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In examining large-scale writing assessments, it quickly becomes apparent that two distinct, albeit highly related, abilities are being measured—reading comprehension and the ability to transform that comprehension into a written composition. The disconnect between reading and writing appears not only in writing assessments, but in the majority of reading assessments administered to students as well. The standard practice is to create and administer writing assessments that pay little, if any, attention to reading demands, and reading assessments that ignore the value of extended writing to reflect reading comprehension.

Based upon our work at the district, state, and national levels, we address the following issues:

- how to improve large-scale writing assessments, and

- how to create bridges between effective reading and writing instruction and writing assessment.

First, we present a framework for integrating comprehension and composition. Second, we identify features of authentic writing assessments and guidelines for their construction. Last, we provide an example of an integrated instruction and assessment model, the Read–Write Cycle, that aims to balance teaching with testing in English subject-area and other content-area classrooms (e.g., science, social studies).

Schema Theory, Reading Comprehension, and Writing Assessment

How are "student-owned" ideas and cognitions translated into the written word? The key to understanding the process of comprehending and composing lies in *schema theory* (e.g., Armbruster, 1976; Adams & Collins, 1977; Anderson, Spiro, & Anderson, 1977). At the center of schema theory is the notion that understanding a complex message depends on the instantiation by the comprehender of a template, or schema, that serves as a tentative framework for organizing the information. The following passage illustrates the idea:

> The procedure is actually quite simple. First you arrange the pieces into different groups. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, then that is the next step. Otherwise you are ready to go. (Bransford & Johnson, 1972, p. 721)

Several similar paragraphs follow this introduction, leaving most "readers" thoroughly confused about the point. What are the barriers to understanding? For the college student, and most other persons, the vocabulary is familiar. The sentences are not especially long or complex. The problem is a lack of connection to a schema—in this instance, easily remedied by suggesting that these are the initial steps in doing laundry. Suddenly the text clicks—the words and sentences fit together, the reader can anticipate the upcoming material, and assessments reveal that the message has been understood.

The schema construct provides a useful foundation for thinking about comprehension and composition; understanding a text requires linking to an existing framework in memory that provides the "slots" into which text information can be placed, and that establishes tentative relations among the incoming elements. The same conceptualization applies to effective writing; the author chooses an existing framework to guide the assembly of known and new elements, then uses the altered framework during the composing activity. Both processes are dynamic; we have all had the experience of stopping mid-way through a reading sample because we began reading using an inappropriate schema for comparison and the new information just does not "fit," or rewriting a composition because we realize that we need to reframe the argument.

The absence of classroom learning activities that scaffold and support students in becoming independent and reflective learners places students in the confusing position of knowing what to do without knowing how to do it.

Schema theory applies with particular force to large-scale assessment tasks. Performance on such tests depends largely on a student's ability to integrate the experience into an existing "slot" for quick associations and superior performance. If a student doesn't "get it," then he or she is lost. Schools try to assist through test preparation programs that simulate testing conditions, emphasizing "tricks of the trade." However, the absence of classroom learning activities that scaffold and support students in becoming independent and reflective learners places students in the confusing position of knowing *what* to do without knowing *how* to do it, nor how to *self-assess* for correctness. In order to improve existing writing assessment, not only do the tests have to change; the classroom instruction used to prepare students for assessment must change as well.

Features of the Authentic Reading–Writing Assessment

In thinking about the creation of an authentic writing assessment, we must first address the overall type of writing assessment. We divide writing assessments into two basic formats: *text-based assessments* and *stand-alone assessments*. Text-based assessments are based on a reading sample or *target text* and are accompanied by a *writing prompt (task)*. Stand-alone writing assessments consist of a writing prompt only, and rely on students' prior knowledge or experience to provide a foundation for the written composition. Our recommendation is that all high-stakes and large-scale writing assessments be text-based.

