COMMON CORE STATE STANDARDS MOVEMENT IN U.S MATHEMATICS CURRICULUM

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ABSTRACT

On June 1, 2010, the Common Core State Standards (CCSS) in mathematics was released. The adoption of CCSS is voluntary, but the U.S. Department of Education will provide some financial incentives for those states that accept it. In the beginning, 48 states initially signed on, and 46 states have officially adopted the CCSS for their state standards so far. This paper looks back the national standards movement in U.S mathematics curriculum and discusses an opportunity that CCSS become national standards in U.S mathematics Curriculum.

1 National Standards Movement

The national standards movement began with the publication of *A Nation at Risk* in 1983. The state governors and business leaders began to increase their involvement in the formation of educational policy that would ultimately become the standards-based reform movement (Puma et al, 2000). In 1989, President Bush proposed the America 2000 Act, which called for mandated national testing. However, this act failed to pass through congress. In 1993, Goals 2000 proposed by President Clinton was passed by Congress. The significance of the Goals 2000 was that it took an important step in requiring states to have education standards in order to receive Title I funds (Miller, 2000). With the enactment of the No Child Left Behind (NCLB) Act of 2001, the Federal Government expanded its role significantly. This act required states to test more frequently with the National Assessment of Education Progress (NAEP) and set more ambitious and uniform improvement goals for their schools, and the Federal Government took action on schools that failed to meet those goals (Fuhrman, 2004). Although no national curriculum was proposed during the initial phase of the NCLB Act, there was a national system of standards-based accountability imposed with the understanding that every school should do well in mathematics.

2 Standards-Based Reform Movement

The standards-based reform movement emerged in the late 1980s and 1990s through the work of a group of education leaders, governors, researchers, curriculum development companies, and professional organizations. The National Council of Teachers of Mathematics (NCTM) has developed standards that address students' learning goals, assessment, and instruction (NCTM, 1989, 1991, 1995,

2000, 2006). NCTM's publications in 1989, 2000, and 2006 were for curriculum, the 1991 publication was for appropriate teaching, and the 1995 publication was for assessment. Falling NAEP scores and a proposed solution from NCTM led to the development of a nationally recognized set of content standards in mathematics (McClure, 2003).

Mathematics education has long been divided by contentious debates about curriculum and instruction. By the Mathematical Association of America, two mathematicians and three mathematics educators gathered to seek common ground in their efforts to improve K – 12 mathematics teaching and learning with two pilot meetings in December 2004 and June 2005. They agreed upon a set of understandings in seven issues and terms: Automatic recall of basic facts, calculators, learning algorithms, fractions, teaching mathematics in "real world" contexts, instructional methods, and teacher knowledge (Ball et al, 2005). The following year, NCTM published the *Focal Point*, which provided a set of core ideas for mathematics in K – 8.

3 Common Core State Standards Movement

In April 2006, President George W. Bush created the National Mathematics Advisory Panel to examine and summarize the scientific evidence related to the teaching and learning mathematics. In 2008, the final report was published with 45 findings and recommendations on key topics, curricula content, learning processes, teachers and teacher education, instructional practices, instructional materials, assessments, and research policies and mechanisms (NMAP, 2008a). In addition to the final report was a set of task group reports on (a) standards of evidence, (b) conceptual knowledge and skills, (c) learning processes, (d) teachers and teacher education, (e) instructional practices, (f) instructional materials, and (g) assessment, as well as (h) a national survey of Algebra I teachers (NMAP, 2008b).

On June 1, 2010, the Common Core State Standards (CCSS) in mathematics, a state-led effort, was released and written through a joint effort by the National Governors Association and the Council of Chief State School Office to develop common K – 12 and college and career ready mathematics standards (CCSSI, 2010). The adoption of CCSS is voluntary, but the U.S. Department of Education will provide some financial incentives for those states that accept it. In the beginning, 48 states initially signed on except for Texas and Alaska, and 46 states have officially adopted the CCSS for their state standards so far. Each state could adopt the CCSS either directly or by fully aligning the state standards with the CCSS. States may also add additional standards.

