly spelled, the scorer ignores the student marking during this scoring for CWS and counts the word as correct for the sequence. The fourth and final step in scoring involves marking the student's writing for words sequences. Two-word sequences with correct grammar, punctuation, and spelling are joined with a caret (^); any incorrect sequence is marked with a large dot (•). Punctuation marks within the sentence are not scored

as correct or incorrect for this written expression measure (e.g., commas and quotation marks). These steps are summarized in Figure 15.

1. READ the passage written by the student. Try to comprehend the "gist" of the student's writing, note grammatical errors, in addition to phrasing and actual sentences (some students write one continuous sentence).

2. FORCE SENTENCES. Allow only one run-on. Force periods in the student's writing in cases where sentences are inappropriately long. This in turn requires you to circle additional words. Words at the beginning of sentences must be capitalized to be correctly spelled.

3. CIRCLE INCORRECT SPELLING. Words that are not appropriately capitalized (beginning of sentences, and proper nouns) are considered incorrect and should be circled. This includes words that *are* capitalized and should *not* be.

4. MARK CORRECT AND INCORRECT SEQUENCES OF WORDS.
   –Indicate correct word sequences with a caret (^). If the sentence is started correctly, capitalized and correctly spelled, one correct sequence is marked.
   –Mark incorrect sequences with a dot (•).

Continue to mark carets for each sequence of words within the sentence when grammar and spelling are appropriate. If incorrect, mark a dot. The end of the sentence also gets marked with a caret if the final word is (a) spelled correctly, and
(b) followed by an appropriate ending mark (e.g., '!' '.' '?'). If a or b above is incorrect, mark a dot for the end of the sentence.

Figure 15. Scoring procedures for correct word sequences.

Examples one and two in Figure 16 illustrate markings for correct and incorrect word sequences. As shown in Figure 16, the beginnings and endings of sentences have the potential for correct word sequence markings. The word at the beginning of the sentence must be spelled correctly and capitalized to be marked as a correct sequence (^). Additionally, endings must both be spelled correctly and followed by an appropriate ending mark (usually a period or question mark) for a correct sequence. In example 2, of Figure 16, the last word, *spots,* was spelled correctly. However, *spots* was the final word of the sentence, and it was not followed by an ending mark. The dot (•) indicates an

incorrect word sequence. For the most part, the example sentences in Figure 16 have incorrect sequences due to misspelled words. Example 1 in Figure 16 illustrates a

grammatical error that was scored as an incorrect sequence. The student has written *gosts was*. The plural noun (ghosts) requires the verb, *were*. Scoring from the beginning of this

---

Example 1

^The•gosts•was•afraid^of^the^giant^dragon^.

Example 2

^My^dog•iz•red^and^he^has•wite•spots•_

Key to markings: ^   indicates correct word sequence
                     •   indicates incorrect word sequence
                     ◯   indicates misspelled word

Figure 16. Example scoring for correct and incorrect word sequences.

sentence, the following problems arise although a correct beginning is present, an incorrect sequence exists from *The* to *gosts* because of the misspelling, an incorrect sequence from *gosts* to *was* exists because of spelling and grammar, and an incorrect sequence exists from *was* to *afraid* due to the improper grammar of the word *was*, and so on. In example 2, the word *is* is spelled *iz*. The sequence of words *dog* to *iz* is incorrect, and the sequence *iz* to *red* is also counted as incorrect using this scoring procedure.

When the composition is completed, the score is reported as a percentage of correct word sequences. In grades 1 and 2, the percentage is based on the first 20 words; in grades 3-5, the percentage is based on the first 50 words. If students write less than this amount, the percentage is scored according to how much they do write. Calculating the percentage of CWS can be done by computer. Scorers simply count the number of correct sequences (carets [^] and dots [•]) and write these numbers on each

paper (see Figure 17). When these numbers are entered into separate columns on a computer spreadsheet program, a formula can be used to calculate the percent of correct word sequences. This percent is the score reported for individuals and classes in the final analysis.

```
┌─────────────────────────────────┐
│                                 │
│    Written Expression           │
│                                 │
│    Total Words    _____       │
│    TWS            _____       │
│    CWS            _____       │
│    Edits          _____       │
│                                 │
└─────────────────────────────────┘
```

Figure 17. Example scoring box for written expression.

Edit Marks

The final quantitative scoring procedure used for the written expression measure is a count of edit marks. Scorers count each mark that students make on their papers for editing. Because students are given a colored pencil to use in editing on the second day of this measure, counting edits is fairly straightforward. Basically, any colored mark that is a change from what had been previously written is counted. Editing marks may include punctuation, spelling, capitalization, and word replacement changes. This number is written in the scoring box for later computer data entry.

Qualitative Scoring of Written Expression

The written expression task is structured to correspond closely to instruction in the writing process. Similarly, qualitative scoring procedures are designed to reflect scoring procedures familiar to the district. An analytic rating system should reflect critical dimensions of the writing process; each of these dimensions is described on the following page.

