Quality Online Resources and Supports for Educators Teaching the Common Core State Standards for Mathematics

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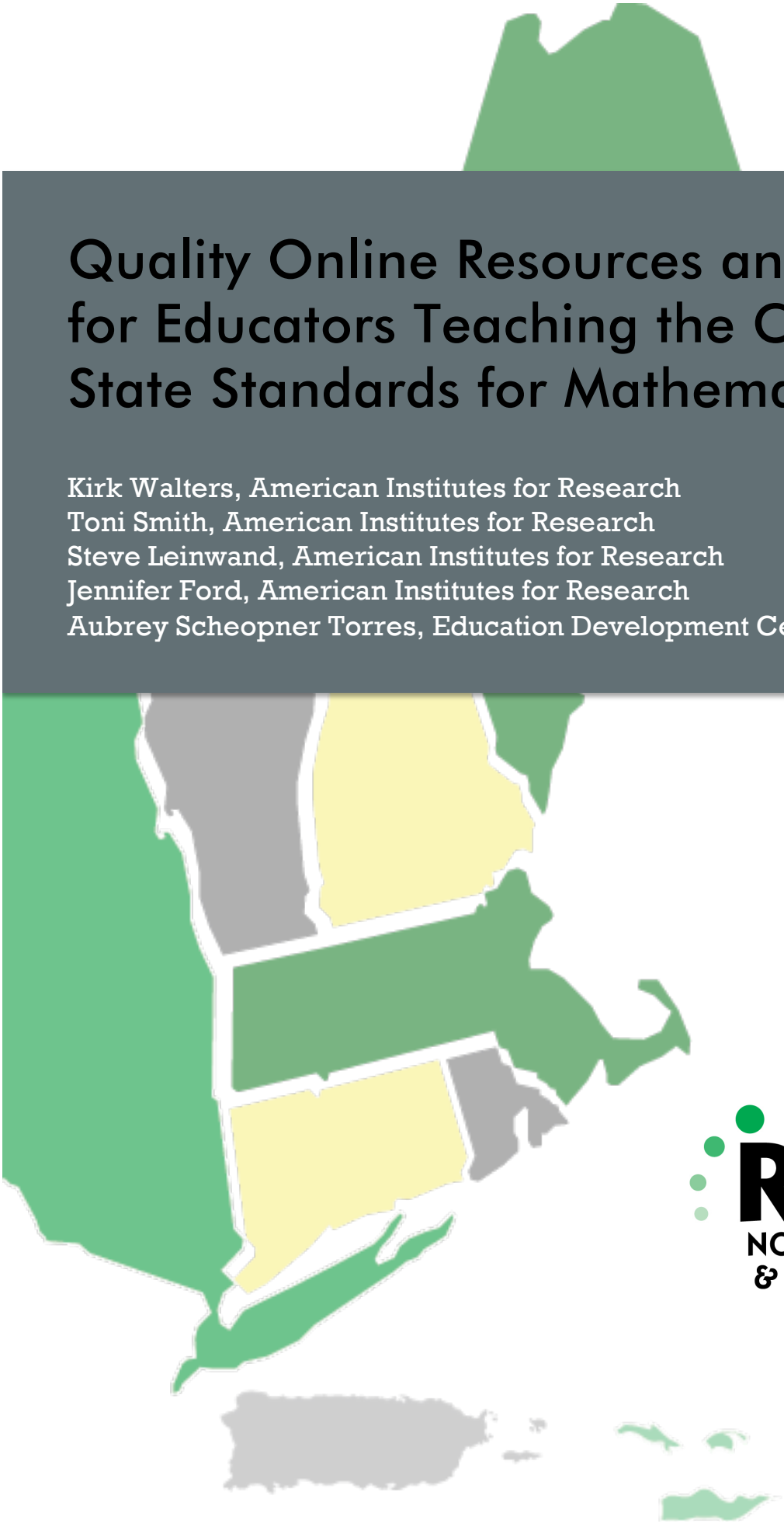

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Summary

In response to the challenges and needs described by Northeast educators as they gear up to teach the Common Core State Standards for Mathematics (CCSSM), this report includes descriptions of high-quality online resources that are aligned to the two areas of greatest need: (1) instructional resources (e.g., lessons, units, and assessments) and (2) resources that support teachers' understanding of the CCSSM, which could be used specifically for teacher professional development.

Math experts at the Regional Educational Laboratory Northeast and Islands coded both types of resources for quality using a standard rubric, identifying a total of 19 exemplar online resources: 13 exemplar instructional resources and 6 exemplar resources that support teachers' understandings of the CCSSM.

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Why This Study?

Mathematics educators around the country are gearing up to teach the Common Core State Standards for Mathematics (CCSSM), which are the product of the first systematic movement in the United States to incorporate rigorous mathematics content standards of high-performing countries. Adopted by 43 states (Carmichael, Martino, Porter-Magee, & Wilson, 2010; Kober & Rentner, 2011), the CCSSM places a heavy emphasis on conceptual understanding, coherence among topics, abstract reasoning, and problem solving. This emphasis represents a major shift in content and pedagogy from existing state standards, which tend to focus primarily on the mastery of discrete skills and procedures (Kober & Rentner, 2012). The CCSSM include the Standards for Mathematical Content, outlining what students should understand and be able to do (e.g., number and operations in base 10, measurement, data), and the Standards for Mathematical Practice, which are the capacities that students need to develop (e.g., making sense of problems and persevering in solving them, constructing viable arguments). The Standards for Mathematical Practice cut across all grade levels and intersect with the Standards for Mathematical Content. Although the CCSSM provides opportunities for improved mathematical learning, potential challenges and barriers remain to implementing the complex set of instructional activities associated with this ambitious initiative, such as access to revised curricular materials and fundamental changes to instruction that apply a balanced approach to the content and practice standards (Kober & Rentner, 2011).

Challenges Facing Rural Educators

Implementing the CCSSM as intended will be challenging for mathematics educators in all types of districts and schools (Kober & Rentner, 2011, 2012) but especially so for educators in rural schools. Recent survey data indicate that educators in small, rural schools often feel isolated and overburdened when asked to make substantial improvements in their mathematics and science teaching and often desire additional instructional resources and supports (Babione, 2010; Howley, Wood, & Hough, 2011). Studies on the needs and challenges facing educators in implementing the CCSSM were limited and reported general findings such as those reviewed above. No studies were found that looked specifically at the needs and challenges facing *rural* educators. Members of the Northeast Rural Districts Research Alliance (NRDRA), who are committed to examining structures to support effectiveness for rural educators in the region, identified this topic as a needed area of research and provided the impetus for this study. Specifically, NRDRA expressed interest in learning about the most pressing needs related to CCSSM implementation in rural schools; what states and districts are doing to prepare for and address challenges associated with the CCSSM in rural schools and districts; what types of curricular and professional development opportunities are available and being developed; and how online technology, in particular, can be used to expand access to these resources to rural educators.

Research Design

In response to these discussions with NRDRA, REL Northeast & Islands researchers conducted a systematic review of the available online CCSSM resources aligned to the areas of greatest need. The following research questions guided the study:

- Which online resources meet the identified needs of NRDRA educators?
- What is the quality of these resources for supporting the implementation of the CCSSM?

The systematic review of resources focused on the two highest priority areas identified by NRDRA educators: (1) online instructional resources and (2) online resources to support teachers' understanding of the CCSSM, including resources that could be used specifically for professional development.

