

UNDERSTANDING REFORM:  
A STUDY OF THE STANDARDS MOVEMENT IN MATHEMATICS EDUCATION

by  
Arias Storm Hathaway Turner

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SIGNED: Arias Storm Hathaway Turner

## APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

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Marta Civil  
Professor of Mathematics Education

12/1/2016

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TABLE OF CONTENTS

Abstract.....6

Chapter 1 Introduction.....7

    Personal Motivation.....7

    Research Questions.....8

    Methods.....9

Chapter 2 Why Standards?.....13

    Organizing Education .....14

    Educating with Standards.....17

Chapter 3 Instances of Reform .....17

    Reform by Induction.....19

    New Mathematics (1960s – 1970s).....22

    Summary of Historical Context.....26

Chapter 4 Development of the NCTM *Standards*.....28

    Justifications for Reform.....28

    Formation of the *Standards*.....31

    Implementing the *Standards*.....35

    Examining the Impact.....38

Chapter 5 Development of the CCSSM.....41

    Establishing the Rhetoric of Common Core.....42

    Creating the CCSSM.....46

    Implementing CCSSM.....52

Chapter 6 Insights of an Educator.....53

Understanding Reform	5
Experiencing Reform at the Personal Level.....	54
Comparing Movements.....	55
Accountability.....	57
Reform in Tucson.....	58
The Role of Leadership.....	59
Enacting Change: Money, Teacher Support, and Vision.....	60
Chapter 7 Discussion.....	60
Challenges to Implementing Reform.....	60
Comparing Movements.....	62
Chapter 8 Conclusion.....	64
Summary of Key Ideas.....	64
Personal Reflection: Longevity of Reform.....	66
Concluding Remarks: National Standards.....	67
Implications for Future Research.....	68
Looking Forward.....	70
References.....	71

### **Abstract**

This thesis explores the historical and ongoing efforts to reform mathematics education in the United States. The goal of this study is to understand the Common Core State Standards for Mathematics (CCSSM), or Common Core, in the context of the greater standards movement first initiated by the National Council of Teachers of Mathematics (NCTM). A common theme throughout this study is the complexity of reform and the tensions that exist when implementing change. To understand issues facing reform efforts, I contextualize the ongoing standards movement by summarizing historical factors that contributed to the development and reception of standards in education. This history began with societal changes that led to standardization of different social institutions and continues with an ongoing standards movement in education. To carry out this study, I relied on literary sources as well as on the insights of three individuals that had unique experiences with the standards movement. With this context, I discuss the Common Core movement and greater challenges facing reform in mathematics education. The main finding I present in this study is that controversy surrounding national standards is likely to persist as long as there is a tension between standardization and local control of education.

## **Chapter 1**

### **Introduction**

My introduction into the education community has been gradual and guided by curiosity. Like many graduate students, I have been a student for the majority of my life. The experiences I have had as a student and later as a teacher have led me to reflect on my own schooling and inspired an interest in the field of education. My additional interest in current events naturally drew me to the topic of the Common Core State Standards for Mathematics (CCSSM). This study grows out of that interest in education reform as a mathematics educator and as a student that grew up during the development of these ideas.

### **Personal Motivation**

I became familiar with the CCSSM initiative primarily from articles I encountered while reading the news. From these, it was difficult to judge the quality or effect of the movement. An example of one reaction to the standards circulated by the media was an article in Time Magazine reporting parents' dissatisfaction with a homework problem. In the article, a father, with a background in engineering, complained that his child's homework problem was unnecessarily complicated and that simplicity is prioritized in the real world (Alter, 2016). My issue with this article, and other similar representations of CCSSM in the media, originated with the extent to which blame seemed to be placed on the standards themselves. I did not think it was reasonable to judge a collection of standards on the basis of issues related to their implementation in a specific classroom. Additionally, it was not clear that the parents included in these kinds of articles demonstrated an understanding of the ideas guiding the homework problems they were critiquing.

This experience with the portrayal of the mathematics component of the Common Core State Standards (CCSS), also referred to as Common Core, motivated my further research of the movement. This led to a broader interest in mathematics education reform and the history of that reform in the United States. I began my research in this topic by examining the standards documents that the National Council of Teachers in Mathematics (NCTM) has produced in recent decades.

I looked back at past movements in mathematics education reform and focused on the use of standards as a mechanism for curricular change. As I reviewed relevant literature, a narrative persisted that reform occurs like a pendulum wherein similar ideas for reform cycle in an out of vogue. This narrative led me to question the capability of reform movements to lead to a substantial and lasting shift in mathematics curricula.

The argument I present in this study stems from my reflection on the ability of the standards movement to change education. I argue that the goals and justifications for national standards are in conflict with the existing educational system, which is based on a tradition of local control. This lack of unity in educational goals across the country leads to a fundamental problem with the creation of any set of national standards. In this study, I develop this argument through a historical analysis of reform movements in mathematics education specifically focusing on the NCTM *Standards* and the CCSSM.

### **Research Questions**

The goal of this study is to better understand the CCSSM by contextualizing the document with the NCTM *Standards* and the broader standards movement of the most recent decades. Instead of attempting to characterize the movements in terms of success, I will focus on

what was and was not accomplished with respect to the construction and implementation of standards. I will address the following questions in this study:

- How are the NCTM and CCSS movements broadly similar and different?
- How do the associated standards documents compare? In particular, I address the content and goals of the official publications of the NCTM *Standards* and the CCSSM.
- How has reception of these standards documents varied with respect to the media, parents, and teachers?

## Methods

This thesis is an expansion of a term paper I wrote for a course covering curriculum reform in science and mathematics.<sup>1</sup> I began with the literature review from that paper, which was employed to describe the sequence of reform movements in the United States. I then removed sections not relevant to the emphasis of this study and edited or rewrote the existing text. An example of content I removed was a section describing a reform movement that occurred in the early twentieth century, since in this thesis I focused primarily on history related to the standards movement of the most recent decades including the NCTM and CCSS movements. Other than the removal of the aforementioned section, the entirety of the term paper was utilized in this study. The remaining parts of this thesis were written with further research of relevant literature, interviews with experts in the field of mathematics education, and the comparison of the content in the two standards documents themselves.

**Interviews.** I got in contact with and subsequently interviewed Dr. John Dossey, the president of NCTM from 1986 to 1988 during the development of the 1989 *Standards* (NCTM, 1996). I prepared for my interview with him by reading, following his recommendation, two

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<sup>1</sup> I completed TTE 542, School Mathematics and Science: History, Curriculum, & Reform with Dr. Kristin Gunckel as the instructor.

books ((McLeod et al., 1996) and (Wilson, 2008)) and multiple articles he considered particularly helpful in understanding the history of the NCTM *Standards* movement. The subsequent interview I conducted with Dr. Dossey guided me in my interpretation of the historical events recounted in the readings. I include the questions around which the interview was based in Appendix A.

I transcribed most of the interview by listening to the recording and noting moments that contributed to my understanding of the movement. I listened to these passages multiple times and transcribed them. I then used the collection of quotes as a reference as I researched and wrote this thesis. The sections that I noted contained information that I had not seen, or had seen with minimal detail, in my reading. This included Dr. Dossey's characterization of past events and motivations behind those events. I focused on general information about reform in mathematics education and about the ongoing standards movement. I included quotes that elaborated on the sequence of events I am emphasizing in this study, namely the development of New Mathematics, the NCTM *Standards*, and the CCSSM.

As I continued my research, I contacted Dr. Bill McCallum to discuss his views as one of the lead authors of CCSSM. The interview I conducted with Dr. McCallum further guided my research with the perspective of an advocate for CCSSM. I did not include quotes from Dr. McCallum in this study, although the questions I utilized in the interview are included in Appendix A. This was due to a variety of factors including the short length of our interview and extent to which I felt the interview further elaborated on ideas I present in this study. However, the insights he provided informed my understanding of the Common Core movement as I conducted research and developed my conclusions.

In particular, I found his definition of a successful movement to be helpful as I evaluated the reforms in this study. Dr. McCallum explained that he would consider the CCSSM successful if some large number of schools and teachers understood and utilized the principles outlined in the standards. This idea was significant for my understanding of reform, because it shifted my expectations. It contradicted the notion that anything short of universal adoption implied failure of the reform. Following this interview, I began to question my preconceptions about how education reform occurs in general and what are reasonable outcomes to expect.

My final interview was with Ms. Connie Lewis. Ms. Lewis has worked as an educator and leader in professional development in the Tucson area for over 28 years. The purpose of this interview was to further understand the perspective of an individual working at the school and district level that was involved with the implementation of various standards documents.

Following the interview, I listened again to the recording and noted quotes that I considered particularly important and relevant to her narrative. I used those notes to guide the passages I transcribed and included in this thesis. I then took the transcribed passages and lightly edited them so that filler words and false starts were removed, and so that most sentences were easier for the reader to understand and grammatically correct.

Throughout this process of transcribing and composing quotes into a cohesive narrative, my goal was to capture the nuance of Ms. Lewis's perspective. Although there is an unconscious bias in this procedure to select quotes that reinforce my existing opinions, I worked with that understanding and actively attempted to convey her story as wholly as possible. After writing Chapter 6, I emailed a copy of the chapter to Ms. Lewis and she affirmed that I accurately portrayed her perspective.

**Literature Review.** In addition to the interviews I conducted, my research utilized existing literature on reform movements in mathematics education. My initial resources were drawn from the research paper upon which this thesis is based. The ideas of the original paper came from class readings and discussions, and the literature review within the paper came from Internet searches referencing those ideas. I made the decisions about whether or not to include a source based on its ability to contribute to my historical timeline of events.

In this study, my research focused on expanding my understanding of the timeline I had constructed. I continued with Internet searches and focused on the sequence of events relevant to the release of the NCTM *Standards* and the CCSSM. My understanding of the CCSSM was based on a book that summarized the development of the Common Core (Rothman, 2011). Additionally, as mentioned previously, Dr. Dossey recommended books and articles that further developed my understanding of the NCTM *Standards* movement. I utilized those readings along with the listed references within them to source additional material.

Chapter 2 of this study relies on readings and resources utilized in a course taught by one my committee members, Dr. Rose Ylimaki<sup>2</sup>. I found Autio (2013), a required reading as part of a course project, particularly meaningful in shaping my understanding of the existing education system in the United States. The course's reading list also included articles by Kliebard (1975) and Apple (1978). These authors, and the references within their articles, provided a foundation from which I broadened my understanding of the standards movement. Additionally, class discussions that unpacked the readings were significant in developing my interpretation of the texts. Through these references and their interpretations, I began to interpret the history of reform

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<sup>2</sup> I completed EDL 623, Curriculum and Instructional Leadership.

within the context of certain themes, including neoliberalism and hierarchically organized institutions. I explain these themes in the following chapter.

**Documents.** The standards documents themselves, including NCTM (1989) and CCSSM (2010), were a natural source for information. My initial vision in this study was to include a direct comparison that analyzed the documents in order to convey similarities and differences in terms of content, structure, and goals. However, after further research, I realized that this approach would not have been a particularly valuable component of the study. One reason for this, as I explain in a later section, is that the CCSSM seemed to be an evolution of prior standards documents that were successively released. Instead of including a comparative document analysis in this study, I sought to demonstrate the features of each respective document.

## Chapter 2

### Why Standards?

**Myth:** These standards amount to a national curriculum for our schools.

**Fact:** The Common Core is *not* a curriculum. It is a clear set of shared goals and expectations for what knowledge and skills will help our students succeed. Local teachers, principals, superintendents, and others will decide how the standards are to be met. Teachers will continue to devise lesson plans and tailor instruction to the individual needs of the students in their classrooms. (NGA Center & CCSSO, 2010)

On the website for the CCSSM, in the *Myths vs. Facts* section, it is stated that the standards document is not considered a curriculum. I would like to further explore the controversy of whether national standards are considered a national curriculum and why the distinction between those concepts has been made on the Common Core website. Moreover, in

this chapter, I want to explore themes in the historical development of the use of standards in education.

Curriculum can be defined broadly as the content of an education. This could include everything from the educational goals dictated by school administrators to the lesson plans composed by teachers. The standards documents described in this study are examples of an intended curriculum, as defined by Van den Akker (2004), written at the national level. Van den Akker lists three broad categories within the definition of curriculum: the intended curriculum includes the visions and intentions of an education; the implemented curriculum refers to the materials utilized in teaching and the interpretation of educational goals at the classroom level; the attained curriculum is the education that reaches the students.

Rather than dwelling on detailed academic definitions of what a curriculum is, the Common Core website seeks to establish distance from the portrayal of the standards as a national curriculum. The explanation for the distinction relies on the value of local control in the education process. Instead of justifying why the influence of “Local teachers, principals, superintendents, and others” (NGA Center & CCSSO, 2010) is important, the fact is taken for granted. The tacit acceptance of local control is a part of the existing common sense about education in the United States. Issues related to public policy may appeal to common sense rather than academic explanations, because common sense is viewed as knowledge on which everyone agrees. The difficulty with common sense and the reason that it should be scrutinized is that common sense evolves as society changes. One of the ways that society has changed in recent history is with the shift toward structuring institutions according to the model of a business.