In order to expound upon an academic topic, the writer must have access to relevant background knowledge. Expecting students to rely exclusively on personal experience or encouraging them to be "creative" when composing responses is unreasonable for those students who lack opportunities to obtain appropriate background knowledge. The most relevant foundation for an academic writing assessment thus begins with a target text, designed to help students learn from its rhetoric structure and semantic associations, and to allow connections to prior experiences (schema theory). Comprehension then fashions the rhetorical, conceptual, and semantic perspectives into a dynamic mental entity that enables and organizes the coming writing

task. The writer can view the task at hand from various cognitive perspectives using the text as the medium for thought, comprehension, and organization. Without a base text, the writer is adrift in semantic space, dependent upon idiosyncratic experiences to accomplish the task. Writing assessments, especially high-stakes assessments, should test students' abilities to compose, and rely as little as possible on students' pre-existing background knowledge. Text-based assessments equalize the playing field by providing that base. To the argument that this approach mixes comprehension and composition, the answer is that writing assessments always involve comprehension. Prompts must be read and understood, and students must be able to comprehend their emerging texts.

Text-based writing assessments can take three basic forms: summarization, extension, and transformation. *Summarization* highlights the key semantic elements in the text and reflects the structure of the target text. *Extension* goes beyond summarization; the essay includes information from the target, along with other pieces of relevant knowledge and experience. More than for summaries, a sense of audience is critical to extension; students must select knowledge that is relevant to the designated purposes. Finally, *transformation* asks the students to go beyond summarization and assorted associations to individualized, novel constructions.

Creating text-based writing assessments does pose challenges for the test designer. The choice of the target text raises a host of considerations. Reading level and interest must reflect the student population. Our review of a statewide writing assessment comes to mind; third graders were presented with a ninth-grade target passage that probably hampered student performance. Unfamiliar vocabulary, or words used in unfamiliar ways, requires supportive context such as anaphora or paraphrasing, metaphors, and analogies. The layout of the target text also requires attention; font, paragraphing, headings, and graphic devices can either help or hinder. Schema theory points to the role that culture and experience play in creating an individual's knowledge (Kaplan, 1966). Assessment designers must be aware of students' cultural background and preconceptions, as well as how these culturally defined lenses may affect perception of the target material. For example, middle school students new to our country may be at a disadvantage when asked to read a target text describing the development of the freeway system in the United States. Unlike many (though not all) adolescents born in this country, they lack a preexisting schema that they can activate for "driving in the USA" to help them make sense of the text.

Writing assessments, especially high-stakes assessments, should test students' abilities to compose, and rely as little as possible on students' pre-existing background knowledge.

Schema theory suggests that text structures (narrative, compare/contrast, cause/effect, etc.) are important supports for comprehension. Several researchers (see Driscoll, 1994; Halliday & Hasan, 1989) have shown that readers' schemas of text structure help them interpret the information presented in the text. To facilitate student learning and achievement, the text structure of the target text must be familiar to students, i.e., it must contain memory "slots" into which the new text information can be placed, establishing tentative relations for the incoming elements. In the freeway illustration, most adolescents have slots for "on/off ramps," "freeway exchanges," "car pool lanes," and "toll booths" (not all freeways are free). This material is essential background for understanding the passage *content*. A well-structured expository text on freeways gives readers clues about how this information is organized:

> Drivers on the first freeways built in the United States ran into some serious problems. For instance, they couldn't always tell how to get on and off the highways, especially when changing from one freeway to another. Buses and car pool drivers were in the same messes as everyone else. And everyone came to a stop at tollbooths. New highways dealt with these problems.

This topic sentence includes several signals about how the rest of the text is organized, if the student has learned how to recognize the signals. The task for teachers is to introduce students to multiple text structures during classroom instruction. On the other side of the aisle, assessment writers should ensure that texts employ structural devices that facilitate students' recall of material.

