

# Practical Assessment, Research & Evaluation

A peer-reviewed electronic journal.

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Volume 7, Number 13, February, 2001

ISSN=1531-7714

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## Using State Standards and Tests to Improve Instruction

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### Abstract:

Most states have mandated curriculum standards and tests for their students. This article describes a program used by two educators in New Jersey. The aim of the program is to help teachers understand and use their state's standards and test specifications to improve classroom instruction and raise achievement. The program is part of a research project being conducted by the authors.

Today many states around the country have curriculum standards, and state developed assessments to monitor the implementation of those standards. Most state standards define expected outcomes, that is, what students need to know and be able to do, but do not mandate specific strategies or pedagogy used by local districts. Elementary, middle and high school students around the country take at least one state mandated test during their school career. However, 35 out of 50 states do not require teachers take a course, or demonstrate competency, in the area of assessment. Hence, teachers generally have limits to their knowledge of how to design and use tests and assessment tools. Richard Stiggins (1999) wrote, " It is time to rethink the relationship between assessment and effective schooling."

It is possible for teachers and administrators to use state content and process standards, test specifications, curriculum frameworks, sample questions, educational research, and exemplar papers to improve instruction and classroom tests and assessment procedures, but limited understanding puts constraints on this use. Researchers Paul Black and Dylan Wiliam (1998) stated standards are raised only by changing what happens in the classroom, beginning with teachers and students. These researchers go on to say that a large body of evidence suggests that attention to formative assessment is a vital feature of classroom work and the development of it can raise standards.

This article describes a program used by two educators to help teachers improve instruction through a deeper understanding of state standards and test specifications. Any teacher or administrator in any state can use the process outlined in this article. Specific examples were developed using the New Jersey Core Curriculum Content Standards and that state's fourth grade mathematics test.

### Developing a Knowledge Base

Understanding how standards-based state tests are constructed is the first step in being able to use them to guide and improve instruction. A test is essentially a sample of questions or activities that reflect a large body of knowledge and mental processes associated with an academic subject area. It is highly impractical to design a test that includes all of the problems that a student could ever do in each content area. Therefore, state tests are samples of possible questions from each area. All state tests are limited samples of what students are required to know in areas such as language arts, mathematics, science, etc. There are large numbers of questions that can appear on future forms of these instruments. A teacher would not be able to address all the possible questions, nor should the teacher attempt that task. However, school districts and teachers should endeavor to understand the delineation of each subject area.

School districts are under pressure to perform well on state tests and often use a test preparation strategy of giving students sample tests from commercially prepared workbooks or state released items to get ready for state tests. Although this is one strategy that can be useful for providing general information regarding student strengths and weaknesses as related to the samples, it should not be the only method used by teachers. The strategy itself, does little to educate teachers about how to use and understand state tests, standards, and test specifications. This article recommends a three-part process for developing an understanding of state assessments and using that understanding to improve instruction. That process is delineation, alignment, and calibration.

### Delineation

Delineation is the first component needed to understand any standards based test. It is the process of thoroughly identifying all aspects of a particular subject domain; the aspects are also known as dimensions. Delineation involves the

use of state testing documents that describe each content area of the assessment. The documents usually include test specifications, specific skill cluster information, subject area frameworks, assessment examples and exemplars, and the state standards. Delineation requires an examination of these documents for assessment dimensions such as content, cognitive level and complexity. A thorough delineation might also include analysis of the test format, motivation, the difficulty level of the questions, and related affective characteristics of the subject area.

Thoroughly examining state standards and test specifications is a way to begin delineation. The New Jersey Standards include macro or big picture statements and cumulative progress indicators that provide details about general performance expectation. The State's test specifications are particularly helpful because they go further and break the Standards down into two distinct types. Knowledge specifications describe the specific processes and content that all students must know by the end of fourth grade. Some would call these content standards. Problem solving specifications describe what students should be able to do with the content knowledge. They are also known as process standards. The following example is excerpted from the 4<sup>th</sup> grade New Jersey mathematics standards and test specification manuals.

**Macro Standard 4.1:** All students will develop the ability to pose and solve mathematical problems in mathematics, other disciplines, and everyday experiences.

**Cumulative Progress Indicator 4.1.2:** Recognize, formulate, and solve problems arising from mathematical situations and everyday experiences.

Test Specification Manual - Cluster IV Discrete Mathematics:

Knowledge (content standards): Students should have a conceptual understanding of: Tree diagram

Problem Solving (process standards): In problem solving settings, students should be able to: Draw and interpret networks and tree diagrams

After reviewing the 4<sup>th</sup> Grade New Jersey Core Curriculum Content Standards and test specifications for mathematics, a teacher would be able to identify seven distinct mathematics strands or dimensions. Those strands are Numeration and Number Theory, Whole Number Operations, Fractions and Decimals, Measurement/ Time/ Money, Geometry, Probability/Statistics, and Pre-algebra. Figure 1 represents the content delineation of the domain of mathematics after a team of 4<sup>th</sup> grade teachers examined the New Jersey Core Curriculum Content Standards, 4<sup>th</sup> grade state test specifications, and the local curriculum.