Analytic Scoring Dimensions

The system developed for this measure is somewhat similar to that used in most state-wide writing assessments, but it has the added advantage of being research-based. Three dimensions–coherence, cohesion, and conventions–are listed and defined in Figure 18.

Coherence refers to the overall structure and delivery of the entire composition; when considering the coherence of a student's writing, the scorer must consider a sense of beginning, middle, and end in terms of organization and overall structure flow of the written story. The reader needs to attend to the overall story line and big idea within the story in determining a final score.

Cohesion refers to the sentence-by-sentence coordination of the writing. The connection of ideas and logic in the information written at the sentence level is subjectively considered when scoring this dimension. The reader looks for the logic of each sentence in relation to the preceding and following sentences. The reader/scorer also attends to the consistency of voice in the student's written composition; in that sense word choice highly influences cohesion. A sophisticated vocabulary and well-developed sentences express ideas more clearly than kernel sentences without adjectives or adverbs. For example, a student writing the sentence, *"The colorful butterfly floated from the sky onto the delicate*

COHERENCE:	Whole sense of the composition, beginning-middle-end, overall organization.
COHESION:	Sentence-to-sentence linking, how composition is strung together, how ideas connect sequentially, information in subsequent sentence(s) is used to develop and elaborate previous ones.
CONVENTIONS:	Refers to standard writing conventions of correct spelling, grammar, capitalization and punctuation.

Figure 18. Definitions for three analytic scoring traits.

flower pedal," is more developed than a sentence which states the same action without description, *"The butterfly landed on the flower."* Cohesion extends the writing, both vertically and horizontally.

The final qualitative dimension is *Conventions,* in which the reader/scorer attends to word-by-word grammatical and syntactic accuracy. Appropriate writing mechanics, spelling, handwriting, grammar, and punctuation are all considered with conventions.

Analytic Scoring Procedure

Scorers should be trained to follow a four-step process for scoring writing samples analytically. First, scorers must organize all writing samples across schools by grade level. Then, all compositions are read quickly by each person in the scoring group. For this step, scorers can be paired up and work together to read and rate the compositions. In the third step, the pair determines if a paper is rated a "1" or a "5" (they focus just on the extremes). These opposing ratings of "1" and "5" indicate the worst and the best of scores,

respectively. The number "1" reflects a composition that is fragmented, and the writing is not considered cohesive, coherent, or inclusive of proper conventions. On the opposite extreme, a rating of "5" indicates the composition is well structured (coherent), flows sequentially and logically within and between sentences (cohesive), and reads with no or little difficulty due to proper mechanics (conventions).

Papers that do not fit the "1" or "5" categorization are separated from the two extremes and left in the middle. The fourth and final step involves sorting out compositions. The readers need to read this middle pile quickly and sort the best of this middle pile into the category of "4" and the worst of the pile into the "2" category. Those remaining compositions in the middle then can be placed into the "3" category.

The scorers now have five distinct piles with assigned numbers from "1" to "5," representing worst to best within each of the dimensions of coherence, cohesion, and conventions. The only important caveat is that scorers should rate papers on these dimensions separately: First, all papers are rated on coherence; then, all papers are rated on cohesion; finally, all papers are rated on conventions. By rating them in separate trials, it is less likely that contamination will occur.

Summary of Written Expression Measures

In summary, the written measures are designed to reflect a task that is classroom-based and authentic, yet, is standardized and consistently administered and scored. Both quantitative and qualitative measures are used to capture student performance, focusing on productivity, use of language, and ability to convey an interesting and cogent story.

MATHEMATICS

The range of mathematics skills for all elementary grade levels (1-5) varies from basic ordinal counting to numeral identification and manipulation. They include computation in all operations, as well as geometry, measurement, and problem solving. Mathematics domains include (a) *sets*—the sameness and differences of objects or concepts, (b) *symbols*—the graphic representations used including numbers, shapes, and notations, (c) *basic operations*—addition, subtraction, multiplication, and division, and their relationship to each other according to specific properties, (d) *algorithms*—the rules for completing mathematical operations and problems, and (e) *problem solving*—applying mathematical concepts and operations in context (Tindal & Marston, 1990). To develop broad district-wide math measures, sample items need to be selected systematically from each domain and grade level.

The domains of mathematics curricula described here reflect three sources. The first source is classroom teachers, who should be asked to contribute specific problem types. Teachers then have the opportunity to suggest representative items from the instructional curriculum used in their district. The second source is guidelines from district math objectives. Based on these guidelines, specific math problems can be crafted to represent broad criterion-referenced measures. Third third source, *Direct Instruction Mathematics*, by Silbert, Carnine, and Stein (1991), is a complete and clearly organized arrangement of math items representing each of the domains mentioned above. The text contains a skills hierarchy that displays instructional sequences and sample items organized by grade level. Whatever sources are used to construct math measures, they need to represent the range of math instruction and student skills at the elementary level.

The measurement is designed to generate products that parallel the students' instruction. To develop a diagnostic tool that captures both dimensions (instruction and student skill), production responses are needed for every item on each measure; this differs from measures in which students select an answer from two or three answer options. To obtain production responses, oral answers may be required for items, particularly at the first and second grade levels (i.e. counting, describing, and beginning numeration). As a consequence, oral responses require individual administration, as in the reading measure. Most math measures, however, require students to respond in writing and therefore can be administered to groups of students within the same grade level.