The research team used a systematic approach to identify potential online resources in these two priority areas. The approach was also informed from a common theme in the rural education literature that time is especially limited for rural educators in small schools, many of whom teach multiple grades and subjects. Thus, only websites with an explicit, coherent, and easily navigable CCSSM organizational structure were included in the review; less coherent and difficult-to-navigate programs were excluded. For example, websites were determined to be easily navigable if they included CCSSM content as "buttons" on the homepage; provided access to CCSSM resources in no more than two mouse clicks; and contained bullets, diagrams and other types of formatting to make the information easier to follow than straight text. Given resource constraints that are common to rural educators, the search for online materials was also restricted to open-source materials. (See Box 1 for a brief description of the data and methods and Appendix A for more detail on the methods.)

Box 1. Data and Methods

The review process included searching for resources on the major search engines (e.g., Google, Bing, Yahoo) with CCSSM filters and keywords, searching on CCSSM meta-sites (e.g., CCSSMath.org), and searching the state education websites of all 46 states and territories that had adopted the CCSSM at the time of the search. To be reviewed for quality, each resource had to meet three criteria. The resource had to have (1) an easily navigable CCSSM organizational structure, (2) explicit references to the CCSSM content and/or practice standards, and (3) explicit links to one or more of the content standards in grades 3–8. The initial search produced 184 online instructional resources that were screened according to these three criteria, of which 59 met all three criteria and were reviewed for quality with the EQuIP rubric. The search also yielded 206 resources to support teachers' understanding of the CCSSM, of which 48 met all three criteria and were reviewed for quality with the EQuIP rubric. Two mathematics content experts (from a team of three) rated all 59 instructional resources and all 48 resources to support teachers' understanding of the CCSSM. Only instructional resources that reached the *Exemplar* or *Exemplar If Improved* levels according to the EQuIP are included in this report. For the resources to support teachers' understanding of the CCSSM, only two of the four EQuIP dimensions were applicable. Only resources that met most or all of the criteria within one or both of the relevant dimensions were rated *Exemplar* by the research team and included in this report.

Note: See Appendix A for more detailed discussion of methods.

Once the two types of resources were identified, mathematics content experts on the research team analyzed each type of resource systematically. For the instructional resources, the team used an established rubric that is tailored specifically to these types of CCSSM resources: the Educators Evaluating the Quality of Instructional Products (EQuIP) rubric (see Appendix B). Because this rubric does not align fully with resources that focus more on promoting teachers' understanding of the CCSSM—for example, resources that could be used for professional development—the team drew from relevant aspects of the EQuIP and established criteria applicable to these types of resources (see Appendix A, Analysis of Resources for Understanding the CCSSM).

The EQuIP rubric was developed by Achieve (www.achieve.org) in collaboration with education leaders from three REL Northeast & Islands member states (Massachusetts, New York, and Rhode Island) and is organized by four main dimensions: (1) alignment to the depth of the CCSSM, (2) key shifts in the CCSM, (3) instructional supports, and (4) assessment (see Table 1; see Appendix B for the rubric). Alignment and depth refer to the extent to which the resource captures the full depth of the content and/or practice standards on which the resource is focused. Key shifts refer to the changes in focus, coherence, and rigor (balance of application, conceptual understanding, and procedural fluency) that distinguish the CCSSM from typical state standards. Instructional supports refer to the extent to which the resource provides clear guidance to support different levels of student learning. Assessment refers to ongoing opportunities within the resource to measure whether students are mastering the content and skills.

Table 1. Dimensions of the EQuIP Quality Rubric

Alignment to the Depth of the CCSSM	Lesson/unit aligned in depth to grade-level CCSSM mathematics standards; practice standards identified in grade-appropriate way and connected to content; content represents a balance of mathematical concepts and procedures.
Key Shifts in the CCSSM	Focus, coherence, and rigor of the lesson/unit consistent with CCSSM. Focus targets major work within each grade; coherence develops new concepts based on previous understandings; rigor balances application, conceptual understanding, and procedural fluency.
Instructional Supports	Lesson/unit responsive to varied student learning needs, including clear guidance, precise and accurate mathematical language and representations, opportunities for productive struggle, and guidance for scaffolding and differentiation.
Assessment	Lesson/unit assesses whether students are mastering standards-based content and skills.

Source: EQuIP Rubric for Lessons & Units: Mathematics: http://www.achieve.org/files/EQuIPmathrubric-06-17-13.pdf

The rubric contains rating scales for each of the four dimensions and an overall scale. Each dimension is rated on a scale from 0 to 3, with a score of 3 meaning that the resource met most or all of the criteria in the dimension and a score of 0 meaning that the resource met none of the criteria (see Appendix B for the complete rubric and scoring process). The overall rating is based on the sum of scores across the four dimensions, with 12 being the maximum overall score.[1] Resources with overall scores of 11 or 12 are classified as *Exemplar*, and resources with scores of 8 to 10 are classified as *Exemplar If Improved*. This scoring system applies directly to

[1] A score of 3 in each of the four dimensions would yield an overall rating of 12 (score of 3 x 4 dimensions).
[2] Under the modified EQuIP rating scheme for this type of resource, no *Exemplar If Improved* rating was applied.

instructional resources because all four dimensions were used. Other resources that were reviewed but did not reach the *Exemplar* or *Exemplar If Improved* levels are included in Appendix A.

Resources that support teachers' understanding of the CCSSM fell into three categories: (1) those that focused on the content standards, (2) those that focused on the practice standards, and (3) those that focused on instructional shifts associated with the CCSSM. Resources focused on the content standards were scored on coverage of standards across grade levels and content domains, connections made across grade levels, use of videos to illustrate the standards, and connections to practice standards. Resources focused on practice standards were scored on coverage of standards across grade levels, use of videos to illustrate standards in practice, and connections to content standards. Resources focused on instructional shifts were scored on coverage across grade levels, use of videos to illustrate/explain shifts, connections to content standards, and connections to practice standards. Resources were classified as *Exemplar* if they received a score of 2 or 3 for each dimension of the EQuIP rubric that was relevant to the resource.[2]

Findings

The findings from the review of online resources are presented in these two sections: Online Instructional Supports and Online Resources for Understanding the CCSSM. Within the first section, programs that received *Exemplar* or *Exemplar If Improved* ratings on the EQuIP rubric are summarized and presented alphabetically. Within the second section, programs that received an *Exemplar* rating according to the research team's criteria are summarized and presented alphabetically. The summaries of both types of resources refer to specific CCSSM content domains and CCSSM practice standards, which are presented in Table 2 for reference.

Table 2. CCSSM Content Domains and CCSSM Practice Standards

CCSSM Content Domains	CCSSM Practice Standards
Operations and Algebraic Thinking (OA)	1. Make sense of problems and persevere in solving them
Number and Operations in Base 10 (NBT)	2. Reason abstractly and quantitatively
Number and Operations-Fractions (NF)	3. Construct viable arguments and critique the reasoning of others
Measurement and Data (MD)	4. Model with mathematics
Geometry (G)	5. Use appropriate tools strategically
Ratio and Proportional Relationships (RP)	6. Attend to precision
Number System (NS)	7. Look for and make use of structure
Expressions and Equations (EE)	8. Look for and express regularity in repeated reasoning
Statistics and Probability (SP)	

Source: http://www.corestandards.org/Math

[2] Under the modified EQuIP rating scheme for this type of resource, no *Exemplar If Improved* rating was applied.