The genre or type of text also influences students' performance on writing assessments. The major categories that appear in school settings through the middle school grades include narrative, persuasive, and expository (encompassing descriptive, sequential [e.g., cause/effect], and explanatory types) (Chambliss & Calfee, 1998). In most American classrooms, and in high-stakes assessments through grade three, the narrative genre is most common for reading and writing instruction and assessment. Many have argued, and we agree, that exposition is a better genre for assessing reading comprehension and writing ability. Unlike narratives, exposition relies less on everyday experiences than academic schemata—the type of schema schools seek to develop in students. Students who have learned the difference understand that text clues alert them

to carefully reconstruct and analyze what is being read. Exposition provides the base for district and state content area standards. Finally, academic writing demands are located more often in the expository genre; while creative writing is valued by teachers and enjoyable for students, success in high school, college, and beyond more often springs from research reports than from short stories. Reliance on expository writing tasks for large-scale or high-stakes assessment not only gives students practical experience, but also aids in shifting the focus of students, teachers, and administrators to the genre that prepares students to achieve future success, both socially and professionally. But for exposition to serve for high-stakes assessment, teachers must provide students with the opportunity to read and write in a variety of expository forms (i.e., biography, editorials, reports, brochures). These experiences need to be grounded in genuine texts like those found on library shelves and in bookstores; traditional textbooks generally provide poor models for reading and writing.

Once the target text has been selected, the structure and content of the *writing prompt* is a critical next step in creating a writing assessment. As a part of the *Reading and Writing about Science Project (RWS)* (Calfee & Miller, 2003), we have developed guidelines for the construction of writing prompts based on research and practice. Teachers and schools that have used these guidelines have reported a positive effect on the quality of student writing; using a consistent form for prompts allows students to "slot" a new prompt into prior experience with greater success. The following list of prompt construction guidelines focuses on activating and, where necessary, re-shaping students' prior background knowledge and existing schema.

- Begin writing prompts with a *focus statement,* such as "You are learning about different kinds of rocks and how they are formed through the rock cycle process." The focus statement has a two-fold purpose: (a) it activates students' prior knowledge, and (b) it models implicitly to students that *thinking before writing* is critical to writing a coherent and effective essay. Focus statements may be separated from the actual writing directive by placing them in separate paragraphs, folding over the sheet of paper, or using two separate sheets.
- *Provide students with space* to create webs, weaves, and/or graphic organizers of their own design to help organize their thoughts prior to writing. This space may be provided between the focus and directive statements or on a facing page. A statement such as, "You may use this space to plan your writing," should be included in the prompt (or after it) so that students (1) are encouraged to develop a written organizer and (2) know they are *allowed* to write in the blank space (obvious to us—but not to students accustomed to being told "don't write in the book"). Younger students may be provided with an advanced organizer that accompanies the writing prompt.
- Tell the students what form (also referred to as "type") the writing is to take: a letter, paragraph, essay, or some other form.
- Offer specific and simple instructions about the purpose of the students' writing. Use phrases like:
  - "Write a story that tells . . ."
  - "Write an essay to explain . . ."
  - "Write a letter to convince . . ."
  - "Write a letter to persuade . . ."
- Tell the students who the *audience* is for the composition. Giving the students an idea of whom they are writing to/for gives them critical/essential information about tone, vocabulary, and structure. It also makes the writing more *real* for students and encourages them to consider audience in their writing, and, by extension, authorship in their reading.
- *Remind students to give supporting details.* A concluding sentence might take the following shape: "Be sure to include examples from what you have just read to support your explanation/argument." *A word of caution*: Prompts often encourage students to draw on personal experience, which is all that students can do with a stand-alone assessment. For text-based prompts, scoring rubrics generally privilege the use of the target text, which makes sense. But if the prompt "invites" students to bring in personal experience, many students will turn to familiar associations at the expense of the target text. The result can be a creative work that scorers rate as "off topic." In general, reference to personal experience in text-based prompts should be handled with care, making clear to the student how such material should be incorporated in the composition, and emphasizing the importance of including material from the target text.