Scoring Basic Operations

Unlike the written expression and reading measures, mathematics measures are scored using only quantitative procedures. Few (if any) procedures are yet available to qualitatively score math problems. Nevertheless, alternative quantitative procedures are available.

Traditional scoring of math problems focuses on evaluation of the final answer: The response is considered correct or incorrect, all right or all wrong, as shown in Figure 19. When a problem requires a single step and a one-digit response (e.g., basic facts), a single score or point is assigned for calculating the entire problem regardless of its complexity. When a more complex problem requires a multiple digit response, as in multi-step operations and problem solving, again, a single point or score is awarded. In traditional scoring, these problem types are scored equally as right or wrong.

Traditional scoring

1 point for correct answer

0 points for incorrect answer

Addition	Subtraction	Multiplication	Division
		42	71
25	69	x13	5)356
+16	−38	126	35
41	31	42_	06
		546	5

Figure 19. Traditional scoring of mathematics problems.

In contrast, a more sensitive metric can be crafted, in which student performance is evaluated by counting the number of digits in the correct place value in the steps and in the final answer. Using this scoring procedure, the entire answer and the steps (below the operation symbol) required in the process of finding it are scored for accuracy. This scoring compares the student work with an answer key, digit-by-digit, for all steps after the equal sign. When there is a match between key and student product, one digit correct is scored. The reported score is the total number of correct digits for each item and the entire measure.

The advantage of this scoring method is threefold (Tindal & Marston, 1990). First, a distribution of scores across a grade level or class can be obtained that reflects more well-calibrated differences between students. Second, growth or change in student performance can be detected when sensitive measurement procedures are in place from one measurement period to another. Finally, and most importantly, when all steps in problem-solving are scaled, more diagnostic information is highlighted and emphasized. Students receive a score that is more representative of performance and

sensitive to change. The score reflects student skill level, knowledge of facts, ability, and speed with which one can work math problems.

Computation Problems

Because each grade-level measure should (or probably does) contain computation problems, basic rules can be used as guidelines for scoring these problem types; they are specific to each operation. With all operations, place value is very important when scoring: All problems are scored from the ones' column on the right to the final column on the left, at all levels of work completed. Scoring specific to each problem type is described in the following sections.

Addition and Subtraction Operations

Scoring for basic computation problems in addition focuses only on digits in the answer (and ignores work shown above the addend with carrying problems). Numerals used for regrouping, those carried from one column to the next, do not contribute to the score. In the Figure 20 examples, the first problem has no regrouping requirements. Two of the three digits in the answer are correct, 1 hundred, and 7 ones; the 6 in the tens' column is incorrect. In the second addition problem, regrouping in the tens' column is required to correctly solve it. This student has completed the operation correctly and all three digits are credited to the student. No score is given for writing the 1 regrouped from the tens to the hundreds column. Likewise, there is no penalty for not writing a numeral used for regrouping.

Subtraction has the same focus on correct digits in the answer. No intermediate steps are scored for this problem type. Regardless of a requirement to borrow or regroup, only the digits in the product are scored. The first subtraction problem in Figure 20 has only one digit credited as correct. The six in the ones' column is correct; the four in the tens' column is incorrect. No score is assigned to crossing out the 6 and

writing a ten next to the five in the ones' column. The score for this subtraction problem is one correct digit.
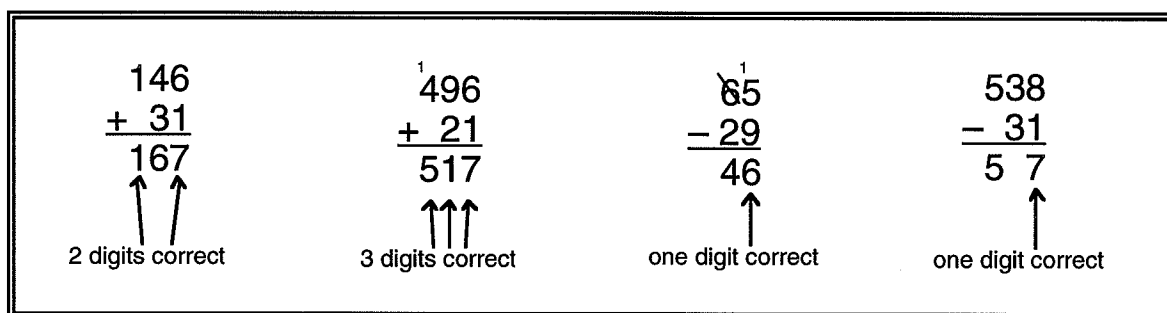

Figure 20. Scoring using correct digits in addition and subtraction.