Online Instructional Resources

Two online resources for instructional support received an *Exemplar* rating, combined with 11 receiving an *Exemplar If Improved* rating, for a total of 13 recommended resources. These resources are summarized in Appendix A, Table A1 and in narrative descriptions. Each description includes the name of the resource or program; a link to the website; an indication of whether a login is required (all programs included are open source); a brief description of what the resource is and how it is organized; and a table indicating the grade level(s), CCSSM content domains, and CCSSM practice standards addressed by the instructional resource (see Table 2).

Table 3. Summary of Instructional Support Resources

Resource	Contents	Grade or School Level
Exemplar		
Engage New York	Units, lesson, tasks, assessments	PK–HS
Illustrative Mathematics	Lessons, tasks	K–HS
Exemplar if Improved		
Dan Meyer's 3-Act Lessons	Lessons	3–HS
Emergent Math	Lessons, tasks	4–HS
Inside Mathematics	Lessons, tasks	K–HS
Khan Academy	Lessons, exercises	K–HS
Learn NC	Lessons	K–HS
LearnZillion	Lessons, assessments	K–HS
Mathematics Assessment Project	Lessons, tasks, assessments	6–HS
Mathematics Common Core Toolkit	Frameworks, assessments	K–HS
National Science Digital Library	Lessons	K–HS
Ohio Resource Center	Lessons, curriculum resources	K–HS
Southeast Comprehensive Center	Lesson videos	K–HS

Note: Some resources identify specific grades at the high school level, while others do not.

Source: REL Northeast & Islands research team analysis of online resources

Exemplars

1. **Engage New York** (www.engageny.org/mathematics | open/no login). The site contains CCSSM curriculum overview maps for grades PK–5, 6–8, and 9–12 and complete curriculum modules for grades PK–12. The modules are comprehensive and include lesson plans, tasks, formative and summative assessments, and student work samples. At least one module is fully developed in each of grades 3–8, but not all modules are developed for all grades. Resources are explicitly linked to CCSSM content domains in grades 3–8 and Standards for Mathematical Practice. The site is well organized and easy to navigate.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
x	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

2. **Illustrative Mathematics** (http://www.illustrativemathematics.org | open/no login). This still-expanding site provides illustrative tasks and lessons that are reviewed by mathematics educators prior to posting. As noted on the site, Illustrative Mathematics "provides guidance to states, assessment consortia, testing companies, and curriculum developers by illustrating the range and types of mathematical work that students experience in a faithful implementation of the Common Core State Standards." The resources are linked directly to each Common Core content standard and are all readily available as PDFs. In addition, the reviewer ratings for each resource are provided on the site.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Exemplars If Improved

3. **Dan Meyer's Three-Act Math Tasks** (http://tinyurl.com/kzgawgs | open/no login). This site is a spreadsheet with links to approximately 70 lessons that are each linked to one or more grade 3 through high school Common Core math standards and one or more Standards for Mathematical Practice. Nearly all the lessons, launched with a video or graphical hook that invites students into the relevant mathematics, balance procedure and conceptual understanding as students work in teams and individually to resolve the mathematical problem posed in the launch (e.g., How long will it take to fill the tank? How many pennies will you need to fill the circle? Will the basketball go through the hoop?).

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
				x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
				x	x	x	x	x	x	x	x	x	x				

4. **Emergent Math** (http://emergentmath.com/my-problem-based-curriculum-maps | open/no login). This site contains problem-based curriculum maps that align Web-based problems and lessons to each of the grades 4–8 and high school Common Core State Standards. Rather than have users search a range of resources for what is linked to a standard, this curriculum map links specific, carefully selected resources from such sites as NCTM Illuminations, MARS, Illustrative Math, and Dan Meyer to specific standards arranged by curriculum units, making it very easy to navigate.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
					x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
				x	x	x	x	x	x	x	x	x	x				

5. **Inside Mathematics** (http://insidemathematics.org | open/no login). This site features videos of innovative teaching methods and insights into student learning, linked directly to the Common Core Practice Standards and a set of tasks that support these teaching methods. Particularly useful are the videos of public lessons, number talks, and problems of the month that link the standards, high-quality tasks, and instructional practices.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

6. **Khan Academy** (https://www.khanacademy.org | open/login). This site contains thousands of practice problems that are primarily skills practice and hundreds of videos that address the Common Core standards and can be used by students and teachers in school or for homework. There is limited evidence of the Practice Standards on the site, and the video lessons are not directly aligned to the Common Core standards.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x								

7. **LearnNC** (http://www.learnnc.org/lp/editions/ccss2010-mathematics | open/no login). This site provides a broad range of aligned resources for each grade level K–8 and for

each high school domain. The aligned resources are comprehensive lesson plans that are either locally developed or drawn from available Web resources. Each set of resources is linked directly to the specific Common Core content standard.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x								

8. **LearnZillion** (www.learnzillion.com | open/login). The site is an online learning platform that combines video lessons recorded by a selective group of teachers, assessments, and progress reporting. Each lesson—more than 3,000 are currently available—is linked to a specific CCSSM content standard, and multiple lessons can be assembled as playlists within a CCSSM content domain. Practice problems and quizzes can be assigned to individual students, and the program generates feedback for teachers on student performance. Resources are explicitly linked to CCSSM content domains for each grade level K–8 and for each high school domain. The site is well organized and easy to navigate.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x								

9. **Mathematics Assessment Project** (http://map.mathshell.org/materials/background.php | open/login). This site contains mathematics lessons (grade 6 through high school) and a large collection of high-quality "novice, apprentice, and expert" tasks (elementary, middle, and high school) that are all aligned to the appropriate Common Core content and practice standard(s). The lessons contain detailed lesson plans and lesson resources, and each task includes PDFs of the task, the rubric, and scored and unscored samples of student work.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
							x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	X	x	x	x	x	x	x	x	x

10. **Mathematics Common Core Toolkit** (http://www.ccsstoolbox.org/ | open/no login). This site, from the Dana Center at the University of Texas, contains key visualizations or animations for grades 6–12, K–12 grade- and course-level curriculum frameworks for implementing the Common Core, and a set of Partnership for Assessment of Readiness for College and Careers (PARCC) prototype tasks for grades 3–11.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

11. **National Science Digital Library** (http://nsdl.org/search/standards/D10003FB | open/no login). This site provides a library of more than 4,000 resources—primarily lessons and lesson plans—aligned to mathematical topics but not specifically to the Common Core content or practice standards. The value of this site is its breadth, providing a wide range of resources that support mathematics instruction.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x								

12. **Ohio Resources Center** (http://ohiorc.org/standards/commoncore/mathematics | open/no login). This site provides a broad range of instructional resources for each grade level K–8 and for each high school domain. The aligned resources are primarily comprehensive lesson plans that are drawn from available Web resources. In addition, the resources include assessments and curriculum resources. Each set of resources is linked directly to the specific Common Core content standard domains.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x								

13. **Southeast Comprehensive Center** (http://secc.sedl.org/common_core_videos/index.php | open/no login). This site contains a set of videos directly linked to the Common Core content standards. Each

video focuses on one or more specific standards and usually includes examples and/or illustrations geared to enhancing understanding. The intent of each content-focused video is to clarify the meaning of the individual standard rather than to be a guide on how to teach each standard, although the examples can be adapted for instructional use.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Practice Standards							
OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
x	x	x	x	x	x	x	x	x	x								

Online Resources for Understanding the CCSSM

Four types of online sources provided information about the CCSSM content standards, one provided information about practice standards, and one focused on expected changes to instruction to address the content standards. The sites are summarized in Appendix A,Table A2 and in narrative descriptions. Each description includes the name of the resource or program; a link to the website; an indication of whether a login is required (all programs included are open source); a brief description of what the resource is and how it is organized; and a table indicating the grade level(s), CCSSM content domains or CCSSM practice standards addressed by the instructional resource (see Table 2), whether the user can view a video, and whether connections are made between and among different types of standards.