### Mathematics Domain

Numeration/Number Theory	Whole Number Operations
Fractions/Decimals	Measurement/Time/Money
Geometry	Pre-algebra
Probability/Statistics	

#### (Delineated Strands / Dimensions)

(Figure 1 –A delineation of the domain of Mathematics)

Working through the different dimensions associated with the delineation process helps to increase teacher and administrator understanding of each content area and its relationship to the standards, classroom instruction and assessment.

The following activities can begin once teachers and administrators specify all of the subject area dimensions:

- selecting and designing classroom assessments and practice questions
- revising and designing curriculum that is congruent with the content identified in the state standards and the district's delineation of the state designed exams
- designing teacher training using instructional techniques that support these dimensions

A closer look at the 4<sup>th</sup> grade New Jersey Core Curriculum Content Standards and test specifications for mathematics reveals an emphasis on performance and the use of mathematics to solve open ended and word problems. The test specifications for that exam imply that the mathematics test questions are primarily composed of problem solving tasks. Therefore, it is safe to assume that test questions will require thinking in the application, analysis, and perhaps synthesis and evaluation levels of cognition.

### Alignment

During the alignment phase, administrators and teachers work to identify, analyze, generalize, and describe the links between the various elements associated with the subject area previously delineated and the sample questions selected for practice or classroom activities to assess student progress. The sample questions and student assessments can be derived from several sources including state released test items, commercially manufactured test preparation materials, or teacher made activities. Teachers and administrators examine linkages in the materials, organization, textbooks, instructional strategies and other elements described in the curricula and used in daily instructional activities to ensure consistency with the district’s delineation of the state assessment.

Using and understanding the test specifications become even more important at this stage. Let’s imagine that a pair of 4<sup>th</sup> grade teachers recently completed a delineation of the mathematics domain and identified their next unit of study. The unit centered on Standard 4.1.1 and the test specification listed below. Reviewing the prior example from the test specification manual and Cluster IV the teacher would complete several alignment tasks:

Test Specification Manual - Cluster IV Discrete Mathematics:

Knowledge (content standards): Students should have a conceptual understanding of: Tree diagram

Problem Solving (process standards): In problem solving settings, students should be able to: Draw and interpret networks and tree diagrams

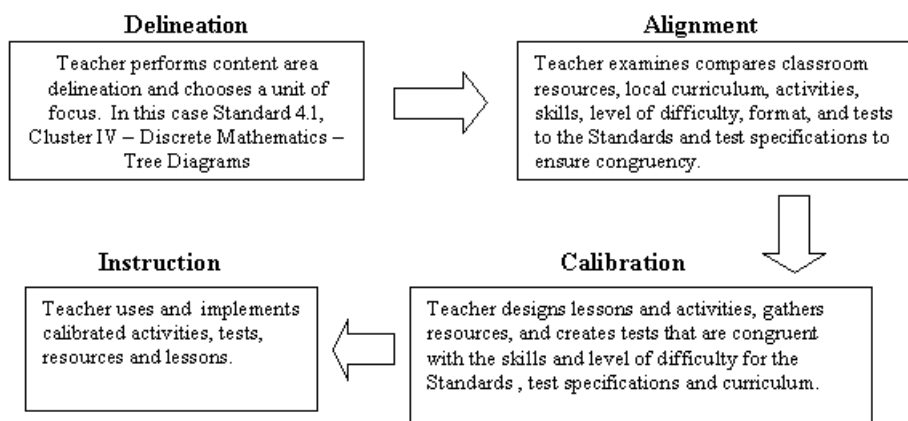
Tasks:

1. Review classroom resources, curriculum, textbooks, teacher activities, student thinking strategies and tests to ensure that the above test specifications and macro standard are addressed on the knowledge and problem solving level. Do the teacher resource materials and classroom instruction address the proper skills?
2. Review the above factors to ensure congruency between the level of difficulty required by the standards and specifications, and the difficulty of the actual teacher resources and activities. Do the teacher’s tests, lessons, activities etc., match the difficulty level required by the standards and specifications?
3. The teacher must also consider format. Although less important than skills and difficulty, the teacher resources, activities, and tests should familiarize the students with state test question formats.

Teachers must align classroom assignments and activities to the subject area delineation to ensure congruency.

