

The *Journal of Mathematics Education at Teachers College* is a publication of the
Program in Mathematics and Education at Teachers College
Columbia University in the City of New York.

Guest Editor

Ms. Heather Gould

Editorial Board

Dr. Philip Smith
Dr. Bruce Vogeli
Dr. Erica Walker

Corresponding Editor

Ms. Krystle Hecker

On-Line Editor

Dr. Diane R. Murray

Layout

Ms. Sonja Hubbert

Photo Editor and Cover Design

Dr. Mark Causapin

Dr. Elizabeth Hagan was discharged from the US Navy as a Lieutenant in 1946 and completed the PhD in Measurement and Evaluation at Teachers College in 1952. Her collaboration with Robert Thorndike resulted in many papers and books including the influential 1961 John Wiley publication, *Measurement and Evaluation in Psychology and Education*. Dr. Hagan concluded her career at Teachers College in 1976 as Acting Dean of Academic Affairs.

Dr. Stuart Weinberg was the Mathematics Department Chairman at Stuyvesant High School before joining the Teachers College faculty as Director of Student Teaching for the Program in Mathematics. Dr. Weinberg has applied his extensive classroom experience to the development of methods of assessing teachers' classroom performance utilizing belief systems and attitudes.

Aims and Scope

The *JMETC* is a re-creation of an earlier publication by the Teachers College Columbia University Program in Mathematics. As a peer-reviewed, semi-annual journal, it is intended to provide dissemination opportunities for writers of practice-based or research contributions to the general field of mathematics education. Each issue of the *JMETC* will focus upon an educational theme. The themes planned for the 2012 Fall-Winter and 2013 Spring-Summer issues are *Equity* and *Leadership*, respectively.

JMETC readers are educators from pre-K-12 through college and university levels, and from many different disciplines and job positions—teachers, principals, superintendents, professors of education, and other leaders in education. Articles to appear in the *JMETC* include research reports, commentaries on practice, historical analyses, and responses to issues and recommendations of professional interest.

Manuscript Submission

JMETC seeks conversational manuscripts (2,500-3,500 words in length) that are insightful and helpful to mathematics educators. Articles should contain fresh information, possibly research-based, that gives practical guidance readers can use to improve practice. Examples from classroom experience are encouraged. Articles must not have been accepted for publication elsewhere. To keep the submission and review process as efficient as possible, all manuscripts may be submitted electronically at www.tc.edu/jmetc.

Abstract and keywords. All manuscripts must include an abstract with keywords. Abstracts describing the essence of the manuscript should not exceed 150 words. Authors should select keywords from the menu on the manuscript submission system so that readers can search for the article after it is published. All inquiries and materials should be submitted to Ms. Krystle Hecker at P.O. Box 210, Teachers College Columbia University, 525 W. 120th St., New York, NY 10027 or at JMETS@tc.columbia.edu.

Copyrights and Permissions

Those who wish to reuse material copyrighted by the *JMETC* must secure written permission from the editors to reproduce a journal article in full or in texts of more than 500 words. The *JMETC* normally will grant permission contingent on permission of the author and inclusion of the *JMETC* copyright notice on the first page of reproduced material. Access services may use unedited abstracts without the permission of the *JMETC* or the author. Address requests for reprint permissions to: Ms. Krystle Hecker, P.O. Box 210, Teachers College Columbia University, 525 W. 120th St., New York, NY 10027.

Library of Congress Cataloging-in-Publication Data

Journal of mathematics education at Teachers College
p. cm.

Includes bibliographical references.

ISSN 2156-1397

EISSN 2156-1400

1. Mathematics—Study and teaching—United States—Periodicals
QA11.A1 J963

More Information is available online: www.tc.edu/jmetc

Journal of Mathematics Education at Teachers College

Call for Papers

The “theme” of the fall issue of the *Journal of Mathematics Education at Teachers College* will be *Equity*. This “call for papers” is an invitation to mathematics education professionals, especially Teachers College students, alumni and friends, to submit articles of approximately 2500-3500 words describing research, experiments, projects, innovations, or practices related to equity in mathematics education. Articles should be submitted to Ms. Krystle Hecker at JMETC@tc.columbia.edu by September 1, 2012. The fall issue’s guest editor, Mr. Nathan N. Alexander, will send contributed articles to editorial panels for “blind review.” Reviews will be completed by October 1, 2012, and final manuscripts of selected papers are to be submitted by October 15, 2012. Publication is expected by November 15, 2012.