Table 4. Summary of Resources for Understanding the CCSSM

Resource	Contents	Grade or School Level
Clark County School District — Blast	Content Standards	K–HS
North Caroline State University — TurnOnCCMath.net	Content Standards	K–8
Southeast Comprehensive Center	Content Standards	K–HS
The University of Arizona; Institutes for Mathematics and Education; Progressions Documents	Content Standards	K–HS
Inside Mathematics	Practice Standards	K–HS
Achieve the Core	Instructional Shifts to Address Content Standards	K–HS

Source: Research team analysis of online resources

Exemplars: Content Standards

1. **Clark County School District – Blast** (http://commoncore.ccsd.net | open/no login). This site contains videos that explore many of the CCSSM content standards. Each video begins with a discussion of how the given standard connects to other content standards in the CCSSM. Then, each video provides an explanation of the mathematics found in the standard as well as what students are expected to know and be able to do with respect to that standard. Throughout the video, connections are made between and among content standards from other grade levels as well as some of the practice standards. Each video uses a variety of representations to explain the mathematics, provides example problems to illustrate the mathematics, and includes a discussion of students' mathematical

development with respect to the standard. Links to short video discussions of the practice standards are provided.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Connections Across Grade Levels	Videos	Connection to Practice Standards
OA	NBT	NF	MD	G	RP	NS	EE	F	SP			
	x	x			x	x	x	x	x	x	x	X

2. **North Carolina State University TurnOnCCMath.net** (http://turnonccmath.net/index.php | open/no login). This site provides a visual representation of the connections between and among CCSSM content standards for grades K–8. The user can choose whether the representation should illustrate the relationship between the content standards by (a) grade level or (b) content domain. After the user has chosen a representation, the user can then click on a standard to learn more about the standard and its relationship to other standards, including the progression that students follow from grade to grade.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x				

Content Domain(s)										Connections Across Grade Levels	Videos	Connection to Practice Standards
OA	NBT	NF	MD	G	RP	NS	EE	F	SP			
x	x	x	x	x	x	x	x	x	x	x		

3. **Southeast Comprehensive Center** (http://secc.sedl.org/common_core_videos/index.php | open/no login). This site contains video explanations of many of the CCSSM content standards. Although each video provides information about the mathematics associated with each standard and uses a variety of representations to do so, the videos neither describe connections across grade levels nor outline potential connections to the practice standards.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Connections Across Grade Levels	Videos	Connection to Practice Standards
OA	NBT	NF	MD	G	RP	NS	EE	F	SP			
x	x	x	x	x	x	x	x	x	x		x	

4. **The University of Arizona; Institutes for Mathematics and Education; Progressions Documents** (http://www.illustrativemathematics.org and

http://ime.math.arizona.edu/progressions | open/no login). This site features a set of progressions documents that outline the connections between standards across grade levels. Each document focuses on a mathematical content domain (geometry, number and operations in base 10, statistics and probability, etc.) and describes "key connections among standards, points out cognitive difficulties and pedagogical solutions, and gives more detail on particular knotty areas of mathematics" within that content domain. Because they outline mathematical connections between grade levels, the documents provide some insight into the development of students' mathematical thinking over time. Although these documents focus on the CCSSM content standards, connections are made to some of the mathematics practices, where appropriate.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Content Domain(s)										Connections Across Grade Levels	Videos	Connection to Practice Standards
OA	NBT	NF	MD	G	RP	NS	EE	F	SP			
x	x	x	x	x	x	x	x	x	x	x		x

Exemplars: Practice Standards

5. **Inside Mathematics** (http://insidemathematics.org/index.php/common-core-standards | open/no login). The strength of this site is its focus on the practice standards. Links for each practice standard are connected to a description of the mathematical practices, what one should look for in classrooms where teachers are developing that practice within students, and a collection of video clips of classrooms that illustrate students' development of the practice. Within the collection, the user will find video clips that represent a range of grade levels and a variety of mathematical topics. Each video clip is accompanied by an explanation of how that clip illustrates the featured mathematical practice.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Practice Standards								Videos to Illustrate Practice	Connection to Content Standards
1	2	3	4	5	6	7	8		
x	x	x	x	x	x	x	x	x	

Exemplars: Changes to Expect in Instruction with the CCSSM

6. **Achieve the Core** (http://tinyurl.com/mynpm5a | open/login). This site contains professional development modules that provide information about the instructional changes teachers should expect as they implement the CCSSM content standards. Each module contains a full set of professional development materials, including a facilitator's

guide, associated PowerPoint presentations, and activities in which to engage the teachers.

Grade Level(s)													
PK	K	1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x	x	x	x	x	x	x	x	x

Videos to Describe Changes to Expect in Instruction	Connection to Content Standards	Connection to Practice Standards
x	x	x

Possible Applications

Educators may choose to implement these CCSSM resources in different ways, depending on their needs and objectives. For example, certain instructional resources highlighted in this report could be used to present information directly to the whole class, provide individual students with extra support or practice, or help a teacher or group of teachers plan a lesson or an instructional unit.

This report concludes with two examples of how these resources might be used—one for elementary educators and one for middle school educators. These examples are meant to be illustrative rather than exhaustive; how the resources are ultimately used depends on the specific needs of the users.

Elementary School Application

Consider a third-grade teacher who is trying to teach her students how to solve problems using multiplication and involving arithmetic patterns (CCSSM 3.OA.9). The teacher has limited resources to support this standard, but she has Internet access and an LCD projector. She wants to present the content in an interesting way, but the textbook provides little opportunity for engagement. She thinks that a video might be engaging and selects one of Dan Meyer's Three-Act Math Tasks (http://mrmeyer.com/threeacts/buckythebadger/) to teach this standard instead. She immediately sees the potential of this video-supported lesson to generate interest as students estimate their solutions in act one. The students enjoy watching the video from a real college football game. In act two, the teacher and students determine what information they need to solve the problem, which provides opportunities for students to practice constructing viable arguments and critiquing each other's reasoning (MP.3). Students watch the video (rather than consulting the back of the book) to determine the answer in act three, leading to the sequel where students are asked to extend what they are learning to other situations and even make algebraic generalizations.

Middle School Application

Consider a middle school mathematics department wrestling with the grade 6 Ratios and Proportional Relationships standards (SSSM 6.RP). Meeting as a professional learning community, the teachers decide to first read and discuss the three 6.RP standards themselves. For deeper insight into the meaning of these standards, the teachers turn to the CCSSM progressions documents (http://ime.math.arizona.edu/progressions) and download the 6-7 progression document to strengthen their understanding of the mathematics of these

standards and how the grade 6 standards grow into the grade 7 standards. Armed with this knowledge and now interested in seeing exactly what a set of lessons that focus on these standards might look like, the teachers then turn to LearnZillion. (www.learnzillion.com) and collaboratively review the lessons and the coach's commentary that are linked to 6.RP. Next, the teachers design lessons based on what they have learned and seen on these sites, try the lessons out, and regroup to debrief on what worked and what needs to be adjusted.