### **Organizing Education**

**Business Model.** “Schools, as now organized, are a product of the industrial age” (NCTM, 1989, p.3). However, this organization is based on ideas that go back to the scientific revolution. In the creation of a formal curriculum for mathematics education, there are assumptions that must be made. For instance, some set of mathematical knowledge, that which is included in the curriculum, is particularly desirable for every student to know. Then, the goal is that students exit the school system having obtained this knowledge.

This educational process is the product of scientific reasoning applied to the institution of education. The process persists because it seems to be the common sense approach for accomplishing educational goals. Deference to reason and logical processes is one of the central characteristics of modern thought. Historically, as reason permeated scientific pursuits, social institutions also incorporated analytical principles.

Autio (2013) discusses philosophical influences on the field of curriculum studies. Autio described the rise of Calvinism as one of the forces influencing British and northern European societies. The principles underlying Protestantism, and Calvinism in particular, encourage efficiency and a prioritization of outcomes over process. In education systems, this led schools to present material in a concise and systematic way. Thus Calvinism influenced a departure from the previously typical “dialogic glosses on ancient and honored texts” (p. 73). Instead of teachers having the freedom to expound upon the content however they considered appropriate, directives were handed down emphasizing efficiency (Autio).

Following the rise of industry in the 1800s, the model of efficiency in education was further reinforced with the managerial structure of businesses. Kliebard (1992) argued that the standard design of educational systems in the United States was drawn from the organization of corporations, and this was particularly the case “in the early twentieth century” (p. 115). Within

the context of education, students represent the raw material. Students are processed through the education system, and the final product is a citizen ready to enter society as a productive adult.

When utilizing the framework of a profitable business, quality control of the manufactured product is prioritized. Kliebard (1992) argued that this results in educational content designed for “product standardization and predetermination” (p. 124). Both the curriculum and the management of students are organized so that the transmission of the prescribed set of information can be easily executed and measured. The task for the teacher is to establish order in the classroom so that students can recite the information conveyed to them and pass tests in order to demonstrate this ability (Dewey, 1944). The persistence of this method of instruction is due to the saturation of managerialism, the philosophy behind business models, in our society and the common sense that accompanies it.

In addition to quality control, the hierarchical structure of businesses has been incorporated into educational institutions. The tiers of control that exist include the state, district, school, and classroom levels. The top-down organization of education institutions can pose problems by excluding stakeholders from decision-making processes. This can lead to policies that do not address the concerns of teachers and students.

**National Standards.** The idea that participation in decision-making is or is not representative of all stakeholders characterizes a thin versus thick democracy. Apple (2014) defines a thick democracy as a “democracy grounded in full collective participation” (p. xxi). A thin democracy is one in which decision-making practices do not fully incorporate the diversity of those affected by the resulting policies. Given the breadth of impact that national standards would have in the United States, I argue such a document would be characteristic of a thin

democracy. National standards necessarily exclude some voices in the development process, since a widely diverse population is addressed by a single curricular document.

The Common Core website explains that although the standards exist at the national level, local educators influence the content experienced by students. If the goal were not to directly affect what is going on in classrooms day-to-day, then what would be the purpose in creating a national standards document? One difference between what is written in a standards document and what occurs in the classroom is that the formally written educational goals are more official than the experienced implementation of those goals. Apple (2014) discusses this idea of official knowledge and writes, “What counts as legitimate knowledge and one’s right to determine it is lodged in a complicated politics of symbolic control of public knowledge” (p. 69). In the quote at the beginning of this chapter, taken from Common Core’s website, it seems that the organizations responsible for the CCSSM have determined what counts as legitimate knowledge and are attempting to confer power to local educators.

In general, standards documents categorize knowledge that their authors consider legitimate. These documents represent the aims and values of the people and organizations that create them. For that reason, when reviewing a collection of standards, the background motivations of those responsible for it should be considered. Sometimes deconstructing the aims of curricular documents is made difficult by justifications that appeal to common sense.

### **Educating with Standards**

The current rhetoric that dominates education policy is epitomized by a few buzzwords including: college- and career-ready, competitive, accountability, and high standards. These words are sufficiently common that their use does not always necessitate further explanation. In

order to deconstruct this rhetoric, I explain below the ideas that generated some existing education policies.

**Defining neoliberalism.** The persistent rhetoric that promotes the economic utility of education arises from a neoliberal ideology. By neoliberal ideology, I mean the belief system that values the power of the free market to address the needs of society. This philosophy privileges capitalism as a mechanism to optimize the production of commodities and ideas. When these values are applied to education, competition is utilized to improve educational outcomes. Schools are rated according to performance on standardized exams, and countries are similarly ranked by test scores. The purpose of these rankings is to promote policies and practices that yield successful outcomes. In this way, education has been reconceptualized as a commodity where schools are valued according to performance on exams.

The impetus for measuring academic achievement began with the desire to measure the efficiency of an educational system and has evolved into a mechanism by which various systems are ranked. Apple (1978) discussed this concept and argued knowledge that can be employed “to stratify individuals” (p. 382) is awarded high status. The content in the classroom that is most emphasized is that which will be included in the standardized exams used to stratify schools.

**Measuring and raising achievement.** In constructing the content of an education, there are various methods that guarantee the inclusion of particular educational content. The first method begins with the construction of formal standards. The knowledge presented in the standards is made legitimate by its inclusion in an official document. If exams are written based off these standards, then it is increasingly likely that the material will be conveyed to students.

Alternatively, educational content could be derived from an exam. This method is exemplified by the construction of standards that are benchmarked by standards of countries that

perform well on international exams. In order to align curricula with those of more successful countries, standards can be constructed that approximate what already exists and has potentially led to high scores.

Neoliberal principles shape educational content in both of the curriculum-writing processes that I described. In each instance, standards and rankings act as a mechanism to elevate the status of some knowledge.

### **Chapter 3**

#### **Instances of Reform**

The movements discussed in this section represent a series of policies and programs implemented within a given general time period. As with any historical account of extensive events, it is important to note that there are many concurrent factors at work. Issues related to education exemplify this, given the diverse regions, populations, and policies that interact. Each movement consists of a collection of simultaneous and connected intentions for reform, rather than a single unified cause.

#### **Reform by Induction**

The role of education changed as free schooling spread throughout the United States in the early 19<sup>th</sup> century. The purpose of education took on a moral responsibility that included the development of beneficial habits (Sztajn, 1995) and general knowledge of how to be a decent citizen. Arithmetic was seen as having a moral purpose, since it provided mental training that improved students' "social, moral, and religious status" (Monroe, 1917, p. 57). As a result, mathematics took on a role beyond the mathematical content and the ability to perform computations. It became a means of developing effective reasoning skills, which resonated within this country.

In the early 1800s, Johann Heinrich Pestalozzi theorized an innovative way of teaching mathematics called the *inductive* method. The method was based on the idea that students learn best by beginning with a simple and concrete problem that evolves through a series of related questions to an abstract generalization. This style of learning was a departure from the previously common *rule* method, which emphasized memorization of general principles (Kilpatrick, 2014).

Pestalozzi sought to develop the mind and utilize mathematics in that process. This was exemplified by his appreciation for mental arithmetic and the introduction of “Geometry into the elementary schools, and the art connected with it, [to model] and [draw] beautiful objects” (“Pestalozzian”, 1837, p. 9). Pestalozzi’s ideas were based on facilitating students’ growth as opposed to strictly achieving measurable outcomes.

Warren Colburn expanded upon Pestalozzi’s theory and initiated a widespread pedagogical reform with the 1821 publication of his textbook *First Lessons in Arithmetic on the Plan of Pestalozzi, with Some Improvements*. Colburn believed, as did Pestalozzi, that students learn best by first developing an understanding of individual ideas, which then lead to the general underlying principles themselves. He argued in the preface of the book, “After the pupil comprehends an operation, abstract examples are useful to exercise him, and make him familiar with it. And they serve better to fix the principle, because they teach the learner to generalize” (Colburn, 1970, p. 16).

This argument reflected the evolving purpose in education, because Colburn addressed both the computation and also the conceptual needs of the learner. The emphasis on the process by which students learn is notable because it evokes the progressive sentiments of philosopher and education reformer John Dewey almost a century earlier.

Colburn emphasized the need for teachers to move through topics one at a time, so that students do not develop the habit of only partially learning concepts. Teachers were also instructed to not provide the answer, so the student is coached through the procedure of finding a solution. Colburn suggested, “If the learner meets with a difficulty, the teacher, instead of telling directly how to go on, should examine him and endeavor to discover in what the difficulty consists; and then, if possible, remove it” (Colburn, 1970, p. 30). Through this process students learn to navigate increasingly difficult concepts. Instead of being provided an answer, students are shown that problem solving consists of a series of individual steps that should each be analyzed.

An examination of the ongoing contemporary struggle to incorporate understanding-based teaching methods into curricula suggests that Colburn’s reform did not persist in the form of widespread education practices. Monroe (1917) describes *First Lessons* as a revolutionary text for school practices in that its release secured arithmetic as an essential subject in mathematics education for every student.

The importance of Colburn’s *First Lessons* justifies the selection of 1821 as marking the beginning of this period in the development of arithmetic as a school subject. Following this date there was a period of very rapid development. New types of texts appeared.

Some of these were revised frequently to keep pace with the growing ideas of the time.

But, beginning about 1860, these revisions ceased, and after this date it is seldom that we find a new text which attained any importance. (p. 89)

Monroe cites some developing theories of the late 1800s that challenged the utility of arithmetic as an exercise in mental discipline.

Additionally, the underlying theory of analytic induction was brought into question. Critiques of reform ideas increased and an 1837 article in the *American Annals of Education and Instruction* identified six main defects with Pestalozzi's theory. The article argued: (1) students were not sufficiently prepared with the necessary skills for everyday life, (2) there was a disproportionate emphasis on abstract mathematical ideas, (3) the process of induction was flawed because students were "not prepared to embrace complicated ideas" (p. 13), (4) Pestalozzi did not sufficiently value the subject of history, (5) lessons encouraged students to question religious beliefs, and lastly (6) students were encouraged to establish their own moral code ("Pestalozzian", 1837). If the criticisms leveled against Pestalozzi in this publication represented commonly held opinions, then this would imply that the contemporary culture was not yet ready for the ideas Colburn and Pestalozzi presented.

### **New Mathematics (1960s – 1970s)**

In the mid-twentieth century, with the impetus of international conflict putting pressure on mathematics and science performance, the collection of curricula reforms, known as New Mathematics, tentatively took hold. The Cold War, and in particular the launch of Sputnik, reenergized discussions surrounding the preparedness of students to enter careers in science and mathematics. In the book, *The new math: A political history*, Phillips (2015) observed that there was an assumption that achievement of higher standards in rigorous subjects would advance the United States' position in "the Cold War of the classrooms" (p. 44). This meant that if students succeeded in school, they would continue on to careers in science and mathematics, which would expand militaristic opportunities through improved technology and strengthen the economy. Thus, as the mathematics education community would see again in subsequent decades, a political agenda propelled mathematics education to reform.

Educators supported the attention given to education, and “Critics of the status quo praised the replacement of educators by scientists as textbook authors” (Phillips, 2015, p. 22). Millions of federal dollars funded the School Mathematics Study Group, a collaborative group of disparate mathematical societies tasked with developing material that would change the face of school mathematics (Phillips). This indicates that mathematicians and the federal government played a central role in developing New Mathematics.

Scientists and mathematicians determined the ideas necessary in developing an understanding of mathematics, which led to the formulation of teaching material. In particular, university mathematicians that worked with pure mathematics were the dominant voice in the movement (Stanic & Kilpatrick, 1992). Initially, the eight members of the School Mathematics Study Group advisory committee were academic mathematicians (Phillips, 2015). This led to the inclusion of subjects from modern mathematics such as set theory and modular arithmetic in school curricula (Phillips). Academic mathematicians can recognize the value and power that these subjects represent within the field of mathematics and their application to K-12 mathematics. For example, set theory can be directly applied to students’ work with inequalities. Developing students’ basic understanding of these less common mathematical subjects requires knowledgeable teachers, consistently implemented material, and a receptive audience.

Advocates for New Mathematics emphasized the need for an updated mathematics curriculum that reflected the contemporary needs of students and society. Phillips (2015) summarizes the underlying philosophy of New Mathematics throughout the movement,

The new math was sold on the promise that a new form of mental discipline was required for U.S. citizens facing an assortment of political, social, technical, and moral quandaries in the 1960s. Creators of the new math, that is, did not promise higher test scores.