The final subtraction problem in Figure 20 illustrates place value issues in scoring using correct digits. The seven in the ones' column is the only correct digit. Although there is a 5 close to the hundred's column, this digit is not counted as correct. The digit '5', when scoring from the ones' column at the right, is the second digit, representing the tens' column, not the third digit from the right, which would represent the hundred's column. Using these scoring guidelines, the scorer is not in a position to judge whether the student tried to line up the columns, or forgot to write a zero in the tens' column: Score from the right to the left for correct digits, regardless of alignment with the columns in the written problem.

Multiplication Operations

Multiplication problems are scored for each calculation completed toward the final answer (see Figure 21). For example, a two-digit by two-digit problem without carrying is scored as follows: (a) Three digits for correctly multiplying 4 times 62, for an answer of 248, (b) two correct digits for correctly multiplying 1 ten times 62, for an answer of 62 tens (or 620), and, (c) three digits for adding these to products for the final answer of 868, for a total of 8 correct digits in this problem.

As can be seen in the second example of this same problem in Figure 21, the student did not correctly multiply 4 times 62. Only one of the three digits is correct. The second intermediate step (1 ten times 62) is correct for two digits. Finally, due to the error in the first step, the answer contains only one correct digit, the 8 in the ones' column. The final correct digit count on this problem is 4. Thus, the student receives some credit for the calculations that were done correctly within the problem.

```
        62                      62
      x 14                    x 14
      248  ◄— 3 correct digits    108 ◄— 1 correct digit
       62  ◄— 2 correct digits     62 ◄— 2 correct digits
      868  ◄— 3 correct digits    728 ◄— 1 correct digit

   Total 8 correct digits      Total 4 correct digits
```

Figure 21. Example multiplication correct digit scoring.

Division Operations

As in multiplication, all steps in division are scored for accuracy of digits in each place value. The example in Figure 22 illustrates how many correct digits are possible in a complex division problem. Note the first division problem in Figure 22 (on the left), in which the first step has one correct digit (2). The second step has two correct digits– 7 in the ones' column and 1 in the tens' column. Likewise, the score reflects each step of dividing 2 into 375. Finally, there is a one-digit (1) remainder; the answer has 3 digits. The total number of digits possible in this problem is 13.

Now, focus on the incorrect problem (the right side of Figure 22) to analyze how the number of correct digits is obtained. The first step of this division problem is correctly calculated (the number 2) for one correct digit. In the second step, the two digits are correct (17). However, the student incorrectly completes the next step and has

only one of two digits correct (the number 1). The student then subtracts incorrectly at the next step, but does bring down the correct number 5 for two correct digits. The student incorrectly calculates the final step; one digit is correct at this step. Finally, the remainder is incorrect for 0 correct digits. The answer contains one correct digit, one in the hundred's column. The total count is 8 correct digits out of the 13 possible in the score for the response in the division problem.

<u>187</u> ◄— 3 correct digits	<u>198</u>◄— 1 correct digit
2) 375	2) 375
<u>2</u> ◄— 1 correct digit	<u>2</u> ◄— 1 correct digit
17 ◄— 2 correct digits	17 ◄— 2 correct digits
<u>16</u> ◄— 2 correct digits	<u>18</u> ◄— 1 correct digit
15 ◄— 2 correct digits	15◄— 2 correct digits
<u>14</u> ◄— 2 correct digits	<u>16</u>◄— 1 correct digit
1 ◄— 1 correct digit	9◄— 0 correct digits
Total 13 correct digits	**Total 8 correct digits**

Figure 22. Example division correct digit scoring.

Scoring Other Problem Types

As described above, math measures should include problem types beyond computation in the four operations (addition, subtraction, multiplication, and division). Depending on the grade level, students also should be asked to demonstrate their skills in story problems, fractions, and time-telling, A similar set of decision rules for scoring problem-types other than operations has been developed for each measure and is described below.

Scoring for Problem-Solving

Scoring for problem-solving or story problems in math is based on the same procedure of correct digits as explained above; however, in addition to computation steps, other components are addressed. Organization of the entire problem, selection of the operation, and proper labels are considered in scoring. The purpose is to have a sensitive measurement system and allow "credit" for the correct attempts and steps in completing story problems. An example from a third-grade measure is presented below to illustrate the application of correct digit scoring (see Figure 23).

The total possible "correct digit" score for the story problem in Figure 23 is 6. The student is given a point for setting up the problem correctly. In this case, writing the digits with which to operate (125 and 2). The second score is for selection of the correct operation. Because the problem can be correctly solved by multiplication or addition, both are accepted as correct. Students may be equally correct in setting up and working the story problem in Figure 23 as an addition problem (125 plus 125). In this case, set up and operation are correct as addition or as multiplication. The student also is credited for the correct digits in the final answer (this problem has three digits, 250).

Sandy and Barb are each 125 centimeters tall. If Sandy stood on top of Barb's head, how tall would she be?

125	1 = problem set-up*
x 2	1 = correct operation
250 centimeters tall	3 = correct answer (3 digits)
	1 = correct label
score: 6/6	6 = possible score

*set-up = appropriate numerals in the appropriate order

Figure 23. Example of correct digit scoring for story problems.