Call for Volunteers

This *Call for Volunteers* is an invitation to mathematics educators with experience in reading/writing professional papers to join the editorial/review panels for the fall 2012 and subsequent issues of *JMETC*. Reviewers are expected to complete assigned reviews no later than 3 weeks from receipt of the manuscripts in order to expedite the publication process. Reviewers are responsible for editorial suggestions, fact and citations review, and identification of similar works that may be helpful to contributors whose submissions seem appropriate for publication. Neither authors’ nor reviewers’ names and affiliations will be shared; however, editors’/reviewers’ comments may be sent to contributors of manuscripts to guide further submissions without identifying the editor/reviewer.

If you wish to be considered for review assignments, please request a *Reviewer Information Form*. Return the completed form to Ms. Krystle Hecker at hecker@tc.edu or Teachers College Columbia University, 525 W 120th St., Box 210, New York, NY 10027.

Looking Ahead

Anticipated themes for future issues are:

Fall 2012	Equity
Spring 2013	Leadership
Fall 2013	Modeling
Spring 2014	Teaching Aids

TO OBTAIN COPIES OF *JMETC*

To obtain additional copies of *JMETC*, please visit the *Journal’s* website www.tc.edu/jmetc. The cost per copy delivered nationally by first class mail is \$5.00. Payment should be sent by check to *JMETC*, Teachers College Columbia University, 525 W 120th St., Box 210, New York, NY 10027.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear the full citation on the first page. Copyrights for components of this work owned by other than The Program in Mathematics and Education must be honored. Abstracting with credit is permitted. To copy, to republish, to post on servers for commercial use, or to redistribute to lists requires prior specific permission. Request permission from JMETC@tc.columbia.edu.

Journal of Mathematics Education at Teachers College

Spring – Summer 2012

A CENTURY OF LEADERSHIP IN
MATHEMATICS AND ITS TEACHING

© Copyright 2012
by the Program in Mathematics and Education
Teachers College Columbia University
in the City of New York

TABLE OF CONTENTS

Preface

- v **Assessment, Evaluation, and Testing: Measurement at Various Levels**
Heather Gould

Articles

- 6 **Assessment for the Common Core Mathematics Standards**
Hung-Hsi Wu, University of California at Berkeley
- 19 **A Population of Assessment Tasks**
Phil Daro, University of California at Berkeley
Hugh Burkhardt, Shell Centre, University of Nottingham
University of California at Berkeley
- 26 **Assessing Students' Mathematical Proficiencies on the Common Core**
Henry S. Kepner and DeAnn Huinker, University of Wisconsin – Milwaukee
- 33 **Assessment in a Common Core Era: Revolutionary or Evolutionary?**
Allen M. Dimacali, College Board
- 40 **Assessment in Finnish Schools**
Lasse Savola, Finnish Institute of Technology
- 45 **The Russian Uniform State Examination in Mathematics: The Latest Version**
Albina Marushina, Teachers College Columbia University

Assessment Notes from the Field

- 50 **Will the CCSSM Have Staying Power?**
Matthew R. Larson, Lincoln Public Schools, Lincoln, NE
- 53 **Using Item Analysis Data as a Tool to Inform Instruction in the Mathematics Classroom: A Model of Data-Driven Instruction**
William Farber, Mercy College
- 61 **Assessment of Mathematical Modeling**
Ronny Kwan Eu Leong, Universiti Malaya, Kuala Lumpur, Malaysia
- 66 **The Mathematics Portfolio: An Alternative Tool to Evaluate Students' Progress**
Marla A. Sole, Eugene Lang College of the New School for Liberal Arts

TABLE OF CONTENTS, continued

Other

71 ABOUT THE AUTHORS

74 *Acknowledgement of Reviewers*

Assessing Students' Mathematical Proficiencies on the Common Core

Henry S. Kepner

DeAnn Huinker

University of Wisconsin – Milwaukee

The *Common Core State Standards for Mathematics* presents challenges and opportunities to contribute to a common understanding of the mathematical proficiencies expected of our students. This paper discusses the movement to establish multi-state assessment consortia in the United States based in the standards movement set in motion by the National Council of Teachers of Mathematics and the increased accountability of student learning through the *No Child Left Behind Act*. The consortia intend to assess the full range of student learning expectations to include both standards for mathematical content and mathematical practices through construction of comprehensive systems of assessments that accurately measure student progress toward college and career readiness. The systems are to include interim and summative assessments primarily taken in an online environment that allows for automated or timely scoring.