Advocates and eventual promoters of the materials understood the design of the new math to be as much about the politics of the American mind as about mathematics.

Despite the very different trajectories of the new math in the primary and secondary schools and the gradual decline of SMSG as a driving force, the claims behind the new math remained consistent. Evaluation of the math curriculum entailed value judgments about forms of intellectual discipline. (p. 97)

This description describes the curricular movement as a reflection of contemporary culture as it relates to mathematics. The movement itself consisted of both the ideological goals of changing students' habits of mind and the practical goals of updating textbooks and curricula.

The novelty of the topics introduced to the nation's schools contributed to the ultimate failure of New Mathematics. Teachers who had not been adequately trained with the material would either "shy away from it or bastardize it" (Schoenfeld, 2004, p. 257), and the school textbooks often did not faithfully incorporate the concepts of New Mathematics, if they were included at all (Phillips, 2015). Regardless of the factual reality, these factors demonstrate that critiques against the effects of New Mathematics had the potential to be straw man arguments since the reform was not realized in a way that was consistent with its intent.

Additionally, parents' discontent with unfamiliar material has the potential to disrupt any well-intended curriculum. In 1972, a *Washington Post* article detailed an anecdote in which James M. Shackelford found that his daughter and her fellow students were not able to perform a simple multiplication calculation. Similarly,

A front-page article in the *Los Angeles Times* covered the crusade of a state assemblyman...against the new math. Leroy Greene, an engineer by training, claimed that when he looked at his daughter's elementary school new math textbook, he could tell

that computational skills had been neglected at the expense of theoretical concepts and problems. (p. 124)

This type of reporting was common in the 1970s and illustrates the populist response to New Mathematics (Phillips, 2015).

Emotional reactions to the implementation of New Mathematics were characteristic of the negative response to the movement. The statistics cited as evidence against New Mathematics utilized standardized tests as an indicator of diminishing computational ability. However, the fact of declining scores was uncertain, and the connection of those scores to New Mathematics curricula was unclear (Phillips, 2015). Despite this, the reporting led to a public distrust of the movement, which was magnified by its depiction in the media.

The reliance of New Mathematics critiques on test scores is notable, given the current situation in the United States regarding standardized testing. The underlying philosophy of New Mathematics did not emphasize quantifiable results. However, test scores are utilized as a rhetorical device that appeals to society's deference to reasoning-based arguments. Average people were not able to verify the accuracy of test results or demonstrate for themselves the connection of tests to New Mathematics curricula. This meant that the negative portrayal of New Mathematics with regard to testing relied on people's trust in accurate depictions and appeals to common sense around the importance of testing.

The academic critiques of New Mathematics were based on shifting opinions of mathematics education in general. As seen in earlier debates, critics questioned the basic premise of the type of intellectual training provided by New Mathematics. And finally, as the politically charged events that generated the call for reform became more distant, the impetus for reform waned (Phillips, 2015).

The public reception to New Mathematics along with a changing political dynamic led to the movement's collapse and return to traditional instruction. However, New Mathematics continued to influence mathematics education after the movement itself ended. Textbooks produced after the movement continued to include references to relevant topics in pure mathematics (Phillips, 2015).

**Back to Basics (1970s-1980s).** In response to the ongoing reform of mathematics education, critics called for a return to traditional practices. There was a persistent belief that the problem with New Mathematics did not originate from incompetent implementation but instead stemmed from the entire premise, which represented a departure from traditional values. Critics “claimed intellectual training should entail basic skills and rote exercises, not structural understanding or abstract reasoning” (Phillips, 2015, p. 121). Some people viewed mathematics as a computational tool, while others saw it as a tool to develop more complex reasoning skills. Opponents of New Mathematics, including some teachers, believed that traditional skills, such as rote memorization, were the most efficient mechanism of conveying the mathematical knowledge that they valued most. The National Science Foundation (NSF) conducted a study in the mid-1970s and found that teachers did not agree with the justifications of the ideas of New Mathematics and preferred an emphasis on traditional skills (Phillips).

The Back to Basics movement was one component of a reaction to the larger liberal movement of the 1960-1970s. The public shift toward the conservative movement of the 1980s manifested itself in the educational sphere as a rejection of liberal ideas in the classroom (Phillips, 2015). Later, the premise of the Back to Basics movement would be challenged by advancing research on educational psychology that did not support traditional teaching methods.

### **Summary of Historical Context**

Resistance to change has proven to be a dominant voice against curricula reform. A popular opinion of New Mathematics today is that it was a failed movement based on ill-conceived notions. Consider the satirical song, *New Math*, by musician and mathematics lecturer Tom Lehrer. This song, released in 1965, summarized the pervasive sense of confusion regarding the curricular movement, which was characteristic of its depictions in popular culture. Prior to the research that I had done for this project, I personally thought that the attempt, in the 1950s and 60s, to insert pure mathematics into elementary school classrooms was a failure. This perception illustrates the success of smear campaigns against New Mathematics. The reality of the situation was complicated and demonstrated both success of key ideas and problems with implementation. However, nuanced characterizations of the movement were overwhelmed by political, parental, and teacher oppositions.

Movements should benefit from controversy. When reform ideas are debated, successful features should advance to more mature iterations of the movement. Politicians capitalized on the controversy to frame the issue as states' rights versus federal mandates rather than a collaborative effort to reform mathematics curricula. In the reactions to Colburn's reform and to New Mathematics, opponents attempted to discredit any ideas directly related to the movement. This contributes to the belief that education has not steadily improved through incremental change but instead that reform has resembled a swinging pendulum. This metaphor describes the shifts from one trendy teaching method to another with no substantive improvement carrying forward.

The common themes present in the history of mathematics education reform involve the language employed in national dialogues and sustained implementation of ideas in the

classroom. Both of these issues will continue to affect reactions to the NCTM and CCSS movements.

## Chapter 4

### Development of the NCTM *Standards*

The NCTM functions as a voice for mathematics education advocates (NCTM, 2016a). In particular, the vision of the organization is to improve the access to and the quality of mathematics taught in classrooms (NCTM, 2016a). For the organization, this meant promoting ideas that emphasized problem solving and conceptual understanding (NCTM, 1978). NCTM took the initiative to reinstate those foci in mathematics education, as evidenced by the introduction in their 1989 standards document:

These standards are one facet of the mathematics education community's response to the call for reform in the teaching and learning of mathematics. They reflect, and are an extension of, the community's responses to those demands for change. Inherent in this document is a consensus that all students need to learn more, and often different, mathematics and that instruction in mathematics must be significantly revised.

(NCTM, 1989, p. 1)

### Justifications for Reform

NCTM (1989) lists a collection of societal goals and learning goals for students as motivators for the *Standards*.

**Societal goals.** Broad support for the creation of the standards originated with the need for a population of workers that are mathematically literate (McLeod et al., 1996). The meaning of this literacy was in the process of changing as the United States transitioned from an industrial to informational society. Phillips (2015) summarizes the evolving language:

By the 1980s, reformers began pushing back against the “back to basics” movement not by a call for a “new new math” but rather by appropriating the language of “basics” and “standards.” NCTM led the charge, arguing that “basics” should include skills other than rote computation and that “standards” should focus on promoting general problem-solving ability. (p. 147)

NCTM (1989) argued that education goals must be updated to reflect changing societal norms. Although Back to Basics is not mentioned explicitly in the *Standards*, the authors did write that “the mathematical expectations for new employees in industry” are different from the skills gained through “sets of drill and practice exercises” (NCTM, 1989, p. 4). There is a focus in the *Standards* that the document represented a modernization of mathematics to better reflect the needs of society. This is a departure from the traditional knowledge and skills valued by proponents of Back to Basics.

In addition to the evolving requisite skills of workers, the structure of a typical career was also shifting in the United States. Previously, a typical career began and ended with the same company until retirement. NCTM (1989) noted “Employment counselors, cognizant of the rapid changes in technology and employment patterns, are claiming that, on average, workers will change jobs at least four to five times during the next twenty-five years and that each job will require retraining in communication skills” (p. 4). For NCTM, this meant that students required education in problem solving so that their skills would allow for versatility and the ability to “actively create new knowledge over the course of their lives” (p. 4). The desire to accommodate the needs of a changing workforce is a consequence of economic justifications for education and reflects the growing influence of neoliberalism in education. The perception that the economy

could be improved with higher standards in education has encouraged support for and development of standards documents.

Justifications for the *Standards* also included the improvement of social conditions. This meant increasing opportunities for students that are typically unsuccessful in traditional mathematics programs and also improving understanding of issues relevant for an informed electorate (NCTM, 1989).

**Learning goals.** As summarized previously, the broad goal of the *Standards* was to develop students' ability to problem solve and understand mathematical ideas. NCTM also describes this as improving students' mathematical literacy. This is defined through five ideas:

- *“Learning to value mathematics.*
- *Becoming confident in one’s own ability.*
- *Becoming a mathematical problem solver.*
- *Learning to communicate mathematically.*
- *Learning to reason mathematically.”* (NCTM, 1989, p. 5-6)

**The means of conveying the goals.** The choice to utilize standards to convey these societal goals is also described in the NCTM document. The authors write, “Historically there have been three reasons for groups to formally adopt a set of standards: (1) to ensure quality, (2) to indicate goals, and (3) to promote change. For NCTM, all three reasons are of equal importance.” (NCTM, 1989, p. 2)

The idea that the authors express is that standards are the preferred model by which various organizations create and follow expectations. They give the example of medical professions requiring standards, that are updated regularly, to ensure that existing practices reflect the most current knowledge. Similarly, “Schools, teachers, students, and the public at

large” (p. 2) require standards in mathematics to make clear the basic criteria of a mathematics education. NCTM believed that standards could be utilized “as facilitators of reform” (p. 2) to provide a mechanism by which to incorporate the latest ideas in the mathematics education community into the classroom.

McLeod et al. (1996) argues that NCTM contributed to the reformulation of standards documents by utilizing standards as “statements for judging quality” (p. 36) and as an embodiment of the vision of the organization. Previously, standards were employed to provide specific criteria against which curricular content could be measured. All of these factors led to a critical mass of support for a set of standards that would refocus mathematics education around a collection of knowledge and skills that could improve the education system.

### **Formation of the *Standards***

Prior to the release of the *Standards*, NCTM began to take a more central role in reform. In 1978, while Back to Basics was in place, NCTM published an article in *Mathematics Teacher* that argued computational skills are necessary, but they are only one part of a larger curriculum based on understanding (NCTM, 1978). Then, in April of 1980, NCTM released their recommendations for improving mathematics education in *An Agenda for Action: Recommendations for School Mathematics of the 80s*, a precursor to the goals outlined in the *Standards*. This publication represented a shift in the aims of the organization; following this, NCTM endorsed specific changes in education policy (McLeod et al., 1996). NCTM did not use this platform to polarize the preexisting debate between teaching for understanding versus computational skills. Instead, NCTM attempted to compromise the past movements with an acknowledgement of the value of computational skills and also the need for deep understanding of mathematical concepts.

The changing landscape of cognitive science in the 1970s and 1980s provided at least one contrasting voice to the justifications of Back to Basics. Research demonstrated that problem solving is one of the most important aspects of mathematical competence (Schoenfeld, 2004). Instead of relying on opinions describing the best way for students to learn, arguments could now incorporate the latest scientific findings. This represented a departure from previous debates of best practice in education, exemplified in Pestalozzi and Colburn's attempt at reform. Justifications for reform in the 1800s relied on philosophy rather than demonstrable evidence. Education as an academic field had developed and was able to incorporate modern scientific principles in debates over education policy.

The call for reform of Back to Basics principles in the 1980s had to be addressed in a way that was distinct from the earlier failed reform of the 1950s. In order to minimize controversy, the NSF, which had a major role in helping construct curricula for New Mathematics, could not play a primary role in proposing reform that resembled a curriculum (Schoenfeld, 2004). This meant that national leadership in addressing the problems in mathematics education could not come from government agencies. As a result, NCTM took on the responsibility for leading reform.

In the summer of 1987, NCTM appointed a group of writers to produce a draft of the standards. Following a period of feedback and revision, the 1989 *NCTM Curriculum and Evaluation Standards*, also known as the *Standards*, was released. The document was not a specific guide of instructional documents or requirements for assessment. Instead, the authors envisioned the *Standards* as a tool to determine whether a mathematics curriculum achieves desirable goals (NCTM, 2016b).

The document was purposefully broad to avoid accusations that a national curriculum had been created. A document that seemed to dictate what should be taught in classrooms across the country would draw criticism, given the history of local control of education. Wilson (2008) and Apple (1992) argue that the generality of the NCTM *Standards* contributed to its characterization as a slogan system. In order to maximize influence, this kind of document requires three main components according to Apple (1992): (a) “a penumbra of vagueness” (p. 413), (b) sufficient specificity “to offer something to practitioners” (p. 414), and (c) “the ability to charm” (p. 414). This means that the document consists of ideas that are general and popular enough to align with what could be considered common sense. This leads to the ability of a variety of groups with distinct interests to identify some aspect of their values with a component of the system.