Finally, a story problem requires an appropriate label, which receives one score. The possible correct digit score for this story problem is 6. To receive the full possible score, the numerals in the problem must be correct, the answer must include correct digits and the appropriate label must be present.

Fractions Scoring

Nearly all grade level measures contain tasks related to fractions. In the earlier grades, students identify fractions in relation to corresponding diagrams. Fractions work includes drawing a picture of a given fraction or writing the appropriate fraction from a (representing) picture (see Figure 24). In later grades, fractions are part of basic computation problems with all operations. Scoring for these items also is based on correct digits (whether the item involves a picture or an operation).

As shown in Figure 24, item 1, if a student is given only the numbers, they need to draw a fraction for a diagram. Correct scores are obtained by (a) marking the shape or diagram into the number for the denominator, and (b) shading in the number of parts in the diagram represented by the numerator of the fraction. This item has a potential of two correct digits.
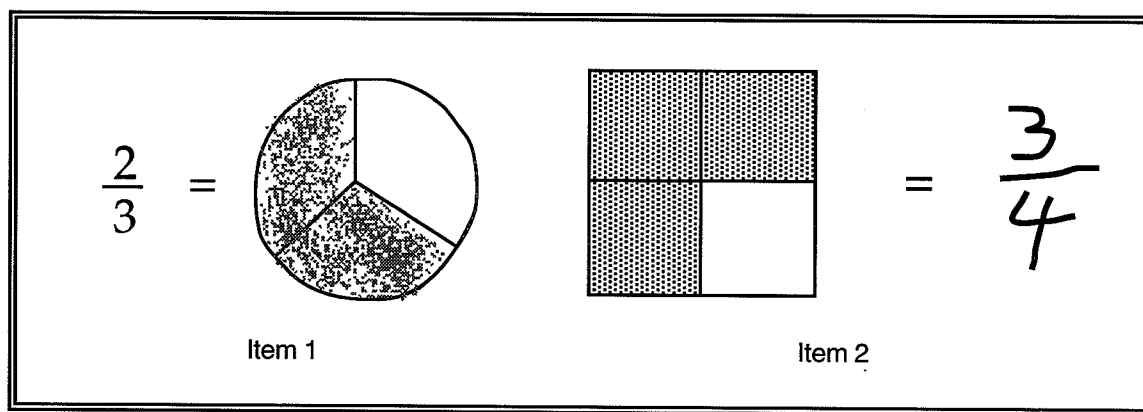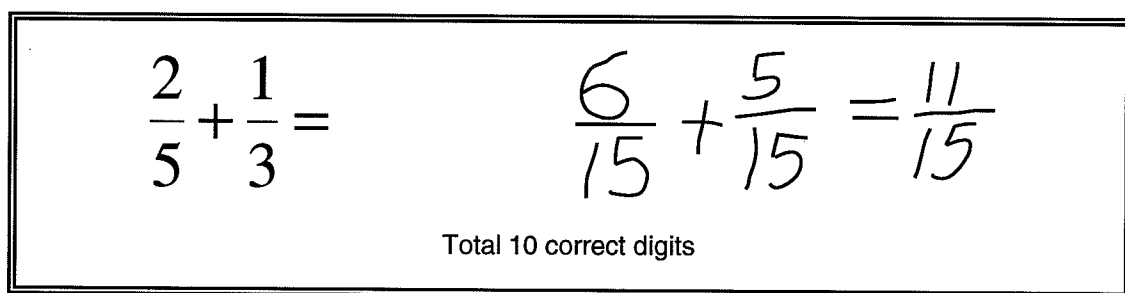

Figure 24. Example of correct digit scoring for beginning fractions.

Item 2 illustrates the opposite task. Given a figure that is segmented and partially shaped, the student must (a) determine the denominator by counting the number of parts the shape contains and (b) figure out the numerator for the fraction by

counting the number of shaded parts. Two correct digits are possible for fraction items of this type.

In the intermediate grades (fourth and fifth), students typically must solve numerical sentence problems containing fractions. Correct digit scoring, as in whole-number sentence problems, is used to score fraction story problems. An example appears in Figure 25 from the fifth grade level. As in multiplication and division with whole numbers, students receive digits correct for the intermediate steps and the final answer. The number of correct digits in the example problem is 10. Each digit in solving the item, in both the numerator and denominator, is counted toward the final score.

$$\frac{2}{5} + \frac{1}{3} = \qquad \frac{6}{15} + \frac{5}{15} = \frac{11}{15}$$

Total 10 correct digits

Figure 25. Example of correct digit scoring for fractions problems.

