Signature Assignment: Framework Evaluation

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Introduction and Background

The Common Core State Standards for mathematics were adopted in 2010 and have since restructured mathematics curriculum in the elementary grades. The standards were then revised in 2013 following Senate Bill 1200, Statutes of 2012, (CDE, 2014, pg. ii). The standards include the 8 standards for mathematical practice, which are the same for all grade levels. Also included are the math content standards which are specific to each grade level. From these standards were formed the Mathematics Framework which was written to as a guide to educators as they create curriculum for the common core state standards. The framework attempts to take the individual pieces of the content standards and guide the construction of those pieces into a complete and comprehensive curriculum for mathematics instruction. "The standards are based on three major principles: focus, coherence, and rigor," which "are meant to fuel greater achievement in a rigorous curriculum, in which students acquire conceptual understanding, procedural skill and fluency, and the ability to apply mathematics to solve problems," (California Dept., 2013, pg. 9). These themes and goals are seen throughout the framework in the organization of it and the content therein.

The framework is organized by grade as well as by the big ideas and topics. There is an overview chapter and then a chapter for each grade TK through 8th grade and then a chapter for each of the ten high school level math courses, including AP statistics. Following that, are six chapters and six appendices that give more overarching guidance for educators when it comes to creating a curriculum and environment that is beneficial for all students by addressing specific strategies and tools for assessment, technology, access, and more. Within each grade's chapter, the standards for mathematical practice are discussed first with examples specific to the grade

given for each of the eight standards. Following that, each of these chapters moves to the specific standards, organized by domain, as they are in the standards document itself. This section includes the standards and explanations of how to do the math and how to teach the math. It even explains the developmental level of the students' thinking and how this fits within the course of their broader education, for example, by discussing what students have learned in previous grades. The section also includes examples of problems for the standards as well as common misconceptions of students with how to address them.

The overarching concept of the framework is a movement away from the traditional memorization and repetitive practice of the past toward a concept and understanding based way of doing math by teaching students how to think mathematically rather than how to do math. Here is an example of this sort of trend: “Students need opportunities to describe numerical expressions without evaluating them. For example, they express the calculation ‘add 8 and 7, then multiply by 2’ as (8+7)x2,” (California Dept., 2013, pg. 238). The focus is on thinking rather than performing. Whether this is a good change or not has been heavily debated and critiqued by people in all spheres of education, such as educators, parents, students, and even other citizens. For instance, some say that this change in focus has caused a decrease in student ability to perform the tasks at all, let alone achieve the original goal of being able to broaden understanding and application of math concepts and skills.

This paper seeks to evaluate the California Common Core State Standards for mathematics framework for K-5th grade by looking at how it lays out scope, sequence and articulation of curriculum as well as its general features of accessibility and practicality. In a sense, this paper looks to determine if the flack common core math has received from the general

population is deserved or if this really is a quality framework for educators to follow as they create their own curriculum for their K-5th grade classes.

Evaluation of Scope

The common core standards included in the framework for K-5th grade cover a wide range of areas within mathematics. These main ideas and concepts are called "domains" and each of the specific standards are categorized according to them. The main domains are Operations and Algebraic Thinking, Number and Operations in Base Ten, and Measurement and Data, Geometry. The domain of Number and Operations—Fractions appears in grades three through five. Within each domain are further subdivisions of the content standards that help further show the depth and breadth of the framework. The names of these domains show well how the framework has shifted focus from more traditional application to more general comprehension. Case in point is having a domain that includes "algebraic thinking." Having standards about just what is going on within students' brains and not about what they are putting on paper is a relatively new concept for math, and, as mentioned in the introduction, has received various responses and had varying success.

The individual standards themselves cover a wide range of types of skills and areas of understanding as well as levels of understanding. This shows that the breadth of the framework standards is comprehensive as well as the depth. For instance, as previously highlighted, within each sub-domain, it is typical to find standards pertaining to the understanding of the concept and standards pertaining to the application of the concept. For example, the first four standards for second grade within the Numbers and Operations in Base Ten domain fall under the subtitle "Understand place value," and the following five fall under the subtitle "Use place value understanding and properties of operations to add and subtract," (California Dept., 2014, pg. 20).

In other words, “to compare numbers, students apply their understanding of place value,” (California Dept., 2013, pg. 134). This then shows the balance of understanding and application that is prevalent throughout the standards and the framework.