**Unpacking the document.** The *Curriculum and Evaluation Standards* conveys both broad statements of content, in the form of standards, and more specific practical information, in the form of discussions accompanying each standard. The following excerpts from the document summarize some of the goals NCTM prioritized with the *Standards*:

This document presents fifty-four standards divided among four categories: grades K-4, 5-8, 9-12, and evaluation. The four categories are arbitrary in that they are not intended to reflect school structure; in fact, we encourage readers to consider these as K-12 standards. (p. 6)

Some proficiency with paper-and-pencil computational algorithms is important, but such knowledge should grow out of the problem situations that have given rise to the need for such algorithms. (p. 8)

The mathematical content outlined in the Standards is what we believe all students will need if they are to be productive citizens in the twenty-first century. If all students do not

have the opportunity to learn this mathematics, we face the danger of creating an intellectual elite and polarized society. (p. 9)

The first aspect of each standard is the mathematical content or practice all students are expected to understand. The remaining description below each standard describes how the standard can be applied practically in the classroom. The application of each standard is illustrated in “the *expected student activities*” (p. 9). The goals of these are defined by “Two general principles...: First, activities should grow out of problem situations; and second, learning occurs through active as well as passive involvement with mathematics” (p. 9).

The main body of the document consists of the fifty-four standards, as mentioned above. I include an example of the mathematical content of one of these standards below to convey the basic structure and content of the collection. The following is Standard 13: Measurement from the Grade 5-8 band:

In grades 5-8, the mathematics curriculum should include extensive concrete experiences using measurement so that students can –

- ◆ extend their understanding of the process of measurement;
- ◆ estimate, make, and use measurements to describe and compare phenomena;
- ◆ select appropriate units and tools to measure to the degree of accuracy required in a particular situation;
- ◆ understand the structure and use of systems of measurement;
- ◆ extend their understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass;
- ◆ develop the concepts of rates and other derived and indirect measurements;

- ◆ develop formulas and procedures for determining measures to solve problems.

(NCTM, 1989, p. 116)

### **Implementing the *Standards***

Within two or three years of its release, the *Standards* had been adopted by as many as 45 states “as the framework for their state math curriculum document” (J. Dossey, personal communication, February 9, 2016). The wide reception and integration of the *Standards* into states’ curricula provoked positive and negative responses in the mathematics education community as well as in the public sphere more generally.

According to John Dossey, NCTM was cognizant of the potential political impact of the release of the *Standards*. As a result, the organizational leaders sought to facilitate a positive reception of the ideas in the *Standards*. NCTM hired a public relations firm that helped organize the release of the document, ultimately costing the organization about \$500,000. The principle by which NCTM responded to unfounded criticisms of the *Standards* was to stand by their document and let these groups carry on until “they defeated themselves”. Dossey described the roll out of the *Standards* as a “publicity campaign” for mathematics curriculum (J. Dossey, personal communication, February 9, 2016).

**Routes to reform.** In addition to considering the management of reactions to the document, NCTM sought to ensure a faithful implementation of the original vision. NCTM wrote supplementary booklets and hosted professional development programs. One of the goals of those programs was to prepare teachers to act as leaders in the reform movement and further disseminate the message of the *Standards*. These efforts contributed to teachers’ awareness of the document and thus increased the impact of reform at the classroom level (J. Dossey, personal communication, February 9, 2016).

The involvement of teachers in the circulation of the *Standards* demonstrated NCTM's vision for grassroots education reform. In the afterword to the *Standards*, NCTM describes the barriers to success encountered in previous attempts at reform:

In the past most educational changes have been approached through a “top down” managerial strategy borrowed from industry. Managers and experts design new parts or procedures and then train workers to use them. The change strategy being advocated here, however, is based on professional development rather than administrative directives. (NCTM, 1989, p. 251)

In their plan for carrying out the goals outlined in the *Standards*, NCTM emphasized the role of teachers and their influence over schools and classrooms.

Another way reform movements can make tangible change in education is by affecting the content of textbooks. NCTM took advantage of this approach by working directly with publishing companies to guide their choices in content and they continue this relationship today. Each spring, NCTM facilitates meetings between leaders in mathematics education research and textbook publishing companies to help the textbooks reflect trends in mathematics education (J. Dossey, personal communication, February 9, 2016). As occurred with the New Mathematics movement, even after a movement's direct influence recedes in the classroom, the changes made to textbooks endure and continue to influence the curriculum.

**Challenges to affecting change.** Despite efforts on the part of NCTM to advocate for and widen the influence of the *Standards*, the extent to which this was achieved merits discussion.

In the 1993 National Survey of Science and Mathematics Education, (Weiss, Matti, & Smith, 1994 as cited by Macleod et al., 1996), teachers were asked the extent to which they were

aware of the *Standards*. They found that as grades progressed, awareness increased. However, the actual percentages of teachers that knew the *Standards* well were somewhat low (18% at the elementary level, 28% for Grades 5-8, 56% at the high school level). The number of teachers that had either no explicit awareness or were unsure decreased as the grade level increased but was still significant (43% at the elementary level, 31% for Grades 5-8, 11% at the high school level).

Education leaders at the state level “tended to estimate that a higher percentage of teachers would know about the *Standards*” (Macleod et al., 1996, p. 86). This might imply that given the foundation developed by NCTM to broaden the influence of the *Standards*, the expectations for the realization of this were not fully met. However, Macleod et al. notes that change at the classroom level occurs slowly. One of the state supervisors interviewed by Macleod et al. observed,

I don't think that the changes that are advocated in the *Standards* have occurred in that many classrooms. I would be very happy if 25% of the classrooms have changed. I don't say that in a negative way; I think that's something we could be proud of. (p. 88)

The extent to which change did occur at the classroom level is unclear. McLeod et al. “found substantial change in state curriculum guidelines, but evidence of change in other areas (e.g., textbooks) was limited” (p. 121). Additionally, NCTM was unable to secure NSF funds “to monitor the impact of the *Standards* (including change in textbooks)” (McLeod et al., p. 121).

In addition to the logistical challenges present in distributing information regarding the *Standards*, the nature of the document itself contributed to challenges in disseminating the ideas. One issue to consider was the grain size of each standard, or the amount of detail that could be included in each academic goal. The writers purposefully chose a larger grain size so that the document did not become a “scope-and-sequence chart for a national curriculum in

mathematics” (p. 116), which meant that interpretation of the standards further complicated the process (McLeod et al., 1996).

Given the controversy regarding any kind of national control of education, as opposed to local or state, NCTM purposefully stayed away from creating a document that would be considered a national curriculum. NCTM focused on general ideas that should be present in a mathematics classroom across grade bands. Then it was up to local educational leaders, school curriculum writers, and textbook writers to translate those ideas into content that can be presented in the classroom. This contributes to the difficulty in translating the goals of the reform movement to a student’s experience in the classroom. The purpose in writing a standards document is to improve students’ educational experiences. However, the document requires interpretation at multiple levels including education leaders, curriculum writers, and teachers. It is possible that the vision of NCTM could be degraded by the time the ideas reach the student.

### **Examining the Impact**

One of the motivations of the *Standards* was an effort to “move our curriculum more to a problem-solving focus than a practicing-and-memorizing focus” (John A. Dossey, personal communication, February 9, 2016). Despite efforts to compromise with positions of past movements, reactions to the document focused on its supposed rejection of traditional education values. Various media outlets colloquially referred to this period of reform and its reactions, mainly in the 1990s, as the “math wars” (Wilson, 2008). The rhetoric surrounding mathematics education escalated to the point that the Secretary of Education Richard Riley requested a change in tone toward more constructive language (Wilson, 2008).

Despite the controversy surrounding the content of the *Standards*, the structure of the document was widely praised. The *Standards* were developed simultaneously as President

George H. W. Bush worked with state governors to establish national education goals. This meant that leading politicians endorsed the *Standards* as a model for curricula in all disciplines. Despite differences between disciplines, some governors believed that the content of any subject could be summarized in a collection of standards (McLeod et al., 1996).

The *Standards* itself was an innovative document, but the structure and concept were the most consequential components for the general education community. The attempt to categorize a variety of subjects into collections of standards began a standards movement in the education community beyond mathematics.

**The math wars.** California was a leader in implementing reform and thus the events taking place there best exemplify reactions to the *Standards*. In 1994, instructional materials were approved that aligned with a preliminary document, the *Mathematics Framework for California Public Schools*, which was based on ideas corresponding to those in the *Standards* (Schoenfeld, 2004). Since the *Framework* was a general document, like the *Standards*, various groups utilized it to develop a wide range of instructional material. Rosen (2000) noted that popular culture and current events were incorporated into curricula; textbooks and assignments were distinct in both appearance and content from earlier generations. Thus, as with New Mathematics, California had a situation where mathematics curricula looked new and different from the material to which parents and teachers were accustomed.

Teaching unfamiliar material is challenging and will not be done faithfully to the writers' intent without substantial professional development and support of teachers. In particular, teaching with the goal of developing problem-solving abilities requires "both knowledge and flexibility on the part of the teacher, who must provide support for students, as they engage in mathematical sense making" (Schoenfeld, 2004, p. 272). A shift to lessons based on NCTM

standards required a different emphasis on content, but more importantly teachers were required to fundamentally change pedagogy. Logistically, this transformation is a significant undertaking requiring distribution of teaching materials, a massive amount of training, and time for adjustment. The vision of reform cannot be totally realized if any of those facets are missing.

The mathematics appeared different from traditional content, and in some cases failed to include traditional values as promised. In one highly publicized instance in California, a sample test item awarded more points to a computationally incorrect answer than a correct answer, because the justification of the work was more coherent with the incorrect answer (Schoenfeld, 2004). This reputation of California's *Framework* and thus the *Standards* led to denunciations of the reform movement as supportive of "fuzzy" mathematics. At this point, the *Standards* became susceptible to criticism by Back to Basics proponents for not emphasizing computation and by mathematicians for lacking sufficient rigor.

**Subsequent standards publications.** NCTM addressed substantive criticisms in the subsequent publication of curriculum standards. In 1998, utilizing feedback of the 1989 *Standards*, NCTM released a draft of the 2000 edition of the *Principles and Standards for School Mathematics* (Wilson, 2008).

The new collection of standards were an update of the previous collection in that they:

- Shifted the suggested content placements from three grade bands, K–4, 5–8, and 9–12, to four grade bands: pre-K–2, 3–5, 6–8, and 9–12
- Added the process of representation to the group of mathematical processes addressed in the Process Standards
- Made specific suggestions for content for the grade bands addressed

- Merged the previous NCTM Standards on teacher education, professional development, assessment, and evaluation with curricular recommendations into a single document.

(NCTM, 2016b, p. 17)

Subsequent standards documents outlined even more specific curricular goals in terms of topics students encounter at each grade level. In 2006, both the College Board and NCTM released content recommendations by grade level. The College Board's *Standards for College Success: Mathematics and Statistics* "outlined two curricular paths for students starting at the sixth-grade level and taking mathematics each year through high school graduation" (p. 17). NCTM published *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence*, also known as *Curriculum Focal Points*. This document was viewed as a move toward outlining a national curriculum. The 1989 *Standards* were purposefully broad to avoid this association. However, the 2006 document can also "be viewed as a response to the Council's recognition of the need to provide curricular coherence and clarity for students" (NCTM, 2016b, p. 18).

## Chapter 5

### Development of the CCSSM

One result of the standards movement initiated by NCTM was the utilization of standards as a mechanism for homogenizing content across regions. Dr. John Dossey justified the need for standards in the 1980s with the increasing mobility of families and the existing variation of education across states (J. Dossey, personal communication, February 9, 2016). In the context of globalization, the significance of state borders is diminished by international competition, because student performance across the entire country, as opposed to each individual state, is compared with the curricula of various countries. This factor influenced the formation of

Common Core by motivating homogeneity of curricula across the United States. I further outline below the circumstances that contributed to the development of the CCSSM.

### **Establishing the Rhetoric of Common Core**

An important note that frames the examination of the discussions and initiatives that coalesced into the CCSSM is the collaborative effort that existed across a variety of organizations. There was no singular group responsible for the development of common standards. Additionally, the organizations and individuals described below do not comprise an exhaustive list when considering all that were involved in the reform. Given the limits of this thesis, it was necessary to exclude participants who were not central to the narrative despite their influence.

**Hunt Institute.** Led by the former governor of North Carolina Governor James B. Hunt Jr., a group met in 2006 to discuss the potentiality of uniform standards across the United States. The existing circumstances were such that the group members involved in the meeting believed that standards, not issued by the federal government, were a viable means of improving education (Rothman, 2011).