Time Telling

Across first through third or fourth grades, time telling needs to be evaluated. Students are required to read clock faces with the time indicated by hour and minute hands. The differences between grade levels centers around the expression of time and specificity of minutes after the hour on the clock. For example, in the first grade measures (see Figure 26, item 1), students write the time for clock faces at hour and half-hour increments. The second example in figure 8 is from a third grade measure, in which students must tell time within five minute increments.
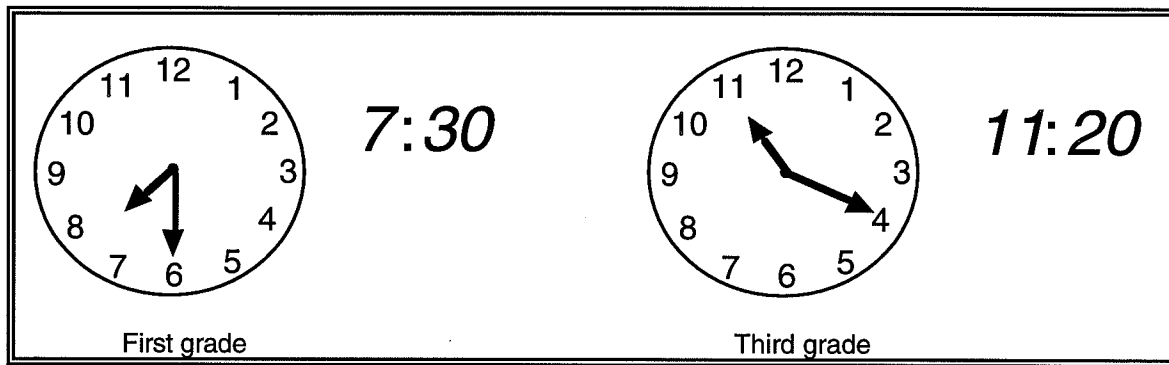
Figure 26. Example of time-telling items.

Time-telling scores are based on digits in the correct places, as described previously. Digits correct for the hour, the correct placement of the colon, and finally digits correct for the minutes. In Figure 26, the answer for the first grade example has 4 possible correct digits. One digit for the hour (7), one digit for the colon (:) and two digits for the minutes (30). The answer for the third grade example is scored exactly the same way, the difference is the hour has two digits (11:20), for a total possible score of 5 digits. In time telling, the zero place holder is critical. If a clock shows five minutes after the hour, the student must indicate this with a zero and five following the colon (:05).

In the accompanying sample problems, all measures designed for fall assessments require students to note the time using two methods. Writing the time using a colon to separate hour from minutes (5:15), and indicating the exact number of minutes after the hour (15 minutes after 5). Winter and spring measures only include writing digits for the time shown on a clock face.

Summary of Math Measures

In summary, measures for math, like the measures for reading and written expression, require production responses from students: A permanent product is obtained for all but the oral response tasks in math. The development of a scoring

template mentioned greatly expedites the scoring process for math. Scorers must be provided with an answer key that contains all correct digit responses, a model of multi-step problems, and explicit guides used for complex problem solving with fraction, area, and story problems. Additionally, all individuals scoring these measures should work together. If a scorer has difficulty determining how to count correct or incorrect responses, or decipher poor or messy handwriting, others also trained in scoring can collaborate to determine what score a student should receive. Of course, for the few portions of the first and second grade measures administered orally, scorers must make an instant decision as to the "correctness" of the response, and immediately indicate on the score sheet a count for the individual.

Administration and Description of First and Second Grade Math Measures

Administration procedures for these measures have been clearly scripted in each set of directions for the math subsections. By using these directions, standards can be maintained across different individuals within the building or district. Such standardization makes it possible to compare scores of students on the same measure from different classes or schools in the same grade. Otherwise, if the administration conditions under which the measures are completed vary greatly, such comparisons cannot be made.

In both first and second grades, specific directions should be presented orally for each subsection of the measure. Administrators need to pace the delivery of directions according to the rate at which the majority of students complete portions of the measure. Although fluency in math skills greatly influences scores in math measures such as these, specified times to the second or minute are not indicated. A general guideline of 30 minutes for completion of the entire measure is recommended.

Administrators should be directed not to greatly exceed this general time allotment for completion of the measure.

The measures designed for first and second grade levels are similar to one another: These measures each contain sections which require individual administration. Oral, individually administered sections include identifying numerals, demonstrating ordinal counting through application, and use of the language "before" and "after" when applied to numerals. The greatest difference between the first and second grade measures is the actual size of numeral used to compose problems. First grade problems consist of single and two digit numerals. Second grade problems include numerals with digits into the hundreds. The first grade measure has 18 subsections, while the second grade measure has 12 subsections to complete.

First Grade Measure

Reading requirements are kept to a minimum (especially in the fall) while students perform calculations, read numerals, and use the language of mathematics. The goal is to measure first graders' mathematics skills and to limit other extraneous skill requirements. For this reason, the administrator orally states directions for each section of the measure rather than requiring students to read directions. As shown in Figure 27, in the fall, students are directed to the various subsections of this measure with picture clues and simple section headers. In the winter and spring, letters and word headings are used as organizers to direct students to different subsections of the measure. The administrator directs the students to a subsection by the picture or letter heading, then orally presents the directions for that section. All word problems are dictated for students, in addition to being presented on the student's page.

Subsections of the first grade measure include items from the domains mentioned previously:

- Counting skills are measured for both rational and ordinal counting. Students make comparisons when counting to find the most, smallest, and sameness.