In more mathematically specific terms, the framework covers a wide scope of areas within mathematics. Number sense, geometry, statistics, both abstract and concrete concepts are all addressed. In the later chapters, which aren’t the focus of this paper, but are still worth mentioning, the framework addresses the differences of scopes within each high school course. For example, there are chapters for the traditional division of Algebra 1, Geometry, and Algebra 2 courses in addition to the more recent development of the Integrated Math I, II, and III courses. This is a more clear example of how the framework lays out the scope of each grade level’s content standards and curriculum.

Evaluation of Sequence

The scope of the framework is organized in a logical sequence as well, moving according to the normal developmental maturity of students. It may seem like common sense to most, but it is still important to keep in the forefront of one’s mind when creating curriculum the idea that, for example, “Instruction in the order of operations should be carefully sequenced from simple to more complex problems,” (California Dept., 2013, pg. 238). After all, a student shouldn’t be expected to learn how to multiply before they have grasped how to add. Adding is a lower level skill as multiplication is also a form of adding, but at a proportional growth rate other than one. Similarly, students shouldn’t be taught to find volume until they have been taught to find area since finding the area is often a step in finding the volume.

Within the framework, the “curriculum spiral” is clearly evident. Jerome Bruner came up with this idea and argued that curriculum should be formed with interrelatedness and connections

across the domains. He was a proponent for the idea that “For students to grasp these ideas and structures, ‘they should be developed and redeveloped in a spiral fashion,’ in increasing depth and breadth as pupils advance through the school program,” (Ornstein & Hunkins, 2017, pg. 186).

This spiral is seen in the framework through the interconnections of the standards between domains and across grade levels. For example, standard 2.MD.3 is “Estimate lengths using units of inches, feet, centimeters, and meters,” (California Dept., 2014, pg. 21). For the following grade, standard 3.MD.2 is “Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings… to represent the problem,” (California Dept., 2014, pg. 26). One can see then, that the standards for higher grades build from standards from the lower grades. What students are expected to learn in one teacher’s curriculum will be necessary for them to know in order to succeed in the next year’s teacher’s curriculum.

Furthermore in regards to connections across domains, standard 3.MD.7 is “Relate area to the operations of multiplication and addition,” (California Dept., 2014, pg. 27). This is an example of how students need to be learning and growing within each domain for the sake of other domains in addition to for the domain itself. The domains rely upon each other and build upon each other within and across the grade levels creating the curriculum spiral and covering the broad scope curriculum should.

Evaluation of Articulation

There is good horizontal and vertical articulation of the content within the framework as the connections between and within the grade levels contribute to good learning. "Vertical

articulation usually refers to the sequencing of content from one grade level to another. Such articulation ensures that students receive the necessary preparation for coursework" (Ornstein & Hunkins, 2017, pg. 168). As for this vertical direction, “each standard is an extension of previous learning, not a completely new concept,” (California Dept., 2013, pg. 10). The framework of each grade opens with a revisiting of what the students were supposed to have learned and mastered before entering the grade in question. For instance, the chapter for Grade 2 begins with, “In previous grades, students developed a foundation for understanding place value, including grouping in tens and ones…” (California Dept., 2013, pg.119). Following that paragraph is a section that begins, “In grade two, instructional time should focus on four critical areas:...” (California Dept., 2013, pg.119). In other words, teachers can look at only the chapter for the grade they are teaching and planning for and they will still be given an idea of how their content fits within the broader time frame of their students’ education.

In addition to having good vertical articulation, the framework has good horizontal articulation as well. “Connections between the standards at a single grade level can be used to improve the instructional focus by linking additional or supporting topics to the major work of the grade,” (California Dept., 2013, pg. 10). A good example of this was given in the section above on scope. The example showed that students are required to use their knowledge and skills from each domain in the other domains as well. Even outside of math though, teachers often work to create vertical articulation and connection by drawing interrelatedness between entirely different subjects as well, which is a great practice for engagement and retention of material for the students.

As for the continuity of the content framework, I would argue that it is reasonably sufficient. There is clear repetition of core practices within the content standards themselves, but

it is also made clearer that "Teachers and administrators alike should note that the standards are not topics to be checked off after being covered in isolated units of instruction; rather, they provide content to be developed throughout the school year through rich instructional experiences presented in a coherent manner," (California Dept., 2013, pg. 235).