References

Babione, C. (2010). Rural and small community educator responses to state academic standards. *Rural Educator, 31*(3), 7–15.

Carmichael, S. B., Martino, G., Porter-Magee, K., & Wilson, W. S. (2010). *The state of the state standards—and the Common Core in 2010*. Washington, DC: Thomas B. Fordham Institute. Retrieved from http://www.edexcellencemedia.net/publications/2010/201007_state_education_standards_common_standards/SOSSandCC2010_FullReportFINAL.pdf

Common Core State Standards Initiative in Mathematics (CCSSM). (2012). *Publisher's criteria for the Common Core State Standards in Mathematics, Grades K–8.* Retrieved from http://www.corestandards.org/resources

Howley, A., Wood, L., & Hough, B. (2011). Rural elementary school teachers' technology integration. *Journal of Research in Rural Education, 26*(9). Retrieved from http://jrre.psu.edu/articles/26-9.pdf

Kober, N., & Rentner, D. S. (2011). *Common Core State Standards: Progress and challenges in school districts' implementation*. Washington, DC: Center on Education Policy. Retrieved from http://www.cep-dc.org/displayDocument.cfm?DocumentID=374

Kober, N., & Rentner, D. S. (2012). *Year two of implementing the Common Core State Standards: States' progress and challenges*. Washington, DC: Center on Education Policy. Retrieved from http://www.cep-dc.org/displayDocument.cfm?DocumentID=391

Appendix A. Data and Methodology

Explanation of Sampling Choices

The research team's approach to identifying online resource websites followed several criteria and consisted of a multistep search process.

Search Criteria for Instructional Resources

Several criteria restricted the types of resource websites included for review in this study. First, all resource websites had to be fully accessible online. This excluded print-based materials, such as mathematics textbooks that address the CCSSM, even if the print-based materials included supplemental online resources, which was sometimes the case. Second, the resource websites had to be easy to navigate and explicitly reference the CCSSM content standards and/or CCSSM practice standards in at least one of the grades in the grades 3–8 band. The following criteria were used to define a CCSSM website's organization as easily navigable:

- CCSSM content areas and/or grade levels are observable as buttons on the homepage without scrolling or altering webpage formatting.
  OR
- Getting to information on CCSSM takes no more than two correct mouse clicks.
  AND content is organized in a way that is easy to follow without reading more than one sentence (e.g., bulleted text, diagram, large or bold letters).

Search Process for Instructional Resources

Using these criteria, the research team conducted a multistage search process based on three strategic approaches: (1) a collection of searches using filters and online search engines, (2) sites listed in collections on meta-sites, and (3) a state-by-state search of sites. Each is described more fully below.

Online search filters. We first searched for CCSSM instructional resource websites using the Google search engine.

- Google was initially used with the following filters:
  - Linked to the official CCSSM site
    (i.e., "link: http://www.corestandards.org/Math") [produced 1.4 million results]
  - Updated since January 2010 (because standards were not officially adopted by states until summer 2010) [reduced to 630,000 results]
  - Included the keywords *common core* anywhere [reduced to 570 results]
  - Originated in United States [reduced to 536 results]
  - Was of one of the following domain types: .com [229 results], .org [217 results], .net [49 results], .edu [22 results], or .us [23 results]
- Google was then used with relaxed search terms to address concerns that the initial search assumptions were overly restrictive:
  - Included keywords *common core* anywhere [produced 138 million results]
  - Updated since January 2010 [reduced to 114 million results]

- Was of one of the following domain types: .com [76.3 million results], .org [9.61 million results], .net [2.57 million results], .edu [571,000 results], or .us [143,000 results]

Meta-sites. We searched for CCSSM instructional resource websites within each of the following meta-sites:

- SylvanLearning.com -> top 10 math sites [10 websites]
- Commoncoreconversation.com -> "Math resources" [88 websites]
- CCSSMath.org [31 websites]
- Free-test-online.com/ccss/ccss_resources.html [7 websites]
- Topedusites.com -> filter "Math" [31 websites]

State-by-state searches. We searched the state education websites of all 46 states that have adopted the CCSSM, using keywords *common core state standards math*.

Major search engine resample. We were initially uncertain about the actual number of extant CCSSM instructional resource websites. The initial multistage search process produced 54 instructional resource websites that fit the inclusion criteria. In an attempt to validate our search results, we reran searches using Bing and Yahoo! search engines with relaxed search terms (*common core state standards math*). The Bing search produced 8.92 million results, and the Yahoo! search produced 803 results. Of the Bing and Yahoo! results, only five new instructional resource websites were found that fit the inclusion criteria—bringing the total to 59. The remaining results were either not includable or redundant with previously identified websites (approximately 91% redundancy). Based on this resampling of major search engine results, we believe that this study's search process has identified over 90 percent of extant instructional resource websites that fit our inclusion criteria.

The process above produced 184 instructional resource websites and 125 that warranted review. These resources were then reviewed in light of the previously mentioned criteria. This process is described more fully below:

- For those that fit, we noted "included" and coded their features.
  - Features were credited if they fit our criteria for ease of navigability, similar to the definition described in the first part of this document.
  - Features were not credited if they were links to other sites; in these cases, the site of the original feature was credited and noted in the brief description.
  - For sites that required payment or login, the website was coded for those features that could be observed without paying or creating a log-in account.
  - If the decision for including a site could not be known unless payment or a login was performed, the site was noted as "excluded."
- For those mathematics-related sites that did not fit, we noted "excluded" and why they were excluded.
  - Additionally, some results did not warrant review and were excluded if those results were unrelated to our search and appeared to be mistaken search results; for example, CCSS sites with only reading standards were excluded and never listed (these unrelated results would not have been counted toward the 125 websites that warranted review and account for discrepancies between the large

numbers of raw search results and the final number of 184 reviewable instructional resource websites).
    - Finally, those listed sites that were marked as "excluded" were double-coded to ensure that they should not have been included. Disagreements during this process were noted as "undecided."

Among the 184 potential instructional resource websites, 125 were excluded because they failed to meet the criteria previously described. The remaining 59 websites were analyzed for quality using the EQuIP rubric. Among these 59 websites, 13 received overall ratings of *Exemplar* or *Exemplar If Improved*.

Search Criteria for Resources for Understanding the CCSSM

We used the following criteria to search for resources for understanding the CCSSM:

- Had an easily navigable CCSSM organization:
    - The CCSSM content areas and/or grade levels are observable as "buttons" on the homepage without scrolling or altering webpage formatting
      OR
    - Getting to information on CCSSM takes no more than two correct mouse clicks AND content is organized in a way that is easy to follow without reading more than one sentence (e.g., uses bulleted text, diagram, large or bold letters)
    - AND contained at least one online professional development (PD) resource of some kind:
        - Professional development: "the time and money diverted to increasing the knowledge and skills of teachers and school leaders" (http://www.achieve.org/files/Action_Educator_Training.pdf, p. 3)
        - Examples of professional development resources and keywords that were considered:
            - *Professional development, online training, instructional improvement, continuing education, workshop, support, learning, coaching, teacher development, educator development, instructor development, webinar*
- Unlike the search criteria for instructional resources, sites did not necessarily need to contain instructional resources in order to be included as professional development resources.