Examiner Copy

On this part, there is no talking. You will answer the question by writing in the boxes. Touch the box with the sun on top. (Monitor). Think to yourself and count. Listen: How many people? (Repeat if necessary.) Write your answer in the box.
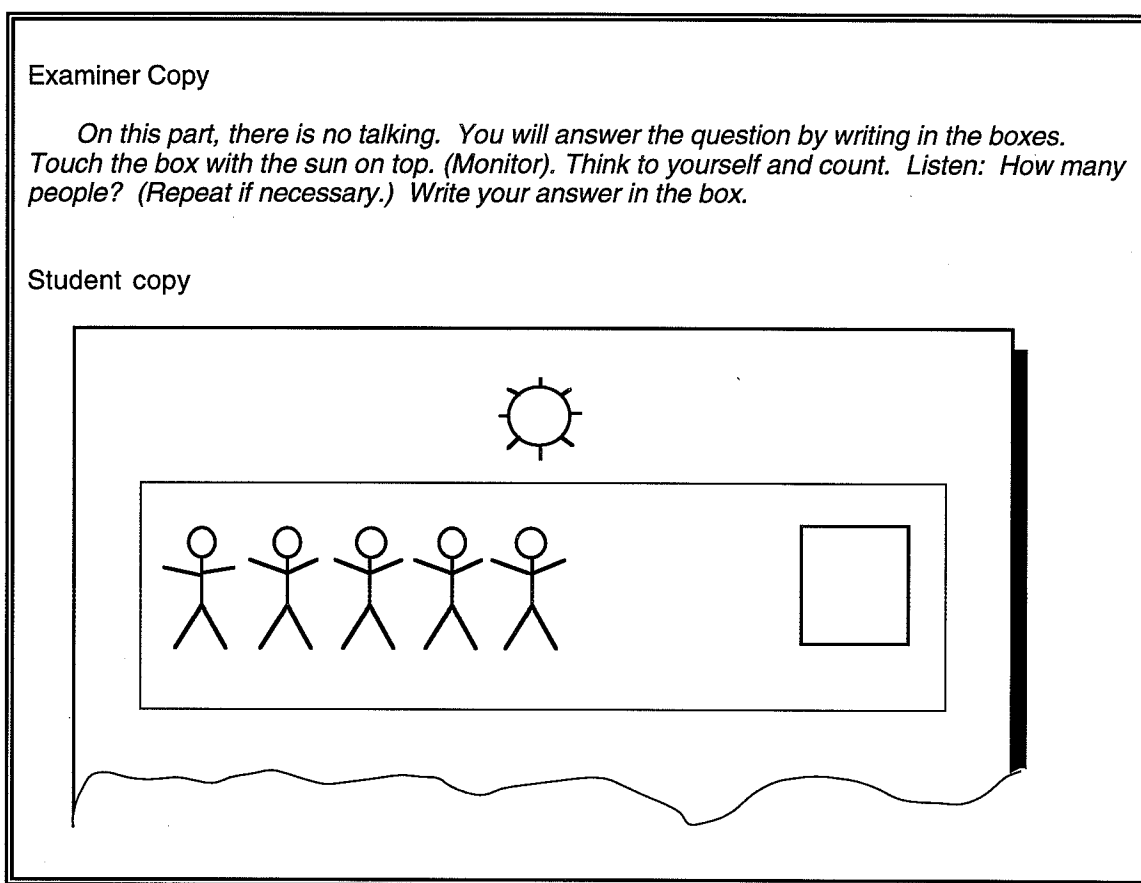
Student copy

Figure 27. First grade math administrator directions.

- Students identify symbols and geometric shapes and complete patterns to demonstrate their understanding of these math basics.

- Numeration skills are measured by asking students to write in the missing number from a sequence (see Figure 28). Each digit written, scored from right to left, is counted for correct digits.

- Problem solving skills for basic addition and subtraction are measured, in addition to dictation of a number sentence with problem solving.

B.   Write the missing numbers

23 _____ 25 26 _____ 28

5 10 15 _____ _____ 30

Figure 28. Example numeration task for first grade - missing numbers.

Second Grade Measure

Second graders also read the directions for each of the twelve subsections of the measure. The administrator reads the directions to the students and provides written copies at the beginning of each section. Again, no assumptions about extraneous skills (i.e., reading, sequence of directions, etc.) are made. The measure is designed to evaluate math skills, not reading, or language abilities. Second graders need to be asked not to move on to the next section until the administrator has read the directions.

As in all grades, the domains of mathematics mentioned previously are included in the second grade measure. Students are asked to complete addition, subtraction, and even basic multiplication problems. Subsections of the second grade measure include problem solving, identification of geometric shapes, and numeration.

Sections of the second grade math measure that are different from the first grade measure include:

- Time telling, in which students are required to write the time for clocks to the hour, half hour, and five-minute increments after the hour.
- Basic fractions problems which measure the following three skills: (a) students write the numeral form of a written fraction; (b) students mark shapes and shade them to indicate the picture for the written fraction; and (c) students are asked to write a fraction using numerals for a picture with parts shaded.