CCSS set grade-specific standards but do not dictate teachers on what and how to teach. The standards do not define the intervention methods or materials necessary to support students. CCSS focus on understanding mathematics in such ways: 1) conceptual understanding and procedural skills are equally stressed, 2) key ideas, understandings, and skills are identified, 3) deep learning of concepts is emphasized, and 4) being able to apply concepts and skills to new situations is expected (Hunt, 2010). The K – 5 standards provide that students build a strong and a solid foundation in whole numbers, addition, subtraction, multiplication, division, fractions, and decimals to enable student hands on learning in geometry, algebra, and probability and statistics. The middle school standards provide a coherent and rich preparation for high school mathematics, whereas the high school standards provide practice in applying mathematical knowledge to real world issues and challenges as well as emphasize mathematical modeling.

4 Common Core State Standards and Other Standards

CCSS is a state-led effort that is not part of the Federal Government development. It is, however, possible that the CCSS had a chance to create the national standards in mathematics by looking at the number of states that initially signed on and by the support provided from the Federal Government to states as they began adopting the standards. What would be the reasons for this? Also, what are some counter arguments?

The first reason is the benefits for states and local districts that adopt CCSS as their standards. The benefits are as follows: 1) CCSS allows collaborative professional development to be based on best practices, 2) CCSS allows the development of common assessments and other tools, 3) CCSS enables comparison of policies and achievement across states and districts, and 4) CCSS creates potential for collaborative groups to gain more economical efficiency for content standards, assessments, professional development, and pre-service teacher education. Each state does not have to develop its own curriculum guide, assessment, and content standards. However, Usiskin (2007) argued that a single set of national standards does not promise that schools speed up to change the curriculum, that students' performance in mathematics will not be necessarily improved with national standards, and that national standards may not be better than local and state curriculum. Another argument against national standards is such that one size does not fit all, since local districts, not the Federal Government, know what is best for their students.

The second reason is that CCSS present different characteristics from other states and professional organization standards. The differences are the followings:

- Fewer, more rigorous, and clearer goal
- Aligned with college and career expectations
- Internationally benchmarked
- Includes rigorous content and application of higher-order skills (mathematical modeling)
- Builds upon strengths and lessons of current state standards
- Research-based
- A stronger emphasis on mastery of basic arithmetic and fractions in elementary school
- A focus on more memorization and automaticity with mathematics facts over elimination and use of calculator (putting the calculators away)
- Pushing for completion of algebra by the end of eight grade, although not mandatory
- Pushing for all students to complete at least algebra II-level mathematics in high school (the minimum expectations for high school mathematics are likely to increase)

Porter, McMaken, and Yang (2010) reported the alignment with three levels – low, moderate, and high – between CCSS and state standards/assessment, CCSS and NCTM standards, and CCSS and NAEP. They found low to moderate alignment between CCSS and state standards and between CCSS and NCTM standards. For assessment, they found that CCSS has low alignment with state assessments and NAEP, but NAEP is more aligned with CCSS than state assessments. The study concluded that CCSS is considerably different from state standards and assessments and NCTM standards. We do not know if CCSS will bring positive or negative impact in mathematics education because the more change CCSS present, the harder it will be to fulfill the change. On the other hand, the more change CCSS present, perhaps the more positive effects CCSS will bring.

5 Conclusion

Many researchers and educators addressed that the traditional U.S. mathematics curriculum is "a mile wide and an inch deep." Quay (2010) reported that state standards are confusing and inconsistent across states, often holding low expectations for students in their mastery and rigor, not adequately aligned with demands of college and career, and do not pass muster with international competitors. TIMSS (2008) showed that the average mathematics score of U.S. fourth- and eighth-graders was higher than TIMSS scale average of 500, but lower than five Asian countries that have national mathematics standards. Moreover, the PISA (2010) result showed that the U.S. average score in mathematics literacy was lower than the OECD average score.

Considering these facts, the U.S. mathematics standards must become substantially more coherent and focused in order to improve student achievement. Based on the experience with current state standards and professional organization standards, national standards must present concerns about the quality and equity of elementary and secondary education (Goertz, 2008). It also makes some difference in what is taught and what is learned. Can CCSS bring coherence to a highly decentralized and fragmented mathematics education in the U.S. as a national standard?

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