Keywords: *Common Core State Standards*, Race to the Top Assessment, PARCC, SBAC.

The rush to develop assessment systems by multi-state governed consortia presents our mathematics education community an unprecedented opportunity to focus on and monitor student learning, to establish ways to examine mathematics education at the local level, and to address equity by looking at comparable student performance within districts and across the country. These assessments will provide an operational definition of the *Common Core State Standards for Mathematics* (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

Since its release on June 2, 2010, the *Common Core State Standards for Mathematics* (CCSSM) has been a focus of study by teachers, mathematics educators, mathematicians, policy leaders, and others. This diverse effort has yet to converge on a common meaning or understanding of what is expected of students. For many, the assessments will show us, "Oh, that's what they expect a student to do."

Our challenge is to participate in this assessment development and interpretation process in every way possible. Whether through reviewing frameworks and specifications, item writing, pilot testing, or contributing to the development and anticipated use of reporting tools, we will learn more if we contribute to a common understanding of the mathematical proficiencies expected of our students. Herein we provide a brief history of the standards and accountability movement, consider what proficiencies are being assessed, and take a look at the proposed accountability systems.

How Did We Get Here? A Brief History of Establishing Standards and Assessment

The standards movement was started with the 1989 release of the *Curriculum and Evaluation Standards for School Mathematics* by the National Council of Teachers of Mathematics (NCTM). This document presented a professional organization's statement of belief about what was important in school mathematics. Throughout the 1990s, most states created their own sets of standards, often based on the NCTM document and successive work in the field.

In 2002, the federal *No Child Left Behind Act* (NCLB) dictated that states assess their students on standards identified at specific grade levels. This established a new precedence in US education, the assessment of "all" public school students on common tests within a state. Previously, assessment decisions in most states were made at the district level—what subjects to assess, at what grade levels, with what tests, and how to interpret, report, and use the results. Prior to NCLB, only a few states required tests in one or two subject areas for high school graduation. With NCLB, for the first time across the country, information was reported on public school students' performance on the same test in reading and mathematics at a given grade level (i.e., grades 3 through 8 and at least once during grades 10 through 12) across an entire state.

In March 2009, the National Governors Association and the Council of Chief State School Officers (CCSSO) voted to establish and promote a common set of standards, initially, in mathematics and English language arts, to be presented for adoption by each state. Since its release, the CCSSM has been adopted by 45 states and some of the US

ASSESSING MATHEMATICAL PROFICIENCIES

territories. In contrast to earlier initiatives and numerous debates around a national (federal) curriculum, this single set of standards was adopted through the required legal process in each state, not by federal decision makers.

Assessment Consortia—Collaboration Across States

As important as the CCSSM may appear, standards are not effective until joined with clearly described *assessments* (What do you really expect students to know and be able to do?), *curriculum* (an instructional program that includes sequenced content and tasks that connect the mathematics and establishes progressive learning challenges for students), and *instruction* that provides students an environment in which they can demonstrate and practice the mathematics they know and are learning. Using strong pressure from the state governors, the business community, and others for reporting student performance on common measures across states, the US Department of Education funded two multi-state driven assessment consortia, the Partnership for Assessment of Readiness for College and Careers (PARCC) and SMARTER Balanced Assessment Consortium (SBAC).

Each consortia has the daunting task of establishing an assessment system that provides common information across its member states for policy and organizational decision making. In addition, each assessment system must provide individual student information for programmatic, instructional, and intervention decisions. Currently, each consortium has about half the states as members and will touch about half the US student population. See Table 1 in Dimacali in this issue to find whether your state is participating and, if so, its affiliation(s).

Each consortium is governed by a group of states. The governing states, through their representatives, make policy decisions, set goals, and provide direction for the tasks within that consortium. The two consortia will work toward the US Department of Education funding requirements (Race to the Top Fund Assessment Program, 2010) to

- Assess student mathematics acquisition and progress toward “college and career readiness;”
- Administer on-line assessments, with timely results;
- Use multiple measures;
- Assess all students, except those with “significant cognitive disabilities;”
- Provide common, comparable scores across member states; and
- Provide achievement and growth information for teacher and principal evaluation and professional development.

The two consortia are working toward the same goals with considerable collaboration and sharing, yet they remain in competition to construct an assessment system

that meets public, or state, expectations. Everyone will learn from this constructive competition.