Description and Administration of Third through Fifth Grade Math Measures

Math measures for third through fifth grade are structured very similarly. The content, of course, changes with each measure to reflect the grade-level curriculum. Items need to reflect the full curriculum, with no limitation of problem types to the time period of the school year in which the measure is administered.

Directions

Portions of the measures for these grades are separated into parts referenced by letters. All portions of the third through fifth grade measures are group administered, with students "walked through" each entire measure: Prior to working any problems, the administrator provides an introduction of each subsection. During this time, students should be told to look at each section of the measure as the administrator reads the directions and/or describes what the student must do when completing that section. The directions are stated simply and do not include strategy instruction. The intent is to direct student attention to the problem types and for students to be aware of operations and work requirements; this is not a teaching time. At the completion of the walk-through, students should be given an opportunity to ask questions, and they should be notified that, during the time to work their problems, they are not to talk or ask questions. An example of administrator directions for this review of the measure for fourth grade is presented in Figure 29.

Part B
Part B is solving fact problems. Each row is a different type of operation. The first is addition (point), the second is subtraction (point), the third row is multiplication (point), and the last row is division (point).

Part C
Turn the page, part C has some fractions work. Reading the directions and write the fraction for each picture after the equals sign.

Figure 29. Administrator directions: Sample from fourth grade measure.

As with the first and second grade measures, a general timeline of 30 minutes is provided for completion. Students should be reminded of the time remaining with a visual display, which can be provided on a chalkboard (see Figure 30).

Write your name and the name of our school _____, at the top of your paper. When you are finished, put your pencil down and listen. I have important directions for these papers.

On the chalk board the teacher should mark 30 lines in a box. They may be in tally groups of 5. Teacher should also have practice item for part B on the board.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Each mark on the board represents a minute. When all of the marks are erased, we will be finished with this material.

You may not finish every problem on every page. That is okay. We would like you to try your best, show your work, and concentrate on these papers. You should work the problems in every part quickly and carefully. If you don't know how to work a problem cross it out and move quickly on to the next problem.

We will start by looking through all of the pages in your packet. Pencils down and look up here. This is not a writing time.

Figure 30. Administrator directions - sample from fourth grade measure.

Thirty lines are written on the board representing 1 minute per line; at each minute (or group of 5 minutes) interval, the administrator erases one line to indicate time remaining with lines remaining. At 5, 12, and 18 minutes into the measure, the

administrator suggests where in the measure students should be to help pace them for timely completion (see Figure 31).

TEACHER: **REMEMBER TO ERASE A LINE FOR EVERY MINUTE**

<u>After 5 minutes say,</u> *You should be finishing parts A and B on the first page and moving on to parts **C and D**.*

<u>After 12 minutes say,</u> *You should be finishing parts C and D and moving on to parts **E, F and G** on the next page.*

<u>After 18 minutes say,</u> *You should be finishing parts E, F and G. on the first page and moving on to parts **H, I and J** on the last two pages. You will have **12** more minutes.*

<u>After 30 minutes say,</u> *Please stop and put your pencils down. It is okay if you didn't finish. You are finished. Turn back to the first page with your name on it. Thank you for working so hard.* Teachers and EAs may collect the packets.

Figure 31. Time reminder directions - sample from fourth grade measure.

Students need to be told that when all marks are erased, they will be finished with the mathematics measure. The administrator may need to monitor students in the classroom throughout the 30 minutes and provide an extra pencil or eraser if needed.

Description of Problem Types

The items sampled on the measures for third through fifth grade include each of the domains of mathematics described earlier. Item difficulty is likely to increase with each successive grade level.

- All basic operations, including facts and increasingly complex calculations in addition, subtraction, multiplication, and division.

- Fractions identification and computation problems.

- Several problem solving concepts, including traditional story problems.

- Use of tables and graphs.

- Identification of numerals to make statements correct.

- Numeration, greater than, less than and equal, and geometric shapes.

An example of item difficulty for a similar concept across grades can be seen in Figure 32 . In fourth grade, students determine *greater than*, *less than*, or *equal* for proper fraction problems. In fifth grade, the students make the same determination for decimals and fractions.

Fourth grade

E.   Use > or = or < to make each pair of numbers *true.*

$\frac{1}{2}$ ◯ $\frac{3}{4}$ $\frac{1}{3}$ ◯ $\frac{2}{6}$ $\frac{3}{5}$ ◯ $\frac{1}{2}$

Fifth grade

E.   Put > or = or < symbol in each circle to make the statement *true.*

.25 ◯ $\frac{1}{3}$ 4.8 ◯ 8.4   .125 ◯ 1.25

Figure 32. Example symbol measures for fourth and fifth grades.

Summary of Math Measure Problem Types

In summary, a range of math problem types are included within and across grades that represent long range goal sampling. Some problems may be from an early part of the year and students are being exposed to the logic and strategies needed to solve items. Other problems are from later units in the school year and, for students to solve them, they have to generalize their skills. This sampling plan, however, is bound to show growth, for, as students are explicitly taught the skills and strategies, the problems move increasingly from preview to review. Fewer of them reflect generalization but are more oriented to immediate application.

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