For exposition to serve for high-stakes assessment, teachers must provide students with the opportunity to read and write in a variety of expository forms . . . grounded in genuine texts like those found on library shelves and in bookstores.

From Teaching to Testing

Authentic classroom writing assessments do not function in isolation but are closely aligned with ongoing instruction. These activities are quite unlike large-scale standardized assessments where the test administrator is not permitted to aid students beyond simple instructions in fulfilling the directions. To learn to handle standardized writing assessments according to their optimal aptitude and ability, students must have opportunities to develop schemata and strategies for reading comprehension and composition, specifically directed toward the types of writing demanded by the assessments, but with scaffolding that helps them acquire the requisite skill and knowledge. Explicit instruction in reading and writing strategies at the classroom level, i.e., prewriting and metacognitive strategies, as well as classroom and small-group interactions that activate and expand background knowledge and schema, provide students with the necessary cognitive scaffolds or schemata to fully display their knowledge and ability in standardized assessments.

The *Read-Write Cycle* (Figure 1) presents an integrated instruction and assessment model of a scaffolding process that enables students to perform optimally on both reading comprehension and writing assessments (Calfee & Miller, 2002). The activities within the Read–Write Cycle introduce students to effective strategies that connect and extend existing schemata and experiences, and offer them expanded opportunities to read and write text, making them applicable to any subject area and any type of text. Metacognitive reflection is emphasized throughout the model, and reading comprehension is assessed continually by both oral and written methods.

To illustrate the Read–Write Cycle (RWC) in practice, we will draw on an example from the RWS Project. The example demonstrates how the RWC model provides an integrative framework for a variety of "techniques" that are strewn in the kitbags of many reading and writing teachers.

During the *Connect* phase from an introductory lesson on the Rock Cycle, the teacher first identifies for students what they will be studying (in this case, different kinds of rocks and how they are formed). Teachers activate students' prior *topic knowledge* (Alexander, Schallert, & Hare, 1991) and existing schema by having them actively reflect, share with others, and use *prewriting* (Tierney, Soter, O'Flahavan, & McGinley, 1989) and *K-W-L* (What I *Know* - What I *Want* to Know - What I Have *Learned*; Carr & Ogle, 1987) as brainstorming techniques. Students write down and share their knowledge and experience in class and small groups about different kinds of rocks and their origins, and make predictions about the content of the upcoming reading sample.

During the *Organize* phase, students (1) read the reading sample on the stages of the rock cycle (igneous, sedimentary, metamorphic), use think-aloud strategies while reading individually, and conduct analysis of text structure, purpose, and audience; (2) organize pre- and post-reading concepts using graphical structures such as a web, matrix, or linear string; and (3) use contextual clues in the text to translate new and unfamiliar vocabulary. *Graphic organizers* have been shown to aid reading comprehension and writing ability (e.g., Calfee & Drum, 1986). In the RWS Project, matching the type of graphic organizer (e.g., falling dominoes, web) to text type (e.g., sequential, descriptive) maximizes the effect of the organizer on student writing coherence. A close match helps students bridge new information from the target texts and pre-existing schema of text structure (e.g., compare/contrast, narrative). Graphic organizers are not *given* to the students; instead, the students, with teacher guidance, actively construct an organizer appropriate to the context, which can vary from student to student. But students have to justify their organization of the content matter into the graphic structures. Defense of the organizer undergirds students' metacognitive and reasoning ability and enables them to develop the structure that "works" best