What Is Being Assessed?—CCSSM Expectations

The full CCSSM document must be considered when establishing assessments and their interpretations. This includes attention to the *Standards for Mathematical Content* and the *Standards for Mathematical Practice*. The concern is that users will focus too intensely on the individual numbered content standards without sufficient attention to cluster groupings of content standards and to the role and import of mathematical practices.

Each consortia has designed draft frameworks to serve as a bridge between the CCSSM and its proposed assessment system. These frameworks inform the development of item specifications and assessment blueprints to ensure that the assessment system accurately assesses the full range of the standards. With slight variations in structure and title, draft versions of the PARCC (2011) “Model Content Frameworks” and the SBAC (2011) “Content Specifications” are available through state departments of education and the consortium websites. The frameworks also intend to clarify the connections between instructional processes and assessment outcomes and provide guidance and clarity for teachers, curriculum developers, publishers, and test developers.

Assessing Proficiency of “Standards for Mathematical Content”

The content standards of the CCSSM present two major challenges for its users, particularly for teachers, curriculum developers, and test developers. One issue is acknowledging that not all standards are created equal. Some demand greater emphasis than others at specific grade levels. The other issue concerns the point-in-time specification of a standard and its necessary development building on knowledge established in previous grades.

Within a grade level or category, domains identify the areas of mathematics to be addressed. Within each domain, a cluster heading provides a coherent statement of intent for an associated group of standards. While of varying specificity, the cluster statements suggest ways to see success of individual standards. It is important to realize that not all standards, nor all clusters, are of equal importance. “Some clusters require greater emphasis than the others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness” (PARCC, 2011, p. 17). In the current effort to construct useful assessments, developers are using cluster headings in establishing evidence of student performance.

While the writers of the CCSSM recognized that not all the standards or clusters were equally important, little guidance was provided beyond the cluster headings in judging priorities. Now, the assessment consortia are providing direction in identifying higher priority clusters at each grade level by assigning terms *major*, *supporting*, and *additional* to clusters. In addressing the call for focus and adequate time for in-depth study on a topic, this is an important and valuable action to focus teachers and curriculum developers.

Why are the identification of cluster priorities being established by assessment consortia teams rather than the mathematics education community? Consequences are already appearing as curriculum developers and instructional leaders begin to identify topics to receive less, or in some cases, no attention based on assessment consortia draft commentaries—not the CCSSM nor professional judgments in the field. The consortia warn that this prioritizing of clusters should not inadvertently suggest that some material not be taught, but rather it should provide guidance in ways that foster greater focus and coherence. Regardless, the consortia are not the right venue for making such critical decisions unilaterally, but rather consensus of priorities for assessment as it relates to instructional goals should emanate from the mathematics education community.

The CCSSM content sequence was established by the CCSSM writers utilizing commissioned “progression papers.” These documents included professional judgment in the form of “learning trajectories” based on the logical structure of mathematics, research on students’ cognitive development, international sequences, examples of best practice, and the NCTM (2006) curriculum focal points. (The papers are being revised for dissemination and drafts are available at <http://ime.math.arizona.edu/progressions>.) The identification of content sequences also involved considerable interaction among the writers and external reviewer panels and input from public reviews. Ultimately, the writers had to decide on the content expectations to include as standards or benchmarks of learning at specific grade levels.

This resulted with the CCSSM content expectations presented in a way not done in many current tools. A content standard, or cluster of standards, is identified and specified at one grade level. Whereas many current US curriculum guides, instructional materials, and assessment frameworks repeat a topic with practically the same lessons or same assessments over several years, the CCSSM presents a standard once as an indicator of a point-in-time for reaching a critical benchmark of learning. It is up to teachers and curricula to identify precursor ideas and plan for development across grades. The CCSSM authors make note of this need, along with the importance of connecting mathematical ideas and skills across domains and categories and across grades. However, the establishment of a well-reasoned, planned instructional

program is left for us to do and is one of our major challenges in the forthcoming years.

How will this play out in the assessments? The consortia are focusing on clearly stating the content to be assessed in a given year. However, the commentary indicates that items and tasks will often be built on the standards students are expected to have mastered in earlier grades. Here is our challenge. If a student does not perform successfully on such a task, can we determine whether it is because the student is not proficient with the current grade cluster or is not proficient on prior content standards assumed in the item? It will be important for both the student and the teacher to have a way of knowing if a reported lack of proficiency is due to current or earlier knowledge and skills difficulties.