General features

The readability and organization of the framework are generally quite good, though there are a few issues that present themselves. The standards themselves are organized well within a single document and follow the expected and consistent layout and sequence. However, the framework itself is organized on the website with links to each chapter. This can be beneficial in that it allows educators and parents to find what they are looking for more easily, but the first step of getting to that page on the website is less than intuitive. An initial search for the framework will take one to the tentative 2023 updated version of the framework. This is not yet in its final edited form and leaves quite a bit to be desired when it comes to readability and organization. The 2013 version, which is what this paper has been evaluating, is far better as it is in its completed form, but in the current fluctuating situation of the framework, it is hard to find it. Still, if one can manage to find the list of links to the PDFs for each chapter of the framework, it is well designed as far as organization is concerned.

This was discussed in part in the introduction of this paper. The layout of the chapters is chronological. The layout within each chapter first looks at the overarching Standards for Mathematical Practice (SMPs) for the specific grade or course and then moves to the more specific content standards and tips and big ideas for their implementation. The standards are organized logically so that it is easy to see the path the content is taking. The numerous charts

and tables within each chapter greatly increase readability as well, even for the reader who is not familiar with the layout and lingo of the common core standards and the SMPs.

Another excellent feature of the framework in regards to this topic is the overview chapter at the beginning of the framework. It discusses the general flow and purpose of the framework and even uses marked images to show how the following chapters work and what certain notations and such mean.

In addition to readability and organization benefits within the framework, issues of cultural and linguistic diversity are also sufficiently accounted for. Once again, though they are hard to find, even if one has found the normal version of the framework, there are brochures, faqs, and other guides to help parents and educators better understand the framework. There exist also copies of the framework, and many of the aforementioned aids, in Spanish. It is somewhat of an oversite not to include copies of it in a few of the other most common languages, especially copies of the parent brochures. However, it is clear an effort was made to make the framework accessible and readable for those who would need it.

Conclusion

Overall, though I would argue that the standards and frameworks have excellent goals and come from logical ideologies, practically speaking, it leaves a bit to be desired. It gives a good guide for teachers creating their own curriculum in that it helps give the big picture for the standards of mathematical practice, and the standards give good specifics, but there is still much left up to the teacher when it comes to putting it all together in a logical and reasonable way. In other words, the framework discusses things in a more abstract and idealistic way than what is practically beneficial for teachers in the processes of creating math curriculum.

The framework discusses the high ideals of the SMPs, and gives great examples of what each could look like, but it doesn't include much help for the creation calendar plan for, say, a 4th grade teacher who was just hired a week before classes start. It says that "Some clusters of standards require a greater instructional emphasis than others based on the depth of the ideas, the time needed to master those clusters, and their importance to future mathematics or the later demands of preparing for college and careers," (California Dept., 2013, pg. 158). In a sense, then, the goal of the framework is to give teachers the big idea of the general flow, goals, and concepts, rather than a step by step plan for designing curriculum or scheduling and creating units. This can be looked at as either a good thing or a bad thing. It is bad in that it can fall short of the specific and detailed guidance that some teachers, especially new ones, need. However, it can be good in the sense that it allows teachers to have more freedom and flexibility in creating a specific curriculum that works for them, for their students, and for the situation of their classroom as a whole. I am of the opinion that teachers should have as much freedom as possible and that they should be held strictly accountable for their actions and measurable results, so I think that giving teachers a common goal and guidelines for both practice standards and content standards should be sufficient. At the same time though, I know that practically speaking I trust a very small percentage of California public school teachers with mathematics instruction, especially if this framework is all that they are given. In actuality, most teachers are given more training and materials than this, but the point remains that with mathematics being as widely struggled with and hated by elementary teachers as it is, this framework and the standards are not enough to ensure that students will get a quality education, regardless of whether it is believed that the framework should be enough on its own or not.

Furthermore, while the framework addresses the needs of various learners in the sense of encouraging various methods to be taught and focusing more on the thinking and understanding of concepts, as discussed previously, it does little for meeting the needs of students who are diverse in other ways. This is not a framework for finding differentiation methods or even UDL ideas. It seeks to help teachers create curriculum for all students, but, as mentioned above, it cannot be the only resource a teacher uses. Even within the sphere of diverse learning styles, the common core focus of understanding and explaining being considered above application can put some students at a disadvantage if they are capable of doing the math correctly every time but are incapable of explaining how or why they do what they do.

Through the process of evaluating this framework, I was able to learn valuable lessons about curriculum development in particular. Curriculum development is not a one-and-done task. It is a process that should continue throughout a teacher's career. New methods and new situations are always coming up and teachers should use those to improve their curriculum continually. When I am a teacher, I hope to be able to create an excellent curriculum in my first year, but at the same time, I hope to make improvements to that curriculum throughout the years and between the years to make sure that I am always giving my students the very best education that I can.

References

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