The development and implementation of national standards would represent a departure from tradition given the historic precedent of local control of education. As mentioned in the previous chapter, political will is such that national leadership in education cannot come from government agencies. For this reason, the standards that James Hunt envisioned with his group could not be a mandate from some central governing body.

The justifications for national standards, as discussed by Rothman (2011), came from two main ideas: variation in standards across state boundaries and the increasing influence of the global economy. The mobility of families across the United States supports the standardization

of content for students. If a child moved to a different school and was significantly behind or ahead of other students, then that student would require additional resources to accommodate their background. Another issue arises as students transition to a university environment. If the prerequisite knowledge of students varies dramatically, it is more difficult for the university to accommodate students' needs.

**NGA's *Innovation America*.** The National Governors Association (NGA) addressed these issues and took an active role with Science, Technology, Engineering, and Mathematics (STEM) education through the *Innovation America* initiative. Janet Napolitano, chair of the National Governors Association (NGA) from 2006 to 2007, worked with the then governor of Minnesota as co-chairs of the *Innovation America* Task Force. Over the yearlong initiative, the NGA Center for Best Practices (NGA Center) released a series of reports detailing information related to the foci of the project: "improving [STEM] education; improving the alignment of the postsecondary system with state economies; and encouraging regional economic growth" (p. ii). (NGA, 2007)

The final report of *Innovation America* summarized the information gathered throughout the year and outlined the plan to enact change in the future. NGA shared their plan to work with the education reform organization, Achieve, Inc., and the Council of Chief State School Officers (CCSSO) (NGA, 2007).

**The National Research Council's Committee on State Standards in Education.**

Following initial discussions, Hunt proposed the implementation of national standards to his organization, the James B. Hunt, Jr. Institute for Educational Leadership and Policy, or the Hunt Institute. The first step in pursuing this campaign was research into issues relevant to the creation and implementation of national standards. To do this, the National Research Council (NRC)

commissioned the Committee on State Standards in Education to determine the existing situation of state standards. They considered aspects including teaching, learning, assessments, and the feasibility of implementing common standards across the country. The information collected by the Committee on State Standards in Education was presented in a series of two workshops in early 2008 (Rothman, 2011).

The NRC hosted the Workshop on Assessing the Role of K-12 Academic Standards in States and the Workshop on Evaluating the Options for Common Standards, in January and March, respectively. These findings were presented and discussed in the workshops. The content covered in the workshops were summarized in two reports (NRC, 2008a).

In assessing standards, the focus was on answering two questions: “[H]ow and to what extent do K-12 state [content and performance] standards in English/language arts, mathematics, and science at key grades vary?” (p. 17); and how does implementation of those standards vary across states? (NRC, 2008a). The first report concluded with a collection of ideas prevalent in various sessions of the workshop. Among these is the following:

There is significant variability among states in the nature of their content standards, what is covered, and the performance levels they set. No clear consensus has emerged in the field as to the effects of the variation, though some view the variation itself as a major impediment to equity. Consistent standards may be a necessary tool for ensuring educational equity, but simply establishing them will not accomplish the goal. More information is needed about why states approach the issue so differently and the effects that these differences have on student learning. (NRC, 2008a, p. 33)

Following the two workshops, the second report released by the NRC (2008b) outlined the key points in a synthesized summary of the proceedings:

- *“standards are now an accepted part of the educational landscape and that they play multiple roles in public education.”* (p. 69)
- *“there is no consistent definition of standards and standards-based reform.”* (p. 69)
- *“The current system is characterized by dramatic variation.”* (p. 70)
- *“The current system of standards is not working as it was intended to.”* (p. 70)
- *“assessment has become the principal driver of most states’ standards-based reform efforts.”* (p.71)
- *“consistent standards may be a necessary tool for ensuring educational equity, but simply establishing them will not accomplish the goal.”* (p. 71)
- *“There are significant practical obstacles to implementing common standards.”* (p. 71)
- *“Common standards would not be a promising strategy for saving money, but the significant costs are those of providing a decent education, regardless of the overarching policy strategy.”* (p. 71)
- *“The establishment of common standards is not likely to lead to a new rush of adequacy or equity lawsuits.”* (p. 72)

The final point particularly foreshadows the difficulties encountered by CCSSM as a result of the future timeline for development and adoption. The workshop participants debated the best path forward:

*Advocates of common standards would do well to consider the political landscape carefully.* Many seemed to agree that a bottom-up, grassroots approach to common standards would be the most likely to succeed, but such an effort may take time. Others argue that a political window is opening now, and that moving forward even with an incomplete and imperfect approach would be preferable to missing that window, given

urgent pressure to address the glaring inequities in educational opportunities in the United States.” (NRC, 2008b, p. 72)

Given the variety of organizations interested in pursuing the establishment of national standards, leadership of the initiative needed to be established. The political necessity of states’ leadership in implementing reform led to the NGA and CCSSO electing to lead the initiative (Rothman, 2011).

### **Creating the CCSSM**

**Getting states involved.** States formally began their involvement in establishing common standards by signing the Common Core State Standards Initiative memorandum of agreement (MOA). States were asked in April 2009 to commit to the initiative (NGA Center & CCSSO, 2010). A copy of the memorandum is included in Appendix B. The MOA stipulated that participating states are required to engage in the process of developing standards. Although adoption of the final product was not mandatory for states that signed the MOA, if a participating state chose to adopt, they must have done so within three years. Additionally, that state’s English language and mathematics standards must have consisted of at least 85 percent common core standards.

The timeline outlined in the MOA began with a July 2009 deadline by which “end-of-high-school expectations” should have been agreed upon. Then the “K-12 Standards in English Language Arts and Math” development process should have been completed by December 2009. Forty-eight states (Rothman, 2011) and three territories (NGA Center & CCSSO, 2010) signed the MOA.

**Race to the Top.** The American Recovery and Reinvestment Act of 2009 was signed into law in February 2009 as a means of stimulating the economy. Within this law, the Race to

the Top (RTT) Fund was created as “a competitive grant program designed to encourage and reward States that are creating the conditions for education innovation and reform [and] achieving significant improvement in student outcomes” (p. 2). The notices of the program were published in November 2009. Applications for these funds could be completed in two phases with deadlines January 19, and June 1, 2010, respectively. If States were unable to apply for or unsuccessful in obtaining funds in phase 1, then they were able to try again later in the year. (U.S. Department of Education (ED), 2009)

The application process was such that points were awarded according to the criteria fulfilled by the state. These points then factor into the ability for states to obtain RTT funds. Part of the application process included the adoption of state education standards that were internationally benchmarked and college and career ready. States were not explicitly required to adopt the Common Core standards. However, additional points were awarded if states adopted said standards by August 2, 2010 (NCTM, 2016)

Members of the NGA and CCSSO worked with the Department of Education prior to the publication of the RTT notices. On August 28<sup>th</sup>, 2009, NGA sent a letter to Arne Duncan, then Secretary of Education, regarding questions over the proposed RTT draft. This letter is included in Appendix C. One point made in the letter was the proposed timeline of June 2010 for adoption of common core standards. This date was significantly earlier than the three-year timeline included in the MOA. The NGA wrote,

Overlaying an artificial and incompatible deadline onto a voluntary process that states have already agreed to unnecessarily accelerates what must remain a thoughtful and state-driven process. Therefore, Governors recommend that the department align the guidance

timetable for common core standards adoption with the Common Core State Standards Initiative MOA. (NGA, 2009)

The published draft of RTT required a demonstration of states' "commitment to and progress toward adopting a common set of K-12 standards (as defined in [the] notice) by August 2, 2010, or at a minimum, by a later date in 2010 specified by the State" (ED, 2009). This updated date was pushed forward, possibly in response to the NGA's feedback. However, the imposed deadline still reflected the Education Department's attempt to exert control over states' adoption of standards.

The Education Department, and with it, the federal government, exert this control over states through the use of economic incentives. States are not required to adopt Education Department policies but instead are recommended to take certain actions. Through these processes, local control of education is technically maintained, however the behavior of state and local government is influenced by national organizations. The Education Department has utilized neoliberal principles to construct national educational goals.

Additional, the purpose of these educational goals is to improve the national economy. As mentioned previously, the RTT funds were a part of the American Recovery and Reinvestment Act of 2009, which encouraged innovation to improve student outcomes. These outcomes included performance on international exams and the ability of students to enter the workforce. The rhetoric associated with RTT policies and the educational goals within them exemplify the current role of neoliberalism in education policy.

**Constructing the document.** As the discussions regarding policy continued, the construction of the standards document was underway. Work groups were organized with the help of organizations "with the most experience and knowledge about college and career

readiness – Achieve, ACT, and the College Board” (Chapter 3, Section 5, para. 7). These groups amassed relevant research in education and developed drafts of college and career readiness standards. Additionally, feedback groups were organized to analyze the produced drafts.

(Rothman, 2001)

The drafts were formally released for public comment in September 2009 following a period of drafting and revision. Among the revision that occurred prior to the formal release was the addition of mathematical practice standards to the collection of content standards. The Thomas B. Fordham Institute (Fordham Institute) rated the document according to the standards’ “content, rigor, and clarity” (p. 1). The draft was given a grade of B. Additional documents were reviewed using the same criteria in order to judge how “the draft Common Core standards stack up alongside extant national and international benchmarks” (p. 1). The “frameworks of the National Assessments of Educational Progress (NAEP); the Trends in International Mathematics and Science Study (TIMSS); and the Programme for International Student Assessment (PISA)” (p. 1) received the grades B, C, A, and D, respectively (Fordham Institute, 2009).

The college and career readiness standards were then delineated by grade level. The first draft of this standards document was released in November 2009 for feedback (NGA Center & CCSSO, 2010). The original deadline for groups to submit a draft of the grade level standards for public comment was January but was pushed back to March 10, 2010 (Rothman, 2011).

**Unpacking the document.** The released document was organized by grades in the K-8 band and by subjects in the high school grade band. Across grades, standards are organized within domains defined by the subject area. Clusters are smaller-scale standards that further detail the broad statement of the standard. In addition to the mathematical content of the standards, each grade and high school subject is accompanied by a collection of mathematical

practices. The Standards for Mathematical Practice are based on “the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections” (NGA Center & CCSSO, 2010, p. 6) and “the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding..., procedural fluency..., and productive disposition” (p. 6).

The stated goals for the impact of the document are summarized in the following excerpts:

Achieving “fewer standards” would be easy to do by resorting to broad, general statements. Instead, these Standards aim for clarity and specificity. (p. 3)

[T]he development of these standards began with research-based learning progressions detailing what is known today about how students’ mathematical knowledge, skill, and understanding develop over time. (p. 4)

The Standards set grade-specific standards but do not define the intervention methods or materials necessary to support students who are well below or well above grade-level expectations. It is also beyond the scope of the Standards to define the full range of supports appropriate for English language learners and for students with special needs. (p. 4)

These Standards do not dictate curriculum or teaching methods. For example, just because topic A appears before topic B in the standards for a given grade, it does not necessarily mean that topic A must be taught before topic B. (p. 5)

One promise of common state standards is that over time they will allow research on learning progressions to inform and improve the design of standards to a much greater extent than is possible today. (p. 5)

These Standards are not intended to be new names for old ways of doing business. They are a call to take the next step. It is time for states to work together to build on lessons learned from two decades of standards based reforms. (p. 5)

I include an example of the mathematical content of one of these standards below to convey the basic structure and content of the collection. The following are the grade 5 standards, with the corresponding cluster of sub-standards, in the Measurement and Data domain: (I exclude the extended description, as is listed below the third standard, of the fifth standard in the cluster for brevity.)

**Convert like measurement units within a given measurement system.**

1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

**Represent and Interpret data**

2. Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

**Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.**

3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

- a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
  - b. A solid figure which can be packed without gaps or overlaps using  $n$  unit cubes is said to have volume of  $n$  cubic units.
4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
  5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

### **Implementing CCSSM**

The delayed roll out limited the time states had to review the document prior to adoption. RTT required state adoption by August 2<sup>nd</sup> in order to qualify for the points associated with the common core standards. The final draft of the CCSSM was released in June 2010 (NGA Center & CCSSO, 2010).

**Shifting political climate.** According to the CCSSM website, “As of December 2013, 45 states, the Department of Defense Education Activity, Washington D.C., Guam, the Northern Mariana Islands and the U.S. Virgin Islands [had] adopted the CCSS in ELA/literacy and math.” By June 2014, the number of states had dropped to 43 states. The most recent number reported is from August 2015 with 42 states having adopted the standards. This number excludes Alaska, Indiana, Minnesota, Nebraska, Oklahoma, South Carolina, Texas, and Virginia (NGA Center & CCSSO, 2010).

It is not clear, however, how many of the states that have adopted the standards are following through with systematic implementation. In Arizona, for example, the state senate voted, in February, 2014, to “bar Arizona from implementing the Common Core standards”

(Fischer, 2014). I would like to note that, anecdotally, educators I have spoken to believe Arizona's current standards are essentially the same as the CCSS but under a different name. This kind of political action demonstrates the ongoing controversy surrounding the Common Core reform.