Assessing Proficiency of “Standards for Mathematical Practice”

The consortia are committed to providing evidence of student performance on both *Standards for Mathematical Content* and *Standards for Mathematical Practice*. Of particular importance for the field and challenge for the consortia are developing measures of the mathematical practices identified in the CCSSM. PARCC (2011) states, “To be consistent with the standards, as a whole, assessment as well as curriculum and classroom activities must include a balance of mathematical tasks that provide opportunities for students to develop the kinds of expertise described in the practices” (p. 7).

The mathematical practices as expectations of student behaviors rest on important processes and proficiencies with longstanding importance in mathematics education. These were built on two pivotal documents, *Principles and Standards for School Mathematics* (NCTM, 2000) and *Adding It Up* (National Research Council, 2001). Table 1 provides a quick view of connections between the Standards for Mathematical Practice and the NCTM process standards. The consortia provide an opportunity for us to use these assessments as leverage to ensure that teachers nurture, observe, and monitor these important student mathematical behaviors in classrooms across the country.

SBAC (2011) intends to focus on complex performances that embody the mathematical practices, as well as the testing of specific concepts, facts, and skills. The draft of its mathematics specifications present four “assessment claims” as broad statements of learning outcomes for approval as policy by its governing states. Each claim indicates what would be expected of a student to demonstrate proficiency across a range of content and practices.

Claim 1. Concepts and Procedures: Students can explain and apply mathematical concepts and

ASSESSING MATHEMATICAL PROFICIENCIES

Table 1. Standards for Mathematical Practice related to NCTM Standards (2000)

CCSSM Standards for Mathematical Practice	NCTM Process Standards
1. Make sense of problems & persevere in solving them 5. Use appropriate tools strategically	Problem Solving
2. Reason abstractly and quantitatively 3. Construct viable arguments & critique the reasoning of others 8. Look for and express regularity in repeated reasoning	Reasoning and Proof
3. Construct viable arguments	Communication
6. Attend to precision 7. Look for and make use of structure	Connections
4. Model with mathematics	Representations

interpret and carry out mathematical procedures with precision and fluency.

Claim 2. Problem Solving: Students can solve a range of complex well-posed problems in pure and applied mathematics making productive use of knowledge and problem solving strategies.

Claim 3. Communicating Reasoning: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Claim 4. Modeling and Data Analysis: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems. (SBAC, 2011, p. 17)

The consortia promise of assessing and reporting on complex student performance requires assessment tasks and items that go beyond selected response items to include constructed response items. The inclusion of tasks designed to capture students' mathematical practices will be important for instruction and curricular materials in preparation for assessment. The creation and dissemination of rubrics to evaluate student performance will be helpful for teachers and students in establishing norms and what counts as evidence. Samples of potential tasks are available on the consortia websites and several other locations such as the Illustrative Mathematics Project (<http://illustrativemathematics.org>).

Constructing an Assessment System

The assessment consortia are each developing a comprehensive system of assessments that are aligned to the *Common Core State Standards* and that accurately measure student progress toward college and career readiness. Figure 1 provides an overview of the system

being built by SBAC. It includes interim and summative assessments in grades 3–8 and high school with coverage of the full range of mathematics standards and the full range of student performance. PARCC has a similar structure.

The first priority for each consortium is the development of common summative assessments to be administered across its member states starting in 2014–2015 school year. These will be used in each partner state as the NCLB accountability measures at the end of each required grade level.

Equally, or perhaps more important, particularly for student and teacher impact, each system will produce a collection of interim assessments and formative tools for use in each grade, K–8, and in high school. The interim assessments, often called benchmark assessments, allow for periodic monitoring of student performance within a content domain at a grade level. These are being designed to provide rapid turnaround for use by teachers, schools, and districts for instructional decision making, possibly student diagnosis, and curricular adaptation.

The interim assessments and other formative tools will be aligned with the corresponding summative assessment. Thus, items and tasks students encounter during the year should be consistent with expectations on the summative assessment for that year. While the interim assessments and formative tools may not be the first products completed, they could be the most valuable and productive components to assist teachers and students in monitoring student performance during the year and provide evidence for teacher and curricular decision making.

Multiple Measures and Item Types

Both consortia are committed to using a full range of items and performance tasks to assess student performance.