We excluded resources for the following reasons:

- Only offered sample problems for students
- Focused on the websites Teaching Channel & YouTube, which were excluded per project lead's instruction
- Did not reference the CCSSM
- Contained professional development resources only for physical locations (e.g., a Web-based advertisement for a workshop in Tennessee)

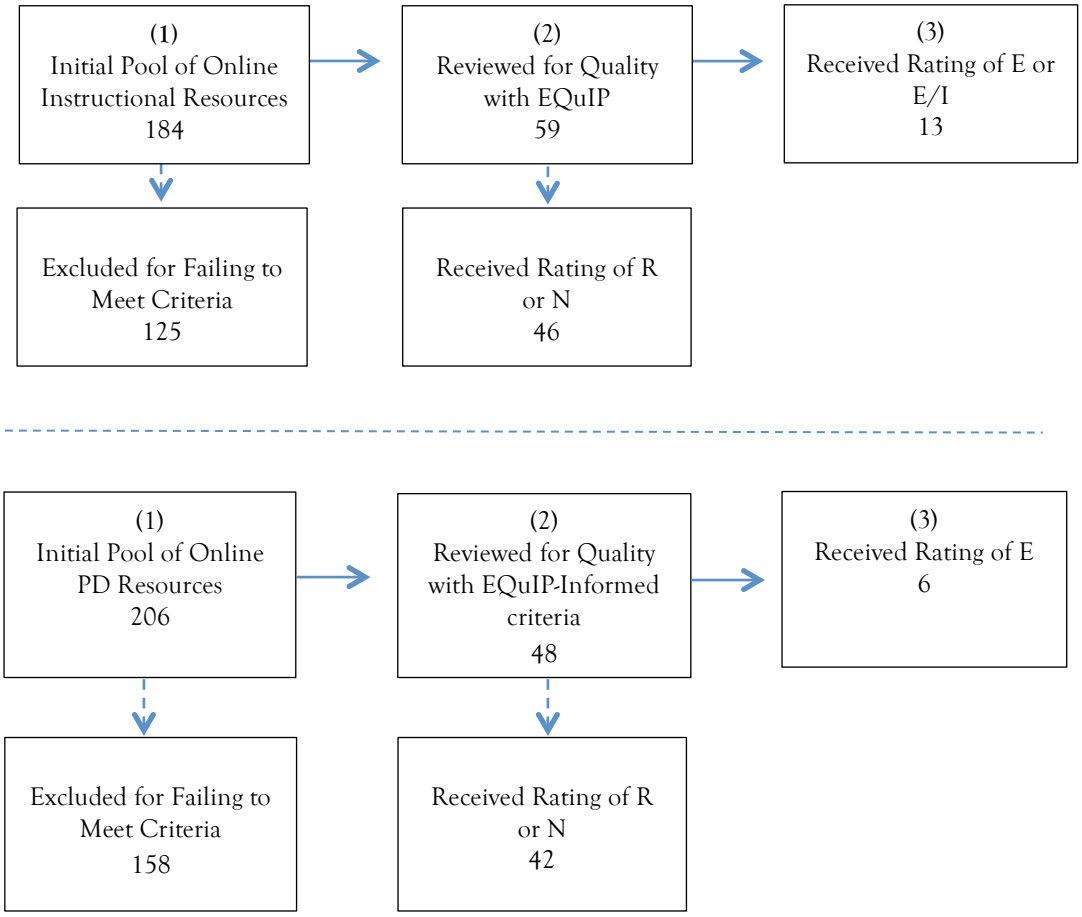
Search Process for Resources for Understanding the CCSSM

This search contained three parts: (1) review of the included and excluded instructional resource websites, (2) searches on Google and Yahoo!, and (3) searches on meta-sites:

- Review of the included and excluded websites:
    - The full list of included and excluded instructional resource websites in this document were reviewed for professional development resources (see search criteria listed above for detailed search logic) [184 websites]
- Searches on Google and Yahoo!:
    - Google
        - Searched for any of the following keywords: *common core state standards* and *CCSSM*, and at least one of the following keywords: *professional development* [1.94 million results], o*nline training* [57,300 results], i*nstructional improvement* [22,300 results], *continuing education* [220,000 results], *workshop* [3.91 million results], *support* [25.3 million results], *learning* [16.5 million results], *coaching* [1.18 million results], t*eacher development* [43,800 results], *educator development* [5,040 results], *instructor development* [5,050 results], *webinar* [234,000 results]
    - Yahoo!
        - Searched for the terms *CCSSM* and *professional development* [686 results]
    - Searches from meta-sites
        - Kentucky Department of Education [18 websites]
        - Amazon.com Kindle search for *CCSSM* [16 online books]

This process produced 206 potential resources to support teachers' understanding of the CCSSM and 48 that warranted review. Among the 206 potential resources,158 were excluded because they failed to meet the search criteria. The remaining 48 websites were analyzed with the EQuIP rubric, with six websites receiving overall ratings of *Exemplar* (see Figure A1).

Figure A1. Online Search and Review Process for Instructional Resources and Resources for Understanding the CCSSM



Note: The ratings are Exemplar (E), Exemplar If Improved (E/I), Revision Needed (R);, and Not Ready to Review (N).

Source: REL Northeast & Islands study records

Table A1. Summary of Exemplar and Exemplar If Improved Instructional Support Resources

Resource	Contents	Grade or School Level[1]	Content Domain(s)[2]										Practice Standards[3]							
Exemplar			OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
Engage New York	Units, lesson, tasks, assessments	PK–HS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Illustrative Mathematics	Lessons, Tasks	K–HS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Exemplar if Improved			OA	NBT	NF	MD	G	RP	NS	EE	F	SP	1	2	3	4	5	6	7	8
Dan Meyer's 3-Act Lessons	Lessons	3–HS					x	x	x	x	x	x	x	x	x	x				
Emergent Math	Lessons, tasks	4–HS					x	x	x	x	x	x	x	x	x	x				
Inside Mathematics	Lessons, tasks	K–HS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Khan Academy	Lessons, exercises	K–HS	x	x	x	x	x	x	x	x	x	x								
Learn NC	Lessons	K–HS	x	x	x	x	x	x	x	x	x	x								
LearnZillion	Lessons, assessments	K–HS	x	x	x	x	x	x	x	x	x	x								
Mathematics Assessment Project	Lessons, tasks, assessments	6–HS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mathematics Common Core Toolkit	Frameworks, assessments	K–HS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
National Science Digital Library	Lessons	K–HS	x	x	x	x	x	x	x	x	x	x								
Ohio Resource Center	Lessons, curriculum resources	K–HS	x	x	x	x	x	x	x	x	x	x								
Southeast Comprehensive Center	Lesson videos	K–HS	x	x	x	x	x	x	x	x	x	x								

1. Some resources specify specific grades at the high school level, while others do not.
2. The CCSSM content standards are Operations and Algebraic Thinking (OA); Number and Operations in Base 10 (NBT); Number and Operations-Fractions (NF); Measurement and Data (MD); Geometry (G); Ratio and Proportional Relationships (RP); Number System (NS); Expressions and Equations (EE); Functions (F); and Statistics and Probability (SP).
3. The CCSSM practice standards are (1) Make sense of problems and persevere in solving them; (2) Reason abstractly and quantitatively; (3) Construct viable arguments and critique the reasoning of others; (4) Model with mathematics; (5) Use appropriate tools strategically; (6) Attend to precision; (7) Look for and make use of structure; and (8) Look for and express regularity in repeated reasoning. Abbreviations are used in the *Exemplar/Exemplar If Improved* profile tables.