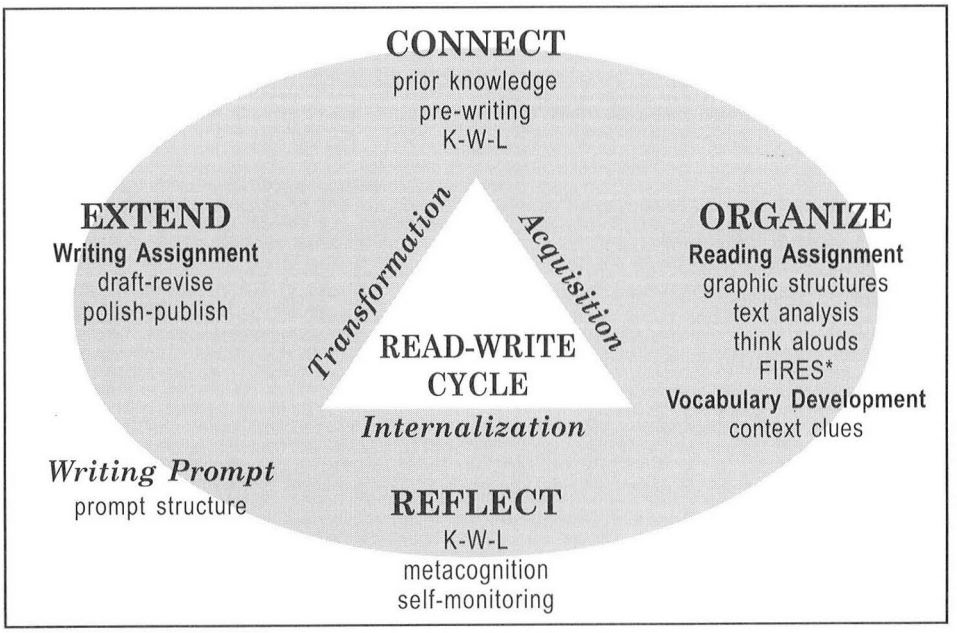

Figure 1. The Read–Write Cycle (Calfee & Miller, 2002).

*FIRES is an organizational acronym strategy that stands for Facts, Incidents, Reasons, Examples, Statistics; it aids readers in organizing the content in a reading sample or in writing points. It stems from the Miami-Dade County (FL) Public Schools Department of Instructional Leadership, 1992.

for them (Chambliss & Calfee, 1998). In a target text on the stages of the rock cycle, for instance, students often organized their information into a format that we have labeled the "sequential web"; each stage of the cycle is represented by a cluster on the web and the stages are then linked to each other with arrows representing transformations from one stage to another.

The think-aloud procedure (Davey, 1983), voicing and writing down thoughts as the text is read, either as a teacher modeling or student self-monitoring technique, has been shown to be effective in raising students' reading comprehension. During the *Organize* phase, teachers using the Read–Write Cycle are encouraged to model think-aloud procedures with students prior to reading. As they read, students are instructed to write both their observations and questions onto the target text copies, and to frequently monitor their own comprehension. The written comments from think-aloud exercises also serve as a bridge to the reflection phase and as a means for teachers to evaluate the extent to which the students use the strategy.

Vocabulary development through the use of *context clues* in the text is another activity in the *Organize* phase during the Read–Write Cycle. The degree of word-level understanding for a passage is closely related to text-level comprehension (Anderson & Freebody, 1981; Nagy, Anderson, & Herman, 1987). Only when students establish deep and extensive connections between words and their meanings, when they learn to "play" with the multiple meanings of key words, does a strong link emerge between comprehension and vocabulary (Beck & McKeown, 1991; Durso & Coggins, 1991). Relying on contextual clues for aiding in vocabulary understanding most directly reflects students' real-life situations when they encounter unfamiliar words. When a reader does not know a word, understanding depends largely on context clues. To be sure, capturing the meaning of a word from context clues is not a "natural act" for most academic texts (Miller & Gildea, 1987); consider the following sentence from a book on the philosophy of science: "Holists think that an adequate social science cannot proceed entirely at the individual level, for macrosociological explanations have an irreducible part to play" (Kincaid, 1996, p. 1). Even the best of readers has to work pretty hard to use context clues to unpack this vocabulary!

