Common Core State Standards: The Blueprint for the *digits* Program

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The Common Core State Standards, now almost universally adopted across the United States, provide a consistent, clear understanding of what students are expected to learn in English language arts and mathematics —defining both the knowledge and skills necessary for success in college and career. These common instructional standards served as the basis for the development of ***digits***, a digital interactive mathematics learning program from Pearson for Grades 6–8.

According to Dr. Francis (Skip) Fennell, Professor of Education at McDaniel College in Westminster, MD, and co-author of ***digits***, the Common Core State Standards for mathematics are rooted in the efforts of the National Council of Teachers of Mathematics (NCTM), including:

- The Curriculum and Evaluation Standards for Mathematics (1989);
- The Principles and Standards for School Mathematics (2000), and more recently,
- The Curriculum Focal Points (2006), which frame the critical mathematics topics to be emphasized at each grade level within the Common Core State Standards.

A Common Vision for Educational Success

In developing the Common Core State Standards, the National Governors Association Center for Best Practices and the Council of Chief State School Officers addressed a number of overarching issues. Among them were the tremendous range of curriculum expectations across the 50 states, the current state of U.S. mathematics curriculum as "a mile wide and an inch deep" when compared to international standards, U.S. population mobility trends, and, importantly, the need to identify critical mathematical knowledge points for students in pre-kindergarten through the middle grades.

The criteria used to move the Common Core State Standards forward included:

- Fewer, clearer, and higher standards that built upon the strengths, objectives and lessons of current state standards;
- Designed to align with college and work expectations;
- Based upon research-based evidence for effective learning;
- Inclusive of rigorous content *and* application of knowledge through higher-order skills, and
- Internationally benchmarked to prepare students for success in the global economy and society.

Developed concurrently with the Common Core State Standards, ***digits*** is the first mathematics program to use the nationally recognized standards as the basis for its scope and sequence.

Table 1:

Mathematical Practices	NCTM Processes
Make sense of problems and persevere in solving them	Problem Solving
Reason abstractly and quantitatively	Reasoning and Proof
Construct viable arguments and critique the reasoning of others	Reasoning and Proof, Communication
Model with mathematics	Connections
Use appropriate tools strategically	Representation
Attend to precision	Communication
Look for and make use of structure	Communication, Representation
Look for and express regularity in repeated reasoning	Reasoning and Proof

At the foundation of both ***digits*** and the Common Core State Standards are the Standards for Mathematical Practice, which describe varieties of expertise that mathematics educators at all levels should seek to develop in their students, according to *digits* co-author Eric Milou, Professor in the Department of Mathematics at New Jersey-based Rowan University. "The Mathematical Practices rest on important processes and proficiencies with long-standing importance in math education."

*"...**digits** is the first mathematics program to use the nationally recognized standards as the basis for its scope and sequence."*

The ***digits*** program was particularly designed to connect the content in mathematics instruction to the Mathematical Practices by integrating them into each three-part ***digits*** lesson.

Part 1: Launch – Every lesson begins with a problem-solving experience where students begin to make sense of problems and are encouraged to explore them.

Part 2: Examples & Key Concepts — Multiple examples in each *digits* lesson address processes such as modeling and attending to precision while illustrating key concepts. Students are also tasked with choosing from an

array of embedded mathematical tools — for example, a two-dimensional graphing platform or number line — to build strategic thinking and decision-making skills.

Part 3: Close & Check — The final component of each ***digits*** lesson is a formative assessment that requires learners to construct viable arguments and critique the reasoning behind them.

Companion pages for each lesson (a page each to accompany Launch and Close & Check) provide a mathematical "practice space" to expand on these processes, asking students to answer focus questions and provide error analysis.

Prevention and enrichment paths based on the interACTIVE Learning Cycle™ of assessment, instruction, and practice combine with individualized study plans, reporting, Readiness and Intervention lessons, and auto-scored homework to immediately identify students' understanding of content.

For example, each Readiness lesson addresses pre-requisite skills to ensure that all students are prepared to learn on-level content. These lessons also offer enrichment for students performing above level based on their readiness assessment results. Readiness lessons include three parts: Intro (to establish relatable context, activate knowledge, and explicitly identify the math skills necessary for completion); Learn (systematic skills review and small-group activities); and Close (whole-class discussion on what students learned and strategies they applied).

Two-part Intervention lessons — pairing an Examples section with a comprehensive Lesson Check — address specific areas of weakness identified by the Readiness Assessment, and can be completed independently or guided by the teacher.

The role of Mathematical Practices in instructor support

According to Milou and fellow author Janie Schielack, Professor of Mathematics and Associate Dean for Assessment and PreK–12 Education at Texas A&M University, the Mathematical Practices are not simply reflected in ***digits'*** student lessons. They are also an important component of the program's teacher support.