Source: Research team analysis of online resources

Table A2. Summary of Exemplar Resources for Understanding the CCSSM

Resource	Contents	Grade or School Levels	Connections Across Grade Levels	Videos	Videos to Illustrate Practice	Videos to Describe Changes to Expect in Instruction	Connection to Practice Standards	Connection to Content Standards
Clark County School District — Blast	Content Standards	K–HS	x	x			x	
North Caroline State University — TurnOnCCMath.net	Content Standards	K–8	x					
Southeast Comprehensive Center	Content Standards	K–HS		x				
The University of Arizona; Institutes for Mathematics and Education; Progressions Documents	Content Standards	K–HS	x				x	
Inside Mathematics	Practice Standards	K–HS			x			
Achieve the Core	Instructional Shifts to Address Content Standards	K–HS				x	x	x

Source: Research team analysis of online resources

Analyses of Materials

EQuIP Rubric

Mathematics context experts on the REL Northeast & Islands research team used the EQuIP (Educators Evaluating the Quality of Instructional Products) rubric to analyze the quality of the instructional resources that met the review criteria. (See Appendix B for the complete rubric and scoring guide.) The rubric is a product of the American Diploma Project (ADP) at Achieve, with input from educators in Massachusetts, Rhode Island, and New York. The EQuIP initiative has the following objectives:

- Increase the supply of high-quality lessons and units aligned to the CCSS that are available to elementary, middle, and high school teachers as soon as possible
- Build the capacity of educators to evaluate and improve the quality of instructional materials for use in their classrooms and schools (see About EQuIP, www.achieve.org/files/AboutEQuIP)

EQuIP is organized by four main dimensions: (1) alignment and depth of the CCSSM, (2) key shifts in the CCSM, (3) instructional supports, and (4) assessment. *Alignment to the depth* refer to the extent to which the resource captures the full depth of the content and/or practice standards on which the resource is focused. *Key shifts* refer to the changes in focus, coherence, and rigor (balance of application, conceptual understanding, and procedural fluency) that distinguish the CCSSM from typical state standards. *Instructional supports* refer to the extent to which the resource provides clear guidance to support different levels of student learning. *Assessment* refers to ongoing opportunities within the resource to measure whether students are mastering the content and skills.

The EQuIP rubric includes rating scales for the four dimensions as well as an overall rating. Each dimension is rated on a scale from 0 to 3, according to following criteria:

- 3: Resource met most or all of the criteria in the dimension.
- 2: Resource met many of the criteria in the dimension.
- 1: Resource met some of the criteria in the dimension.
- 0: Resource did not meet the criteria in the dimension.

The overall rating is the sum of the scores across the four dimensions. To be reviewed, a resource must meet many or most/all of the first dimension (alignment and depth) criteria. The minimum score is 0 and the maximum score is 12 (e.g., a score of 12 would mean the resource received a rating of 3 on each of the four dimensions). The overall ratings include four categories, which are described below:

- *Exemplar* (E): Aligned and meets most to all of the needs in dimensions 2, 3, and 4 (total 11 or 12)
- *Exemplar If Improved* (E/I): Aligned and needs some improvement in one or more dimensions (total 8 to 10)
- *Revision Needed* (R): Aligned partially and needs significant revision in one or more dimensions (total 3 to 7)
- *Not Ready to Review* (N): Not aligned and does not meet criteria (total 0 to 2)

Because only three of the four EQuIP dimensions were applied to the review of the professional development resources (assessment was excluded), the maximum score for the professional development resources was 9 (i.e., a score of 3 on each of the three dimensions). The adjusted totals and overall ratings for the professional development resources are listed below:

- *Exemplar* (E): Aligned and meets most to all of the needs in dimensions 2 and 3 (total 8 or 9)
- *Exemplar If Improved* (E/I): Aligned and needs some improvement in one or more dimensions (total 5 to 7)
- *Revision Needed* (R): Aligned partially and needs significant revision in one or more dimensions (total 2 to 4)
- *Not Ready to Review* (N): Not aligned and does not meet criteria (total 0 or 1)

Table A3 illustrates how the EQuIP rating process works with a sample online instructional resource that received an *Exemplar If Improved* rating (total 8 to 10).

Table A3. EQuIP Rating Process, *Exemplar If Improved* (Example)

Dimension	Does Not	Meets	Meets	Meets Most or	
Alignment to the Depth of the CCSSM			x		2
Key Shifts in the CCSSM				x	3
Instructional Supports			x		2
Assessment				x	3
Total					**10**

Source: REL Northeast & Islands study records

Analysis of Resources for Understanding the CCSSM

The analysis of each resource to support teachers' understanding of the CCSSM was based on two relevant categories from the EQuIP rubric: alignment to the depth of the CCSSM and key shifts in the CCSSM. Instructional supports and assessment were not applicable dimensions for these types of resources. The analysis focused on the following questions:

- Does the source provide information to help teachers better understand the content standards? If yes, then:
  - Does it cover grades 3–8? Does it cover all standards within those grades?
  - Does it explain procedural as well as conceptual aspects of the standard?
  - Does it make connections to standards from other grades?
  - Does it provide a video where teachers can see the mathematics as someone explains the standard?
- Does the source provide information to help teachers better understand the changes to instruction we can expect with the CCSSM?
- Does the source provide information to help teachers better understand the practice standards? If yes, then:
  - Does it provide videos of students developing those standards in actual classrooms?

- Is the mathematics that is depicted in the video rigorous?

Through this analysis, it became clear that some sites focused on the content standards, others on the practice standards, and still others on the instructional shifts. The sites within those categories that were selected for inclusion in the report are those for which most of the answers to associated questions were yes. That is, sites focused on the content standards included in this report are those for which most of the answers to the questions about the content standards were yes. The same is true of the sites that focus on the practice standards. Only one identified site focused on the changes to expect in instruction.

Since only two of the four EQuIP dimensions were applicable to these resources, the experts adapted the scoring structure that was applied to the instructional resources. Resources that were analyzed according to alignment to the depth of the CCSSM or key shifts in the CCSSM dimension were rated *Exemplar* if they received a score of 3 (Meets Most or All of the Criteria) for the relevant dimension. Resources that were analyzed according to both of these dimensions were rated *Exemplar* if they received a score of 3 for both dimensions. The category *Exemplar If Improved* was not used for two reasons: (1) it was not clear how to distinguish *Exemplar* from *Exemplar If Improved* using a subset of the EQuIP dimensions and (2) it was assumed that the primary audience of the report—rural educators in the Northeast—is mostly concerned about information on quality CCSSM resources, rather than distinctions of quality based on whether part or all of a particular rubric were applied to a particular resource.

Math Content Expert Review

Three mathematics content experts from REL Northeast & Islands reviewed the instructional and professional development resources that met the review criteria previously described and presented in Figure A1 (Box 3 in each diagram in the figure). Before using the EQuIP rubric to analyze the contents of each website, the context experts applied the following rules to ensure that their review of each website was sufficiently comprehensive to make a fair assessment (reviewing every link and resource within each website was beyond the scope of this project):

- Review descriptions of all major components on each website's homepage (e.g., lesson plans, lesson activities, assessment tasks).
- Determine the extent to which each of the CCSSM content and practice standards for grades 3–8 are addressed in the resource.
- For websites that contain multiple lessons, tasks, and/or assessments, randomly select three of each type of resource and apply the EQuIP rubric to the examples. If multiple CCSSM standards and grade levels are available, select sample resources from different standards and grade levels to the greatest extent possible.