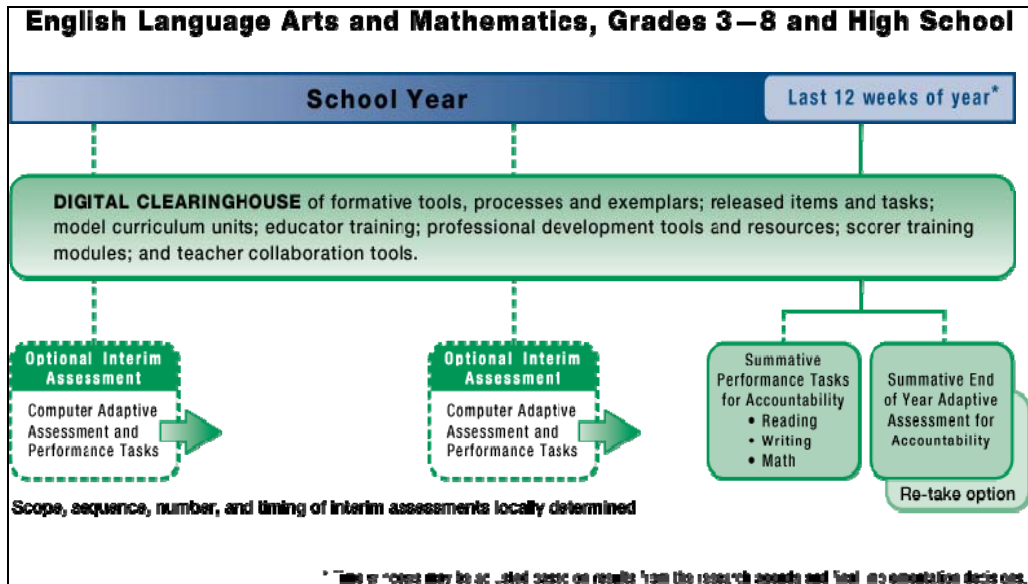


Figure 1. SBAC Proposed Assessment System

Tasks will include a variety of item types: selected response, short constructed response, extended constructed response, technology enhanced, and performance tasks. This allows assessing students on mathematics “ranging from knowing important mathematical facts and procedures to being able to use that knowledge to solve complex problems” (SBAC, 2011, p. 14).

The consortia are establishing test blueprints, with content and item specifications, in order to request proposals from vendors and ask states to write and review test items and tasks. Some contracts are already in place. This activity will be followed by piloting items and tasks. Member states will have the opportunity to participate in the piloting and review of items, and perhaps also in the process for constructing items. Each consortium is committed to engaging teachers and seeking teacher input into the development of items and tools. As the type and level of involvement will vary among the states, you should inquire about the process from your state department of education and offer to participate and contribute. It is critical that teachers use such opportunities to learn what might be expected of their students. This is a beginning stage of teacher awareness and a key opportunity to challenge the expectations of specific items and tasks. Extensive awareness efforts and professional development will be important in ensuring that instruction in the classroom provides students the mathematical practices as well as content knowledge to be assessed.

An Online Assessment Environment

The consortia are planning systems where students primarily take assessments in an online (i.e., computer or tablet) environment that allows for automated or timely scoring. An online system will allow much faster turnaround of results which is critical for teacher and school use in making instructional decisions at both the individual student and instructional unit levels. This also allows for reporting to different audiences that may range from reporting individual student performance data for use by teachers, students, and parents to reporting aggregate data that allows for comparisons across states, districts, and schools. The systems will be initiating research on which items and tasks are suited to automated scoring and which will require scoring by hand.

SBAC is committed to instituting computer-adaptive testing. The specific items presented to each student will differ as items will be scaled on difficulty and will be selected based on that student’s performance earlier in the testing setting. This test model will allow students to respond to fewer items while still providing measures of student performance and information on student growth in comparison to a single form test administered to all students.

This online effort and the commitment to establish tasks that require complex student responses will of necessity mandate the engagement of teachers in writing and reviewing items and tasks along with development of scoring rubrics. Both consortia are planning extensive pilot-testing of items and tasks during the 2012–2013

ASSESSING MATHEMATICAL PROFICIENCIES

school year, primarily using machine scoring. Potential vendors are being requested to engage teachers in writing and reviewing items and tasks. A way for us to be involved is to seek aggressively to participate in the test development and to volunteer for state-conducted piloting so as to provide teacher and mathematics educator feedback.