**Calibration**

After completing the delineation and beginning the alignment processes, calibration begins. Calibration is the act of conducting communications and interactions with teaching staff based on the information identified in delineation and used in alignment. The calibration process ensures that the conceptualization of content, cognitive process, complexity, formats, etc. is consistently understood for each subject area. Calibration, in its simplest form, is designing classroom instruction, activities and assessments that are congruent with content area delineation and alignment. Using the prior mathematics vignette as an example, one can begin to see how the process takes place. Figure 2 represents the sequence of events leading up to calibration.



( Figure 2. Delineation, Alignment, and Calibration Flow of Events)

Imagine that a 4<sup>th</sup> grade teacher completed delineation and alignment and discovered that her/his program was missing a unit on discrete mathematics. That teacher would develop objectives related to understanding, using, and interpreting tree diagrams. Figure 3 is a sample activity / test question created by 4<sup>th</sup> grade teacher Terry Maher to begin addressing the aspect of discrete math noted in the Cluster IV test specification.

Matt has four channels on his television. He has channels 2,3,4, and 5. If Matt watches only two channels each night, how many different combinations of channels can he watch? Show all your work, and clearly explain your answer.

2,3  
2,4  
2,5

3,2  
3,4  
3,5

(Figure 3: A sample activity / test question)

Calibration is any action that helps teachers design activities and construct assessments based on the dimensions of state assessments and standards. This process helps to foster a collective understanding and agreement of the dimensions and domains of each content area. It should be a team effort based on group inquiry.

### Using Score Reports to Improve Calibration

As teachers gain a better understanding of how student work reflects the standards and test specifications through delineation, alignment and calibration, their efficiency and accuracy at identifying which students are meeting the standards should increase. Herein lies the usefulness of score reports. State test score reports sort students into categories of varying proficiency. For example, a student who scores partially proficient, proficient, or advanced proficient on a state language arts test may also show some congruency in the level of achievement in his/her well-aligned school work and classroom assessments. As teachers become better calibrated, they will be able to answer questions such as: Is the student showing partial proficiency, proficiency, or advanced proficiency on class assessments? If not, why? Is the difficulty level of the class work comparable to the state exam? What can I do to help this student meet the state standards? Is my program meeting the standards?

### Predicting Outcomes

Teachers can reflect upon their level of calibration accuracy by attempting to predict student results on state assessments. This type of exercise acts as an extension to the calibration process and can provide teachers with a way to get a very general sense of their level of calibration. Teachers should be aware that there would not be 100% agreement between a student's performance on well-calibrated classroom tests and state assessments based on many factors of test design. This process is meant to compliment the calibration exercises and provide the teacher with extra data.

To begin the prediction process, the teacher uses a list of the students taking the test. Beside each name, the teacher enters a predicted score level. When the state assessment scores arrive, the teacher can compute the level of accuracy as shown below.

<u>Name</u>	<u>Prediction</u>	<u>Score</u>
Allan	Proficient	Adv. Proficient
Ann	Proficient	Proficient
Tamika	Adv. Proficient	Proficient
Bronson	Partial Proficient	Partial Proficient

The list above shows a 50% level of success in the predictions made. The teacher making the predictions returns to each student's work and compares the successful predictions with the unsuccessful ones to gain a better idea of how the assessment performances reflect the aligned student work. Student work associated with actual test scores can form the basis for subsequent calibration discussions. Student work connected to state assessment score levels can also function as scoring examples that students refer to when judging their own work.

### Final Thoughts

The process outlined in this paper is very different from the idea of using testing materials and example tests to teach specific items on state assessments. Although there is a place for such strategies, this article suggests that it is more important for the teacher to understand the entirety of each subject area, and where state test content fits within each of these areas. Teachers must teach toward an understanding of the subject areas while they align and calibrate their classroom activities, resources, tests, and instruction with the specifications and skills required by each state's standards. There is a distinct difference between traditional notions of test preparation and aligning and calibrating instruction and assessments with the content, cognition, difficulty, and format of state assessment instruments, specifications, and standards. The aim is to ensure that teachers understand, and calibrate their classrooms with respect to the entire process and do not simply focus on how to answer specific types of test questions.

The questions will change, but the underlying skills and concepts will not. One must be careful not to wallow in the mire of test prep. As educators, we are trying to link the classroom activities to the standards and skills set by the state. Delineation, alignment, and calibration are academic endeavors that demand unending commitment. Do not expect to accomplish alignment or calibration at an in-service day, or even during the course of a school year. This ongoing process requires constant attention. The administration must provide the time and resources to conduct frequent calibration meetings to examine such things as classroom work and student assessment samples. Beware, it is easy to fall out of alignment and calibration and into test prep.

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**Descriptors:** Performance Based Assessments; State Assessment; Alignment; Academic Standards

**Citation:** Tienken, Christopher & Michael Wilson (2001). Using state standards and tests to improve instruction. *Practical Assessment, Research & Evaluation*, 7(13). Available online: <http://PAREonline.net/getvn.asp?v=7&n=13>.