The decreasing number of participating states reflects states' evolving attitudes regarding the movement. The choice each state makes in the adoption of Common Core is based on a variety of factors involving both the content of the standards and leadership within the state. In the following chapter, I address this nuance with the perspective of an educator that has experienced reform directly.

## **Chapter 6**

### **Insights of an Educator**

Education in schools occurs at the student level in their interactions with teachers, classmates, and learning materials. No set of standards can become successful unless they are first understood and embraced by educators at all levels within the system. Classroom teachers ultimately will control the implementation of any new concept.

To understand the role of classroom teachers in this complex process, I interviewed one of these educators, Ms. Connie Lewis. She has worked as a mathematics teacher and in professional development at the school and district level. My goal in interviewing Ms. Lewis was to utilize her perspective as an educator to better understand the practical effects of national reform.

In this section, each quoted passage comes from a personal communication with Ms. Lewis on May 6<sup>th</sup>, 2016. I supplement these passages with comments to contextualize the quotes provided by Ms. Lewis so that her experience is portrayed as a cohesive narrative.

### **Experiencing Reform at the Personal Level**

Ms. Lewis began working with reform mathematics while working as a classroom teacher and also attending professional development. She expressed her enthusiasm for reforming education:

I love this work, because I went through this evolution myself...I remember when I was a fourth grade teacher back in 1990, and there was a little girl that was confused with subtracting. Borrowing ten, changing the ones to ten ones, crossing out, you know that algorithm...I actually was in teacher professional development when this happened. But it was so poignant for me, because this little girl was so confused, and the only thing I could do (and this is what you see all the time in classrooms) is that you just repeat what I had just said only louder. I said it louder, as if she couldn't hear, and I was more anxious in my voice. So for her, that was a beginning of anxiety.

Ms. Lewis described the program started in the Tucson school district with an initiative utilizing funds from the Title I program and Exxon Mobile. The source of funding is notable, because it did not originate as a local investment in mathematics education. As Ms. Lewis mentions, Title I funds come from the federal level. The additional money provided by Exxon Mobile represented the interest of private industries in education. The effects of the programs established by this funding could be attributed to national, as opposed to local, interest in improving mathematics education.

For me personally in the classroom, the switch was around 1987 to 1990. And so it would have been the first edition of [the *Standards*]. But NCTM, again, was active. I can't remember when my first NCTM conference was, but I started going to them every

year with Exxon money... They funded teachers getting ongoing current practices, and it very much honored the profession.

I asked Ms. Lewis for her thoughts on the top-down nature of reform that occurs at the national level. When considering the NCTM and CCSSM, Ms. Lewis describes them as components of a larger national movement. At the classroom level, the distinction between documents is minimal relative to the associated professional developments. Given that NCTM has been active in facilitating professional development for the Common Core, the organization continues to actively promote reform.

NCTM has been the most powerful force for mathematics teachers for consistently [effecting] change... So that's your top-down. But it's so experienced that it knows how to support teachers.

Common Core, well they all were top-down, because, again, from the perspective of an elementary school teacher, I wouldn't have changed the way I was teaching mathematics, unless somebody had set that up for me. The way that it was initially set up for me, there was a lot of support, so that it was not top-down, but it wasn't bottom-up either. It was: here's a goal, and here are steps that you can take to get there.

But you know, you can't send teachers there unless you have money. A lot of teachers just go by themselves. [They say], "I'm paying my own way. I'm going my own way to Chicago; getting a hotel." It's very impressive. Once they get the bug that there's effective ways of teaching math and [see] kids get excited. The upshot is you have an excited group of kids who are becoming powerful thinkers... That's the bottom line.

### **Comparing Movements**

Throughout the interview, I continued to ask questions that compared the respective effects of NCTM and CCSSM at the classroom level. Ms. Lewis addressed the difficulty in treating the initiatives as separate movements:

I guess what I hear you wanting to understand was just with teachers and the impact of changing the way we taught mathematics, [which] affected us more? And that's hard to tease out, because in the time from '89 to the Common Core, a huge overlay was testing. So some of the focus of "Hey, let's really understand math ourselves, so that our kids could understand math" was derailed with the pressures of testing. So that's why it's a little bit hard of a question for me to answer.

The authors of Common Core worked with NCTM, as well, so some of it is reflective of NCTM's work over many years. [There were] no tremendous big surprises. Except, in Common Core, a big surprise was that Pattern was no longer in Kindergarten... So there were a couple of things like that that were very different from NCTM.

Ms. Lewis compared the NCTM standards documents released in 1989 and 2000. She said of the 2000 *Principles and Standards*,

It was just the structure of it was a little bit different. It wasn't that big of a switch for us from '89 to 2000. A big jump was from [NCTM] to Common Core, because the mathematics was more specific and thorough [in the CCSSM]. [However], NCTM has amazing support documents. [The *Standards*] was just the overview.

The significance of the *Standards* came from the shift toward systematically improving understanding-based mathematics education. NCTM accomplished this work through the production of curricular documents and professional development. Common Core has continued

to pursue this goal, however the effort is an extension of the movement begun by NCTM in the mid-1980s.

When I look at all this work, the Common Core was very significant... The goal was always that we understand the math... But you know, it became political. I heard somebody call it *Obama-core* at one point, and I just thought, this began in the eighties, the original edition of this. So there's a lack of understanding [of the movement].

### **Accountability**

Some of the issues encountered in education reform arise from both the leadership's lack of understanding and also from the competing interests of participants. Although teachers might agree with the idea that students should understand concepts, they are also held responsible for facilitating students' preparation for exams. If these goals do not directly align, then teachers must navigate the prioritization of learning outcomes. As standardized testing became more prevalent, especially beginning around 2000, teachers became increasingly concerned about the implications for students. A consequence of the testing was that teachers and students moved away from learning content that did not directly contribute to exam performance. In this way, the effects of competition incentivize behavior that may not improve student learning.

Over the course of about five years, the questions about how this would help with the kid passing a test became really prevalent. And I began to notice, just on my own, I never documented anything, but it was like, how long from the time I introduce myself at the start of a professional development session and the explanation of what we're going to be doing, ...how long from that point to the question about passing tests? And it became narrower almost to the point where we would start a workshop, and someone would immediately ask, "Is this going to help my kids pass the test?"

At the same time we were trying to help people understand mathematics, there was this undercurrent of, “Are they going to pass these tests? Are we going to be accountable?” The districts weren’t accountable for professional development. The teachers were accountable for passing tests, [and] there was no professional development to support the mathematics, [or there] was very little...

Leadership in districts is also varied... There’s the model of: tell [teachers], and then they’ll go do it. [This] is rampant, and it doesn’t work. There’s an entire literature about how you have to muck around with it. [Teachers] have to solve real problems from authentic situations; they have to have ongoing support; they have to videotape themselves in a classroom, and they have to say [to themselves], “This went well. This didn’t go so well, and what are you going to do different the next time?”

### **Reform in Tucson**

When the district-level teacher education program ended, Ms. Lewis transitioned to working at the school level and recounted reactions from the teachers that participated in the program.

I just sort of disappeared in 2001 or 2002 and went into individual schools...just being a math support.... I [returned] to the district level after about six or seven years... I would go to different schools where I would recognize teachers...And I had so many personal testimonies from these teachers who were in our program that said, “You know, what happened to that program? That changed me so profoundly.”

When I had those teachers come up to me, and I must have had, when I started working at the district level, I can think of a good ten to fifteen teachers, maybe more than that, that actually personally said to me, “Boy do I miss what you guys were doing.” And so that

was about money, that was about teacher support, and that was about a vision. But this [gesturing to NCTM standards] gave us the scaffolding for our vision. Sometimes we weren't quite sure where to go with this, but Common Core really spelled it out well, I always thought.

There was buy-in that this made sense, and there was an appreciation for the support that was there. We'd go to other schools that were not in the Exxon program and were not Title I; we'd have teachers that would transfer, and they would come running back ... and say..., "There's nothing at that school. Can I have some materials to teach fractions? ... Can I borrow them?"

### **The Role of Leadership**

I asked why the leadership did not continue funding the program, despite the positive impact on teachers.

There [were] about nine of us, so it was money. It was economics. [District leadership would] always get these ideas. Somebody goes to a conference; they get this idea, come back, and then try to implement it. But there's not this overall, long-term, sustaining vision. But there was for that period of time, [from 1986 to 2000].

And it was kind of a little bit interesting for us when our program was disbanded. It was several superintendents ago, and when they pulled together a group to lead math, ... it was [mostly] teachers that had been in our project... Through that project that we had been supported to change the way they were teaching math. That [effect] was kind of blind to the district.

This ongoing support wasn't happening. It was happening when we were at the Title I program, when we were working as a really tight team. But in our district, the

administration changed, and they said, “We’re not doing that anymore.” And so we were all...disbanded and put into schools. And then there weren’t profound changes. You needed to just work for a long time to have change in a classroom. People didn’t understand that kind of change.

### **Enacting Change: Money, Teacher Support, and Vision**

The main conclusion I drew from this conversation with Ms. Lewis was the mechanism by which change occurs for teachers and students in the classroom. The importance of local buy-in of reform ideas was made clear by the establishment and subsequent dissolution of the program in which Ms. Lewis participated.

In our conversation, I likened the effects of this program to an object making waves in a pool of water. The program impacted teachers who then continued to propagate those ideas after the program ended. However, the more time that passes, the influence of the program on local schools diminishes. For that reason, sustained financial support, teacher participation, and vision are required.

## **Chapter 7**

### **Discussion**

In Chapters 2 through 5 of this study, I summarized cultural and historical factors that contributed to and contextualized the ongoing standards movement. In Chapter 6, my interview with Ms. Lewis provided insight into the perspective of an educator that experienced the reality of the classroom, as opposed to the idealized goals of reform leaders. This gap between an idea and its implementation has been an ongoing issue throughout the history of reform in education.

### **Challenges to Implementing Reform**

**Politics.** Greater societal reactions to changing education policies were a major issue in almost every reform I discussed in this study. A possible exception to this would be Colburn's Analytic Induction wherein Pestalozzi and Colburn began a national dialogue to incorporate teaching for understanding in mathematics curricula. Given the limited information I had regarding the movement, the extent to which politics influenced the reform is unknown. However, generally, education reform exists within a larger political system. Throughout the history of reform that I have discussed in this study, the influence of politics on the implementation and reception of reform has been a persistent theme.

Reactions to the NCTM reform were such that the Secretary of Education felt it necessary to request more polite language in debates. More recent examples of unproductive language are the depictions of Common Core as a federal takeover of education and its unofficial designation as "Obama-Core".

Political will can act as a motivating factor in reform in addition to hindering change. For example, reactions to the Sputnik and competition with the Soviet Union demonstrated that momentum for change in education can come from issues not directly related to the classroom. This was the case more recently with the association of the Race to the Top fund with Common Core. Investment in improving education was prioritized in an effort to encourage economic growth.

**Standardized Testing.** Test scores are one example of a device that can be employed to influence the public and politics. In the media, scores can be manipulated to convey a secondary message beyond the exam results themselves. For example, the United States has had low mathematics scores on international exams relative to other countries. In reporting this story, there is an implication that the United States is falling behind on the international stage.

The treatment of an isolated number to convey a complex situation oversimplifies the issue for the public. The general public relies on the media to interpret existing information, and test scores can be manipulated to fit within an existing narrative or to advance an agenda. This occurred with New Mathematics. As mentioned previously, declining test scores were cited as evidence of the movement's failure. However, neither the scores nor the connection of those scores to the modified curricula were accurately portrayed in the media. Although news outlets are at fault for the portrayal of test scores, the test scores alone cannot convey sufficient complexity.

Alternatively, test scores can be utilized as a mechanism for evaluating and ranking students and schools. Ms. Lewis discussed the impact of this neoliberal system on teachers and noted the expanding influence of standardized exams on school culture. Reactions to these policies occur at the classroom level and influence potential approaches to reform. By incentivizing high performance on exams, understanding content is not the primary objective for teachers and students. It could be argued that if exams were designed to check for understanding, then that learning goal would be incorporated into the classroom. However, arguing the extent to which standardized exams are capable of capturing student understanding is outside the scope of this study. Reforms might attempt to emphasize deep learning of concepts. Ultimately, however, if the underlying education structure remains the same, then the reform cannot be fully realized.

### **Comparing Movements**

In considering NCTM's documents and the CCSSM, the common goals and basic premises of the documents suggest that Common Core is the latest evolution of the standards documents first established by NCTM.

**Common ground.** NCTM sought to encourage widespread mathematical literacy through the release of the *Standards*. The goal of Common Core was similarly to promote learning of deep mathematical concepts for all students across the United States. Both initiatives focused on condensing K-12 mathematics into a list of statements that could then be applied toward curricula employed by teachers.