The bottom line is that comprehension depends on word-level processing. Acquisition of context strategies for vocabulary development provides students a transferable method that applies to all subject areas. In RWS, teachers developed vocabulary exercises from the assigned readings that allowed students to derive word meanings from the text itself rather than simply looking up words in the dictionary (which often provides limited help; after all, you won't find *macrosociological* in the dictionary). For example, *metamorphic* was a key term in the Rock Cycle unit (referring to both a rock type and a stage in the rock cycle). Many students had heard of *metamorphosis*, but only considered this term in relation to living things like caterpillars and butterflies. The application to describe changes in rocks was not obvious, and had to be explored in the full context of the target texts to reveal the meaning.

After reading the text sample, students examine the structure and content of their graphic organizer and revise during the *Reflect* phase. Students may discard, re-order, or restructure their ideas, some of which may be incorrect, inaccurate, or simply irrelevant. The costs of changes at this stage are relatively modest—nothing has been "written." Students share their reflections on the reading in small groups and with the teacher. K-W-L (What I *Know* - What I *Want* to Know - What I Have *Learned* [Carr & Ogle, 1987]) again serves to further externalize and shape students' reflections on the content knowledge transmitted through the reading.

Between *Reflect* and *Extend*, the teacher introduces the writing prompt. Students proceed to reflect on the task. Writing prompts used for assessment in the Read–Write Cycle follow the guidelines previously elaborated in this article, and students learn to "dissect" the prompt into its constituent elements, to locate ideas from the reading, and to translate the information into a writing plan. The writing prompt for the introductory lesson of the Rock Cycle is shown in Figure 2. The prompt was read and dissected by students before

Student writing prompt:

You are learning all about different kinds of rocks. You are learning how rocks are formed, and how they are related to each other through the rock cycle. [focus statement]

Suppose you want to tell your parents [audience] about what you have read. Write to explain [purpose] your answers to the following questions. (1) What is the rock cycle? (2) What are the different types of rocks formed by the rock cycle? (3) How can rocks be changed from one kind into another through the rock cycle? Use paragraphs [form] to keep your ideas organized. Be sure to use details and examples from what you have read [supporting details] to explain the idea clearly and completely. You may include illustrations if you wish, but your paper will be scored only on your writing.

You may use the space below to plan your writing. [plan here]

Figure 2. Sample prompt from Rock Cycle Unit. Brackets [ ] represent key items in prompt that students are instructed to identify through the "dissection" process.

writing was begun; students knew the purpose of their writing (to explain), who the intended audience was (their parents), the form that the writing was to take (paragraphs), and what type of supporting details to use (from the text reading, not personal experience).

The final task is construction of the individual compositions during the *Extend* phase. The writing task provides an opportunity for students to synthesize their knowledge and transform it in new ways and for new applications. This extension is performed individually, with no assistance from peers or the teacher, as in a high-stakes assessment. But all students can now approach the task with a "mind-full" of coherent information, along with a purpose and audience for the task.

Student's Lament

I don't want to read a book.
I don't even want to draw.
I'm done with all this testing,
I am finished with it all!

I read the stories carefully,
The way my teacher said.
Who knew the letter "C,"
Would fit each answer in my head?

I hope the next part's easier,
If it's not, I just don't care.
I know there is a pattern,
I'll bubble dots to make a square!

Hey, this test is kinda easy,
I'm ready for some more.
I'll make my marks in rows,
And they'll be easier to score.

Why do you say I must erase?
What do you mean they're wrong?
Why do you think I guessed?
You saw me working all along!

I'll work real hard to fix them,
I remember well, you'll see.
Since Shakespeare asked "to be or not,"
I think I'll go with "B."