Explains Schielack, "In creating instructor materials such as Questions for Understanding, we considered what types of Mathematical Practice we wanted our students engaged in, and structured the materials accordingly."

The teacher support components found in ***digits*** were created to address both the content and the practices of the Common Core State Standards. For example, Mathematical Background assists teachers in vertical alignment, placing content into context based on what preceded and what will follow according to the Common Core State Standards.

Focus Questions for each lesson also play a role in context, keeping students focused on the reasoning behind a particular concept, how it relates to other mathematical concepts, and how it might be used in a meaningful way.

By posing questions such as, "How is this example different from the last one?", students begin to look for and make use of structure; this is just one example of how *digits*' teacher support directly supports the Mathematical Practices.

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Unique to ***digits*** is an "Authors' Intent" support component, which offers insights into why the authors chose to include certain examples in a particular section, or to approach a mathematical concept in a particular way. For instance, the ratios lesson in ***digits*** includes an example that was purposefully designed to provide practice with multi-step problems, while also preparing students to write parts of whole ratios in a subsequent example. By reinforcing the intent of the example to their students, teachers are able to maintain focus on a particular standard.

*"The multi-channel nature of the **digits** curriculum and its clear and unobtrusive design were specifically created to appeal to visual, kinesthetic, and auditory learners."*

The ***digits*** program also provides ingrained differentiated instruction support. For example, "Going Further" questions challenge students who are above grade level, while "Questions for Understanding" in the eTeacher Guide allow for informal assessment opportunities so teachers can remedy problems as they arise. The eTeacher Guide also provides specific Differentiated Instruction notes with suggestions for students who may be below grade level.

The multi-channel nature of the ***digits*** curriculum and its clear and unobtrusive design were specifically created to appeal to visual, kinesthetic, and auditory learners.

Beginning with the end in mind: The Understanding by Design framework

According to the ***digits*** author team, the instructional framework used to create the program — including its teacher support components — is based on the Understanding by Design planning approach, which begins by identifying classroom outcomes and performance goals.

Though widely used for a number of years, the Understanding by Design approach has not often been applied to mathematics, according to program author Helene J. Sherman, Associate Dean for Undergraduate Education and Professor in the Division of Teaching and Learning, College of Education at the University of Missouri-St. Louis.

"Lessons in ***digits*** have been created with the idea that, when students do study these concepts and perform these skills, teachers know that they will reach a certain destination. It is the overt intention that is built into these lessons that makes ***digits*** unique," comments Sherman.

Utilizing the Understanding by Design reverse methodology as a foundation, the ***digits*** author team took a three-step approach in creating the program:

- Designing the assessments;
- Designing the goals for each lesson; and, finally,
- Designing the activities that related to each goal.

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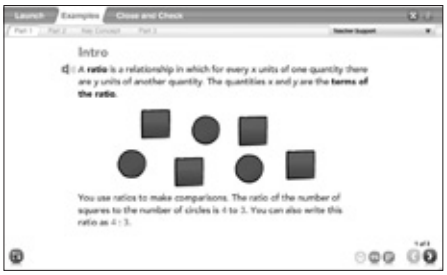
As an example, the topic of ratios is based upon the following Common Core State Standards for Grade Six:

- Understanding the concept of a ratio and using ratio language to describe a ratio relationship between two quantities
- Understanding the concept of a unit rate a/b associated with a ratio a:b with b not equal to 0, and using rate language in the context of a ratio relationship
- Using ratio and rate reasoning to solve real-world and mathematical problems

Using the principles of Understanding by Design, the authors created the Grade Six ratio lesson by asking, "What is the purpose of using a ratio? Why are we learning this? What conclusions are we going to gather from what we're doing?"

Because the Common Core State Standards identify content and desired outcomes so specifically, the Understanding by Design framework used to create the ***digits*** program facilitates the meeting of those Standards, simplifying the assessment process and providing clarity on the desired learning outcomes.



New Standards for a New Generation of Learners

Simply stated, ***digits*** from Pearson offers a comprehensive response to middle school math demands, in the form of a flexible and customizable solution that helps meet Common Core State Standards while giving students and teachers the support they need.

For more information on the Common Core State Standards, visit www.commoncoreanswers.com.

For more information on the ***digits*** middle grades mathematics program, visit www.digitsmath.com.

Pearson Education has incorporated the concepts of the Understanding by Design methodology into this text in consultation with [contributing author/editor] Grant Wiggins, [one of the] creator[s] of the Understanding by Design methodology. ASCD, publisher of the "Understanding by Design Handbook" co-authored by Grant Wiggins, has not authorized or sponsored this work and is in no way affiliated with Pearson or its products.

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