The national movements relied on local leaders in education to buy into the reform and participate in the process of incorporating the ideas into individual schools. Additional national political leadership encouraged the *Standards* and the CCSSM to have greater impact. In the late 1980s, politicians were interested in education reform, and the standards movement aligned with the existing common sense of how curricula should be organized. Similarly, as the CCSSM were being developed, the Department of Education viewed the document as an opportunity to streamline the varied education system among states.

As a result of the similarities between the movements, I view Common Core as the latest iteration in standards-based intended curricula that emphasize teaching for understanding. However, beyond those similarities, the ways in which the documents were created and implemented varied dramatically.

**Diverging paths.** The organizations leading each initiative were completely different in terms of functionality and membership. Common Core was supported by various proponents but was led by the CCSSO and NGA. The premise of the initiative was that a collaborative document would be created and then states would each take over leadership for implementation. That structure differed from NCTM's centrally led reform in which roll out and teacher education were coordinated within the organization.

Two distinct but related issues arise with the lack of central leadership and organizational structure of the Common Core initiative. The first is the consistency of implementation across the country. One goal of the reform was to standardize mathematical content in classrooms. Initially, states are only allowed to have fifteen percent of their standards diverge from Common Core. However, the creators of the document established no revision process. As states periodically update their standards documents, there is no mechanism to align the product of the revisions.

The second issue that arises also relates to future revision of the document. The CCSSM stated that the standards are research-based and organized around learning progressions. As research in this field continues, there does not exist a system to update the original document. This means that the CCSSM has the potential to be obsolete with advancing knowledge.

## **Chapter 8**

### **Conclusion**

The goal of this study was to better understand the CCSSM by contextualizing the document with the NCTM *Standards* and the broader standards movement of the most recent decades. This was accomplished by first examining the historical use of standards in social institutions and reform in mathematics education.

### **Summary of Key Ideas**

In order to situate Common Core within the historical context of reform, I first established the greater societal trend toward efficiently organized social institutions and the use of competition to improve educational outcomes.

**Working with common sense.** The scientific revolution, and its roots in the Calvinist movement, influenced various facets of society. A mindset was developed in the public that

avored logic and efficiency. That mindset persists and has evolved alongside the growing influence of capitalism. This has led to a societal framework in which productivity and the ability to measure output is valued.

These ideals are ingrained in the United States' culture. The goal of maximizing productivity does not need justification, because it falls under common sense. The treatment of standards as a mechanism for organizing curricula across regions is the result of this common sense applied toward education.

**Implementing reform.** It took until the 1980s for standards to become prominent in education, despite the growing influence of standardization in industrial settings. Prior to the standards movement, reform in mathematics education was not centrally led across the United States. Colburn's Analytic Induction and New Mathematics both consisted of a collection of efforts to incorporate reform ideas into the classroom. These movements provoked widespread debates over the merits of reform ideas.

**Beginning of an era.** NCTM revolutionized the organization of educational content by introducing an idea that was a standard practice of other industries. Quality assurance is often achieved by maintaining collections of expectations for products and practices. NCTM repurposed this idea for education to summarize expectations for student learning, teachers, and exams.

The distillation of education into clear standards was well-received by the public and their politicians but debates continued regarding the content of the constructed standards. However, the utilization of standards as a mechanism for conveying educational objectives was widely accepted. Each state began to adopt their own collections of standards across subjects.

**Common standards.** One goal of the NCTM reform was to achieve uniformity in education across the United States. The difficulty in achieving this comes partly from the tradition of local control. In order to encourage uniformity within the context of local control, education leaders collaborated to design widely acceptable standards. The vision of Common Core was that if every state participated in the construction of standards, then states would volunteer to adopt common standards. This vision has been partially realized but continues to evolve. As states continue to contend with a toxic political landscape, the future of the CCSSM movement seems uncertain.

### **Personal Reflection: Longevity of Reform**

Although it is not possible to predict the future of Common Core, I have questioned the long-term viability of the movement throughout this study. These questions were driven by my reflection on the updated iterations of the NCTM *Standards* and their continued relevance decades after the 1989 release. Factors that I have considered in my assessment of the CCSSM include the ability to update the standards after a given period of time, which I addressed in the discussion.

If there does not exist a collaborative mechanism for revision, then individual states will produce documents that are increasingly varied. Additionally, a valuable characteristic of the document is the research around which the standards are based. If updated research cannot be easily incorporated into later iterations of the standards, then that characteristic will become increasingly obsolete. My concern is that since these issues are not addressed in the existing CCSSM document, the researched-based feature of Common Core will diminish in the future. Then at some point in the near future, another iteration of standards could be released and the reform debate would continue. I can only speculate about future reform, however the longevity

of CCSSM introduces a more general question: How can lasting impactful education policy be created?

One component that I believe is necessary is adaptability. The foundation of a reform movement requires the ability to be modified and updated. Common Core accounts for that by allowing states to individually revise their standards. However, the process of fifty states modifying the standards undoes the defining feature of the CCSSM, namely, their ability to establish commonality among curricula across states.

### **Concluding Remarks: National Standards**

The desire for national standards in education, as I have summarized in this paper, is based on an emerging national identity and the influence of competition on the international stage. Globalization and neoliberalism have saturated national dialogues regarding education throughout the standards movement of the past few decades. These ideologies are powerful forces in the United States and encourage increasingly nationalized curricula. In contrast, there is a tradition in the United States of local control of education, based on the responsibility of local governments, as opposed to the federal government, to provide education. The existing infrastructure of the education system reinforces the desire for local control and conflicts with the idea of a centrally organized national curriculum. The efforts to establish national standards that I have detailed in this study have each attempted to resolve this tension.

Both the NCTM *Standards* and the CCSSM utilized elective elements in their plans to implement their standards documents. Instead of requiring states and districts to adopt standards, high quality standards were produced and promoted so that there would be a desire across the United States to utilize a superior curricular document. The CCSSO and NGA further developed the choice-based strategy of adoption by establishing buy-in from states. The memorandum of

agreement (MOA) did not obligate states to adopt the CCSS but ensured their input in the development of the standards. The goal in this process was that states that signed the MOA would have a stake in the final document increasing the likelihood of adoption.

Debates are ongoing over the implementation of the CCSSM despite concerted efforts to accommodate various constituents. Unfortunately, any single standards document cannot represent every stakeholder simultaneously. National standards are being overlaid on a system structured around a diverse collection of independent constituents. Although neoliberal principles are valued among these constituents, tension surrounding national standards will persist so long as the competing aims exist.

### **Implications for Future Research**

The breadth of the topic covered in this study was such that many questions arose that could not be pursued. I include below a discussion to address relevant issues that are outside the scope of this paper.

**Local reform.** The focus of this thesis has been reform that occurs at the national level. An exception to this is the section that referenced reform in California (Wilson, 2008). Even at the state level, reform occurs by coordinating a large number of schools across a variety of school districts.

A possible topic of research could be the systematic implementation of policies at the school or district level. Relevant questions include: What are the direct effects of instituting a collection of mathematics standards on teachers and students? How would scaling those policies to larger regions affect outcomes for student learning?

**Standardized testing.** One education policy that has the potential to derail an attempt at curricular reform is the widespread use of standardized tests. This issue has been mentioned

throughout this thesis, and, in particular, in the interview with Ms. Lewis. However, I have not delved deeply into literature regarding the consequences of testing on students, teachers, and school administrators.

Testing is the main instrument used to evaluate the efficacy of education policies and practices. The reliance of policymakers on test scores emphasizes learning outcomes over learning processes. Further research could be made into alternative methods of evaluating education. What are the effects of testing? How are negative consequences justified, and how might positive consequences be preserved in a different evaluation system?

**Potentially overstated facts.** Throughout my research, I have encountered a few topics common across a variety of sources. These topics include the influence of Sputnik on New Mathematics and the comparison of general education reform to a pendulum. I came across one article by Kliebard (1988) that challenged some common narratives.

In the history of mathematics education, there have been characterizations of reform that are potentially overstated. Although there is some degree of repetition in reform, Kliebard (1988) argues “certain familiar problems may recur from time to time, but they always occur in different settings and with different actors, so whatever it is we can learn from the past must be reinterpreted in light of those differences” (p. 151). Additionally, Kliebard addresses the impetus for reform in the 1950s: “Contrary to popular belief, an adverse reaction to the anti-academic and even anti-intellectual formulations of [existing] movement[s] was already under way before Sputnik was launched on October 5, 1957” (p. 152).

These narratives were prevalent in readings that I reviewed in my study. As a result, I included Sputnik as a motivating factor in the New Mathematics movement. However, given the

arguments made by Kliebard, the extent to which these factors influenced reform should be further researched.

### **Looking Forward**

The complexity of the history of reform is such that any finite study cannot be fully comprehensive. In this study I sought to develop a narrative that broadened awareness of historical and current events. In my research I was struck by the optimism I encountered in all three of my interviews. As I explored multiple reform movements, the ongoing challenges to progress were discouraging at times. However, each of the educators I interviewed conveyed a sense that the projects they have participated in have made substantive steps toward improving students' relationship with mathematics. Given the experience these individuals have in the field of education, I am encouraged by their informed optimism. I look forward to expanding my understanding of mathematics education with this perspective in mind.

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### Appendix A: Notes Utilized in Interviews

Questions utilized in interview with Dr. Dossey

(1) How widespread were/are NCTM Standards? In particular, how widespread are the content guides Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence and Focus in High School Mathematics: Reasoning and Sense Making?

→ Common Ground (Rothman, 2011): By one estimate, the NCTM standards were used as a model by forty states (location 590)

(2) What did you expect the reaction to be when you were developing the standards?

#### **Common Core**

(3) What do you think motivated the development of CCSSM? Did the assessment-based system established by NCLB lead to CCSSM?

(4) Was the main purpose in developing Common Core? To implement uniform use of the types of materials developed with NCTM Standards in mind?

#### **Bold Ventures (McLeod et. al, 1996)**

(5) What was the role of assessment prior to No Child Left Behind? (*Assessment Standards for School Mathematics*, 1995)

(6) How did members of NCTM (that did not directly work on them) react to the *Standards*? (changing internal policy of political positions – Shirley Hill, p. 19)

(7) Was the initial justification for creation of the *standards* more as a means of judging existing curricula or more as a document from which new curricula would be created? (changing meaning of standards, p. 36)

(8) Why were other fields less reception to approaching reform in the same way as the *Standards*? What seemed unique to the subject of mathematics at the time that it could be operationalized in this way? (p. 81)

(9) What was the desired effect of the *Standards* at the classroom level? (Lion's Mane Elementary, p. 94)

#### **California Dreaming (Wilson, 2008)**

(10) What was the process for developing materials that were in accordance with the NCTM Standards? (California's framework process, p. 54)

(11) What do you see as the role of professional development in a standards-based reform? How did NCTM attempt to utilize this resource? (California Math Project, educators in 80-90s, p. 85)

(12) Given the current association of Common Core with the president, how did the reactions to NCTM *Standards* divide amongst members of political parties? (p. 165 – not two sides to each issue, p. 154 – sides were forming in Palo Alto)

(13) How has the definition of math literacy changed in the past 50 years? (p. 157 problem with different definitions of what it means to do math, Schoenfeld's definition)

Questions included in the interview with Dr. McCallum

1. What were major influences on the development of the CCSSM?
2. How do you think the CCSSM are similar from previous reforms such as new mathematics and the NCTM *Standards*? How are they different?
3. Why do you think some states, such as Arizona, have voted to repeal adoption of the standards after previously supporting them?
4. What was and has been the approach for addressing the portrayal of the standards in the media?
5. Do you believe the role of mathematicians in the development of the CCSSM has been greater than in previous sets of standards (in particular, the NCTM *Standards*)?
6. What efforts have been made to minimize the problems with implementation that lead to anecdotes that aren't reflective of the standards themselves?
  - Some anecdotes are a result of parents not understanding the value of the way in which the material is presented.
  - Others result from poorly generated material that are said to align with the standards.
7. Development started June 2009 and the final standards were released in June 2010. Where did that timeline come from?
8. What do you believe was the influence of Race to the Top on the reception of the standards?
9. How do you think success of the standards should be measured?
10. If the idea behind Common Core is that it will remain a long-standing document, what are the plans to revise the document in the upcoming years?

## Appendix B: Copy of NGA Memorandum of Agreement

**The Council of Chief State School Officers and  
The National Governors Association Center for Best Practices**

**Common Core Standards  
Memorandum of Agreement**

**Purpose.** This document commits states to a state-led process that will draw on evidence and lead to development and adoption of a common core of state standards (common core) in English language arts and mathematics for grades K-12. These standards will be aligned with college and work expectations, include rigorous content and skills, and be internationally benchmarked. The intent is that these standards will be aligned to state assessment and classroom practice. The second phase of this initiative will be the development of common assessments aligned to the core standards developed through this process.