Reporting to Multiple Audiences

For the first time, fast and thorough reporting of student performance will be available for multiple audiences. The major responsibilities for access to data and major reports will be controlled by the state.

Teachers will likely have access to student performance data in a timely manner. Rapid turnaround on machine scored assessments should be immediate or within a day or two hopefully to provide information for instructional decisions, both in the classroom and in instructional units. Plans for student profiles are in process to report student performance and growth toward “college and career readiness.” Two major purposes are intended for state data: reporting school performance for quality assurances and allowing cross-state and other comparisons. Reporting tools will also be designed for parents and students.

This reporting scheme will be one of the first to have extensive student data on summative assessments to be analyzed and used in reporting teacher effectiveness. PARCC and SBAC may be a major component in teacher evaluation systems which include a component reflecting student performance.

Just the Beginning

The first administration of summative assessments across multiple states will be during the last 12 weeks of the school year in Spring 2015. It will provide baseline information for states, districts, schools, curriculum developers, and mathematics education researchers. It is important to be prepared to use this information to examine curriculum and instructional practices and plan coherent efforts at revisions. This is likely to be a challenge in the face of anticipated knee-jerk media and public reactions to a new set of scores.

Currently, states and districts are in very different places in implementation and placement of CCSSM. In addition, a major lag exists in instructional materials development which addresses coherence and connections across grades and mathematical domains. The transitions will be on-going, well beyond 2014–2015. At district and classroom levels, teachers and students will be transitioning from one timeline to another as students enter each successive grade with more experience in a new program and sequence. It is important to note that the current rush to cut-and-paste chapters or units from one

grade to another is seriously flawed. Have students really experienced the depth and progression of a topic and its related content? This approach is likely to violate the focus, coherence, and connections expected by CCSSM.

Adoption of the CCSSM involves major increases in student expectations, changes in content sequencing, and the need for access to coherent instructional materials. In addition, constructing an assessment system presents numerous educational measurement issues regarding reliable and valid measurement beyond selected response theory, questions about the predictability of student performance toward the goal of college and career readiness, and the challenges of web-based test administration and scoring. All will involve revisions over time.

Commenting on assessment system status by 2014–2015, Joseph Wilhoft, Executive Director of SMARTER Balanced Assessment Consortium, stated, “The amount of innovation we’ll be able to carry off in that amount of time is not going to be that much....There’s an expectation that out of the gate this [assessment] is going to be so game-changing, and maybe after four or five years it will be game-changing, but not immediately” (as cited in Cavanaugh, 2011, p.11). The promise of effective assessment of students’ mathematical proficiency is enormous. But, we have much hard work ahead.

Websites

- *Common Core State Standards for Mathematics:* <http://www.corestandards.org>
- Illustrative Mathematics Project: <http://illustrativemathematics.org>
- Partnership for Assessment of Readiness for College and Careers (PARCC): <http://www.parcconline.org>
- SMARTER Balanced Assessment Consortium (SBAC): <http://www.k12.wa.us/SMARTER>
- Standards Progression Documents for the Common Core Mathematics Standards: <http://ime.math.arizona.edu/progressions>

References

- Cavanaugh, S. (2011, April 20). Race to top funds prompt district, school-level efforts. *Education Week*, 30(28), 26.
- National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: Author.
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

KEPNER, HUINKER

- National Council of Teachers of Mathematics. (2006). *Curriculum focal points for prekindergarten through grade 8 mathematics*. Reston, VA: Author.
- National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common core state standards for mathematics*. Washington, DC: Author.
- National Research Council. (2001). *Adding it up: Helping children learn mathematics*. Mathematics Learning Study Committee, Center for Education, Division of Behavioral Sciences and Education, National Research Council. Washington, DC: National Academy Press.
- Partnership for Assessment of Readiness for College and Careers (PARCC). (2011). *PARCC model content frameworks—mathematics, grades 3–11*. Retrieved from <http://www.parcconline.org/parcc-content-frameworks>.
- Race to the Top Fund Assessment Program: Notice Inviting Applications for New Awards for Fiscal Year 2010, 75 Fed. Reg. 18171 (April 9, 2010).
- SMARTER Balanced Assessment Consortium (SBAC). (2011). Content specifications for the summative assessment of the *Common Core State Standards* for Mathematics (review draft). Retrieved from: <http://www.k12.wa.us/SMARTER/Resources.aspx>.