Mara Linaberger
Dilworth Traditional Academy,
Pittsburgh Public Schools,
Pennsylvania

Judging the Writing Assessment: The Role of Rubrics

While numerous rubrics are available in the literature and in practice in schools and assessment programs at the state and national levels, rubrics still present a unique challenge for assessment. First, the teacher must decide which writing components, including grammar and spelling, to address and emphasize as instructional objectives. Second, and of greater importance, we think that the conceptual ideas relating to the content area must be rated and measured in every instance. This position differs substantially from the idea that students should handle the mechanics before they are assigned and evaluated on "real writing." For all these reasons, a "one size fits all" holistic rubric that addresses both writing and concepts is impractical and ineffectual at the classroom level. We have all read papers that are fluent, grammatically correct, and well written, only to find they completely miss the point when analyzed for critical concepts. Other papers, especially those from students for whom English is a second language, present a clear, coherent, and compelling message, in spite of numerous surface flaws. Then there is the matter of "off-prompt" compositions, where the student, for whatever reason, drifts away from the assigned topic. Such works can serve as valuable indicators of compositional ability, and we recommend scoring them in the same manner as "on-prompt," with separate ratings for compositional (length, spelling, grammar) and content criteria.

With these considerations in mind, the RWS Project employed a five-rubric scale for writing assessment (available at www.rosannegmiller), based on a model originally created in Project READ-Plus (Calfee & Patrick, 1995). Reflecting the emphasis on text-based writing, we added a sixth rubric to specifically target content-area concepts and gauge comprehension (also available at www.rosannegmiller). The five basic scales are length, coherence, grammar/mechanics, spelling, and vocabulary. Spelling and vocabulary are separate elements for reasons discussed previously. In addition, spelling and vocabulary often exhibit an inverse relationship; as vocabulary improves, spelling deteriorates. This relationship makes sense when viewed from the student perspective; more complex words are more difficult to spell, and should be avoided! If students are not rewarded for taking risks with vocabulary usage (as is the case with many existing rubrics that do not include vocabulary but do consider spelling), then they will simply not take the chance and, thereby, limit their writing. When they are rewarded for taking risks, then they use bigger words. For this strategy to work, of course, students must know the rules of the game—they need to know the rubrics, which is part of the RWS strategy.

For use with a writing assessment, the Content Area Text-Based Writing Rubric needs to be tailored around the key concepts needed to demonstrate comprehension of the target passage. Here it is especially important to inform students about the significant concepts. We encourage teachers to provide models in the early stages of learning. If students do not know what is desired, and have no idea what a "great" paper looks like, then they are less likely to be able to produce one. This idea is scarcely new, but is a variation of the "Writing to Models" approach from years ago. It is important that teachers share with students (and likewise, testing administrators and developers share with teachers) what the goal statements will be at each level *prior* to the administration of the assessment, give students opportunities to read papers at various levels of achievement, and provide an opportunity to discuss the scoring criteria in relation to specific example papers.

Sharing the assessment framework well before "writing on demand" allows all students to more effectively construct papers that meet high standards.

Closing Thoughts

The age of *No Child Left Behind* establishes high stakes for the educational enterprise. For many in the trenches, concerns have emerged about punitive outcomes and inadequate significant resources. The NCLB constant, mirrored in many state programs, is the reliance on externally mandated testing, including impromptu writing tests. The consequences of failure can be substantial for students, for teachers, and for administrators.

The classroom teacher is the critical element in this situation. As should be clear from the previous material, we think that it is possible to support students in achieving high performance levels in both comprehension and composition through integrated and scaffolded reading–writing instruction. The key is not reliance on a particular program or activity—the Read–Write Cycle draws on a wide variety of techniques from other developers and researchers—the key is the orchestration of instructional techniques by the truly "qualified" teacher. A critical issue centers on the matter of control. Genuine professionals exercise independent judgment, resisting efforts to override their autonomy as individuals and collectives. If the goal is a cadre of workers who follow instructions to produce graduates who possess basic skills, then training is the proper model. Our work has been driven by the concept of "high standards for all students," in which we depend on professionals to make informed decisions and meet stated ideals of quality and equity. The model of reading–writing instruction and assessment in this article offers one step toward that aspiration.

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