**Background.** Our state education leaders are committed to ensuring all students graduate from high school ready for college, work, and success in the global economy and society. State standards provide a key foundation to drive this reform. Today, however, state standards differ significantly in terms of the incremental content and skills expected of students.

Over the last several years, many individual states have made great strides in developing high-quality standards and assessments. These efforts provide a strong foundation for further action. For example, a majority of states (35) have joined the American Diploma Project (ADP) and have worked individually to align their state standards with college and work expectations. Of the 15 states that have completed this work, studies show significant similarities in core standards across the states. States also have made progress through initiatives to upgrade standards and assessments, for example, the New England Common Assessment Program.

**Benefits to States.** The time is right for a state-led, nation-wide effort to establish a common core of standards that raises the bar for all students. This initiative presents a significant opportunity to accelerate and drive education reform toward the goal of ensuring that all children graduate from high school ready for college, work, and competing in the global economy and society. With the adoption of this common core, participating states will be able to:

- Articulate to parents, teachers, and the general public expectations for students;
- Align textbooks, digital media, and curricula to the internationally benchmarked standards;
- Ensure professional development to educators is based on identified need and best practices;
- Develop and implement an assessment system to measure student performance against the common core; and
- Evaluate policy changes needed to help students and educators meet the common core standards and “end-of-high-school” expectations.

An important tenet of this work will be to increase the rigor and relevance of state standards across all participating states; therefore, no state will see a decrease in the level of student expectations that exist in their current state standards.

**Process and Structure**

- **Common Core State-Based Leadership.** The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) shall assume responsibility for coordinating the process that will lead to state adoption of a common core set of standards. These organizations represent governors and state commissioners of education who are charged with defining K-12 expectations at the state level. As such, these organizations will

facilitate a state-led process to develop a set of common core standards in English language arts and math that are:

- Fewer, clearer, and higher, to best drive effective policy and practice;
- Aligned with college and work expectations, so that all students are prepared for success upon graduating from high school;
- Inclusive of rigorous content and application of knowledge through high-order skills, so that all students are prepared for the 21<sup>st</sup> century;
- Internationally benchmarked, so that all students are prepared for succeeding in our global economy and society; and
- Research and evidence-based.

□ **National Validation Committee.** CCSSO and the NGA Center will create an expert validation group that will serve a several purposes, including validating end-of-course expectations, providing leadership for the development of K-12 standards, and certifying state adoption of the common core. The group will be comprised of national and international experts on standards. Participating states will have the opportunity to nominate individuals to the group. The national validation committee shall provide an independent review of the common core. The national validation committee will review the common core as it is developed and offer comments, suggestions, and validation of the process and products developed by the standards development group. The group will use evidence as the driving factor in validating the common core.

□ **Develop End-of-High-School Expectations.** CCSSO and the NGA Center will convene Achieve, ACT and the College Board in an open, inclusive, and efficient process to develop a set of end-of-high-school expectations in English language arts and mathematics based on evidence. We will ask all participating states to review and provide input on these expectations. This work will be completed by July 2009.

□ **Develop K-12 Standards in English Language Arts and Math.** CCSSO and the NGA Center will convene Achieve, ACT, and the College Board in an open, inclusive, and efficient process to develop K-12 standards that are grounded in empirical research and draw on best practices in standards development. We will ask participating states to provide input into the drafting of the common core and work as partners in the common core standards development process. This work will be completed by December 2009.

□ **Adoption.** The goal of this effort is to develop a true common core of state standards that are internationally benchmarked. Each state adopting the common core either directly or by fully aligning its state standards may do so in accordance with current state timelines for standards adoption not to exceed three (3) years.

This effort is voluntary for states, and it is fully intended that states adopting the common core may choose to include additional state standards beyond the common core. States that choose to align their standards to the common core standards agree to ensure that the common core represents at least 85 percent of the state's standards in English language arts and mathematics.

Further, the goal is to establish an ongoing development process that can support continuous improvement of this first version of the common core based on research and evidence-based learning and can support the development of assessments that are aligned to the common core across the states, for accountability and other appropriate purposes.

- **National Policy Forum.** CCSSO and the NGA Center will convene a National Policy Forum (Forum) comprised of signatory national organizations (e.g., the Alliance for Excellent Education, Business Roundtable, National School Boards Association, Council of Great City Schools, Hunt Institute, National Association of State Boards of Education, National Education Association, and others) to share ideas, gather input, and inform the common core initiative. The forum is intended as a place for refining our shared understanding of the scope and elements of a common core; sharing and coordinating the various forms of implementation of a common core; providing a means to develop common messaging between and among participating organizations; and building public will and support.
  
- **Federal Role.** The parties support a state-led effort and not a federal effort to develop a common core of state standards; there is, however, an appropriate federal role in supporting this state-led effort. In particular, the federal government can provide key financial support for this effort in developing a common core of state standards and in moving toward common assessments, such as through the Race to the Top Fund authorized in the American Recovery and Reinvestment Act of 2009. Further, the federal government can incentivize this effort through a range of tiered incentives, such as providing states with greater flexibility in the use of existing federal funds, supporting a revised state accountability structure, and offering financial support for states to effectively implement the standards. Additionally, the federal government can provide additional long-term financial support for the development of common assessments, teacher and principal professional development, other related common core standards supports, and a research agenda that can help continually improve the common core over time. Finally, the federal government can revise and align existing federal education laws with the lessons learned from states’ international benchmarking efforts and from federal research.

**Agreement.** The undersigned state leaders agree to the process and structure as described above and attest accordingly by our signature(s) below.

Signatures
<b>Governor:</b>
<b>Chief State School Officer:</b>

## Appendix C: NGA Letter to the Department of Education

**Race to the Top Fund**[-+](#)

August 28, 2009

The Honorable Arne Duncan  
Secretary of Education  
U.S. Department of Education  
400 Maryland Avenue, SW., Room 3W329  
Washington, DC 20202

Re: Race to the Top Fund [Docket ID ED-2009-OESE-0006]

Dear Secretary Duncan,

On behalf of the nation's governors, we submit the following comments in response to the July 29, 2009 notice of proposed priorities, requirements, definitions, and selection criteria for the Race to the Top Fund (RTTT). The National Governors Association appreciates the opportunity to respond to the proposed guidelines and to offer observations and recommendations to help enhance and refine the final request for proposal.

First, we greatly appreciate that the proposal supports and promotes the state-led Common Core State Standards Initiative. Unfortunately, the proposed draft application regarding the adoption of the common standards appears to conflict with the timeline agreed to by governors and chief state school officers in the Common Core State Standards Initiative Memorandum of Agreement (MOA). The MOA specified that states may adopt the common core standards in accordance with state timelines for standards adoption, not to exceed three years. In contrast, the proposed RTTT draft application requires adoption of the common core standards by June 2010.

Overlaying an artificial and incompatible deadline onto a voluntary process that states have already agreed to unnecessarily accelerates what must remain a thoughtful and state-driven process. Therefore, Governors recommend that the department align the guidance timetable for common core standards adoption with the Common Core State Standards Initiative MOA.

Moreover, the RTTT draft application suggests that states must adopt "identical" standards. This is in contrast to the MOA adopted by governors and chief state school officers from 46 states and three territories, which defines state-level "adoption" in terms of a yet to be determined validation process intended to ensure that the common core standards represent at least 85 percent of the participating state's standards. In good faith, forty-nine governors and chief state school officers agreed to develop common standards according to the just-mentioned terms. To honor this process and the conditions under which all states endorsed it, governors recommend that the Department conform the RTTT application to match the agreements found in the MOA previously endorsed by governors and chief state school officers.

Additionally, we received feedback from several states related to a variety of other policy areas within the RTTT draft application that warrant further consideration and clarification:

- 1. State Attorney General signature.** It has been argued by some governors' offices that the proposed application requirement that the State Attorney General, or other chief state legal officer certify that the state application is "complete, accurate, and constitute a reasonable interpretation of state law" is an unnecessary administrative burden that second-guesses and obstructs established state constitutional chains of authority. Governors' offices have argued that this requirement is of little benefit to the application and recommend it be removed.
- 2. State School Board President signature.** We have received comments about the proposed application requirement that a state's school board president must endorse the state application. It has been argued to us that this has the potential to limit gubernatorial prerogatives in proposals. During the first phase of the

State Fiscal Stabilization Fund application process, governors, not school board presidents, were required to certify that their states would meet the four assurances found in the Recovery Act. Some governors' offices have argued that the proposed requirement that a state's school board president must endorse the state application has the potential to make governors secondary actors in the process and have recommended its removal.

3. **Linking student and teacher/principal data for the purpose of evaluation.** One of the two proposed eligibility requirements holds that a state must not have any legal, statutory, or regulatory barriers to linking data on student achievement or student growth to teachers and principals for the purpose of teacher and principal evaluation. However, some governors' office have argued that it is unclear whether a state that does not have any legal barriers to linking data is eligible for grant funds even if a local education agency's (LEA) teacher and/or principal contract or collective bargaining agreement forbids the use of student achievement data for evaluation.
4. **Intervening in the lowest-performing schools and LEAs.** The definition of "authority to intervene" is not specified in the "Turning Around Struggling Schools" criteria and some governors' offices have suggested that it raises state constitutional concerns. A number of state constitutions prohibit the State Education Agency, or other governmental body, from "taking over" schools. Thus, it would be helpful if the Department could clarify the "authority to intervene" to include flexibility for other innovative "intervention" strategies that would not require changes to state constitutions.
5. **Charter school cap.** We have received several comments about the "Reform Conditions Criteria" regarding the extent to which a state has a charter school law that does not prohibit or effectively inhibit increasing the number of charter schools. Clarifying the intentions of this section would benefit states facing a variety of questions. Some governors' offices have argued that this requirement is difficult for states to address because it necessitates significant interpretation. For example, it is not clear if a state may receive grant funds if it has a charter school cap but has not yet reached the numerical limit of charter schools statewide. Likewise, it is not clear if a state can receive grant funds if limits are only applied to the number of a certain type of charter school (e.g., university-sponsored charter school, online charter school) or if it provides a certain subset of schools with charter-like autonomy through legislation or state code. Finally, for states without charter laws, can state law that allows for multiple non-charter school models, such as "Innovation Schools" that provide charter-like flexibility or virtual schools that enable anytime, anywhere learning meet this criteria?
6. **Changes to state law.** There appears to be confusion about the extent to which a state has to change a state law prior to applying for or receiving an RTTT grant. For states that do not meet all of the proposed application requirements, it is important the department provide further clarification on the "Proposed Eligibility Requirements" and "State Reform Conditions Criteria" that deal with state law:. For example, must a change to state law (e.g., legislation to remove a barrier to linking data on student achievement to teachers) be enacted prior to applying for RTTT grant funds or will the introduction of legislation adequate to meet the eligibility requirement and/or reform conditions criteria?
7. **Participating LEAs.** The American Recovery and Reinvestment Act statute requires that at least 50 percent of the funds under a state's RTTT grant must be provided to LEAs based on their relative share of funding under Title I, Part A of the Elementary and Secondary Act. We have received several questions from governors' offices concerning the definition of a "participating LEA." On behalf of these offices, we request that the Department provide additional language to clarify the definition of "participating LEAs," including LEAs who opt out of certain RTTT requirements.

If the Department would like to discuss any of the comments provided in this letter, please contact Linda Lawson, Legislative Director, NGA Education, Early Childhood and Workforce Committee at [LLawson@nga.org](mailto:LLawson@nga.org).

Thank you for your consideration on these important matters.

Sincerely,

Governor Bill Ritter, Jr.  
 Chair  
 Education, Early Childhood and Workforce Committee

Governor M. Jodi Rell  
 Vice Chair  
 Education, Early Childhood and Workforce Committee

Enclosure: NGA / CCSSO Common Core State Standards Memorandum of Agreement

**National Governors Association**

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Appendix D: Timeline of Relevant Publications

<b>Date</b>	<b>Author</b>	<b>Title</b>
1980	NCTM	<i>An Agenda for Action</i>
1983	NCEE	<i>A Nation at Risk: The Imperative for Educational Reform</i>
1989	NCTM	<i>Principles and Standards for School Mathematics (PSSM)</i>
1991	NCTM	<i>Professional Standards for Teaching Mathematics (PSTM)</i>
1995	NCTM	<i>Assessment Standards for School Mathematics (ASSM)</i>
2000	NCTM	<i>Principles and Standards for School Mathematics (PSSM)</i>
2006	College Board	<i>Standards for College Success: Mathematics and Statistics</i>
2006	NCTM	<i>Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence</i>
2007	ASA	<i>Guidelines for Assessment and Instruction in Statistics Education: A Pre-K–12 Curriculum Framework</i>
2009	NCTM	<i>Focus in High School Mathematics: Reasoning and Sense Making</i>
2010	NGA & CCSSO	<i>Common Core State Standards</i>