Each expert reviewed a subset of the resources that met the review criteria with the EQuIP rubric according to these rules and flagged resources for which they were unsure of the rating (e.g., unclear if a resource met the *Exemplar* or *Exemplar If Improved* criteria). The team then met to discuss and review these resources, using the rating determined by the majority of the three experts.

Appendix B. Educators Evaluating the Quality of Instructional Products (EQuIP) Rubric

Grade: **Mathematics Lesson/Unit Title:** **Overall Rating:**

I. Alignment to the Depth of the CCSS	II. Key Shifts in the CCSS	III. Instructional Supports	IV. Assessment
The lesson/unit aligns with the letter and spirit of the CCSS: ○ Targets a set of grade-level CCSS mathematics standard(s) to the full depth of the standards for teaching and learning. ○ Standards for Mathematical Practice that are central to the lesson are identified, handled in a grade-appropriate way, and well connected to the content being addressed. ○ Presents a balance of mathematical procedures and deeper conceptual understanding inherent in the CCSS.	*The lesson/unit reflects evidence of key shifts that are reflected in the CCSS:* ○ **Focus:** Lessons and units targeting the major work of the grade provide an especially in-depth treatment, with especially high expectations. Lessons and units targeting supporting work of the grade have visible connection to the major work of the grade and are sufficiently brief. Lessons and units do not hold students responsible for material from later grades. ○ **Coherence:** The content develops through reasoning about the new concepts on the basis of previous understandings. Where appropriate, provides opportunities for students to connect **knowledge a**nd skills within or across clusters, domains, and learning progressions. ○ **Rigor:** Requires students to engage with and demonstrate challenging mathematics with appropriate balance among the following: – **Application:** Provides opportunities for students to independently apply mathematical concepts in real-world situations and solve challenging problems with persistence, choosing and applying an appropriate model or strategy to new situations. – **Conceptual Understanding:** Develops students' conceptual understanding through tasks, brief problems, questions, multiple representations and opportunities for students to write and speak about their understanding. – **Procedural Skill and Fluency:** Expects, supports, and provides guidelines for procedural skill and fluency with core calculations and mathematical procedures (when called for in the standards for the grade) to be performed quickly and accurately.	*The lesson/unit is responsive to varied student learning needs:* ○ Includes clear and sufficient guidance to support teaching and learning of the targeted standards, including, when appropriate, the use of technology and media. ○ Uses and encourages precise and accurate mathematics, academic language, terminology and concrete or abstract representations (e.g., pictures, symbols, expressions, equations, graphics, models) in the discipline. ○ Engages students in productive struggle through relevant, thought-provoking questions, problems, and tasks that stimulate interest and elicit mathematical thinking. ○ Addresses instructional expectations and is easy to understand and use. ○ Provides appropriate level and type of scaffolding, differentiation, intervention, and support for a broad range of learners. – Supports diverse cultural and linguistic backgrounds, interests, and styles. – Provides extra supports for students working below grade level. – Provides extensions for students with high interest or working above grade level. *A unit or longer lesson should:* ○ Recommend and facilitate a mix of instructional approaches for a variety of learners such as using multiple representations (e.g., including models, using a range of questions, checking for understanding, flexible grouping, pair-share). ○ Gradually remove supports, requiring students to demonstrate their mathematical understanding independently. ○ Demonstrate an effective sequence and a progression of learning where the concepts or skills advance and deepen over time. ○ Expect, support, and provide guidelines for procedural skill and fluency with core calculations and mathematical procedures (when called for in the standards for the grade) to be performed quickly and accurately.	*The lesson/unit regularly assesses whether students are mastering standards-based content and skills:* ○ Is designed to elicit direct, observable evidence of the degree to which a student can independently demonstrate the targeted CCSS. ○ Assesses student proficiency using methods that are accessible and unbiased, including the use of grade-level language in student prompts. ○ Includes aligned rubrics, answer keys, and scoring guidelines that provide sufficient guidance for interpreting student performance. *A unit or longer lesson should:* ○ Use varied modes of curriculum-embedded assessments that may include pre-, formative, summative, and self-assessment measures.
Rating: 3 2 1 0	**Rating: 3 2 1 0**	**Rating: 3 2 1 0**	**Rating: 3 2 1 0**

Directions: The Quality Review Rubric provides criteria to determine the quality and alignment of lessons and units to the Common Core State Standards (CCSS) in order to: (1) Identify exemplars/models for teachers' use within and across states; (2) provide constructive criteria-based feedback to developers; and (3) review existing instructional materials to determine what revisions are needed.

Step 1 – Review Materials

- Record the grade and title of the lesson/unit on the recording form.
- Scan to see what the lesson/unit contains and how it is organized.
- Read key materials related to instruction, assessment and teacher guidance.
- Study and work the task that serves as the centerpiece for the lesson/unit, analyzing the content and mathematical practices the tasks require.

Step 2 – Apply Criteria in Dimension I: Alignment

- Identify the grade-level CCSS that the lesson/unit targets.
- Closely examine the materials through the "lens" of each criterion.
- Individually check each criterion for which clear and substantial evidence is found.
- Identify and record input on specific improvements that might be made to meet criteria or strengthen alignment.
- Enter your rating 0–3 for Dimension I: Alignment.

Note: Dimension I is non-negotiable. For the review to continue, a rating of 2 or 3 is required. If the review is discontinued, consider general feedback that might be given to developers/teachers regarding next steps.

Step 3 – Apply Criteria in Dimensions II–IV

- Closely examine the lesson/unit through the "lens" of each criterion.
- Record comments on criteria met, improvements needed and then rate 0 – 3.

When working in a group, individuals may choose to compare ratings after each dimension or delay conversation until each person has rated and recorded their input for the remaining Dimensions II–IV.

Step 4 – Apply an Overall Rating and Provide Summary Comments

- Review ratings for Dimensions I–IV adding/clarifying comments as needed.
- Write summary comments for your overall rating on your recording sheet.
- Total dimension ratings and record overall rating E, E/I, R, N—adjust as necessary. If working in a group, individuals should record their overall rating prior to conversation.

Step 5 – Compare Overall Ratings and Determine Next Steps

- Note the evidence cited to arrive at final ratings, summary comments and similarities and differences among raters. Recommend next steps for the lesson/unit and provide recommendations for improvement and/or ratings to developers/teachers.

Additional Guidance on Dimension II: Shifts: When considering *Focus*, it is important that lessons or units targeting additional and supporting clusters are sufficiently brief—this ensures that students will spend the strong majority of the year on major work of the grade. See the *K-8 Publishers Criteria for the Common Core State Standards in Mathematics*, particularly pages 8–9 for further information on the focus criterion with respect to major work of the grade at www.corestandards.org/assets/Math_Publishers_Criteria_K-8_Summer%202012_FINAL.pdf. With respect to *Coherence,* it is important that the learning objectives are linked to CCSS cluster headings (see www.corestandards.org/Math).

Rating Scales

Rating for Dimension I: Alignment is non-negotiable and requires a rating of 2 or 3. If rating is 0 or 1, the review does not continue.

Rating Scale for Dimensions I, II, III, IV:

3: Meets most to all of the criteria in the dimension
2: Meets many of the criteria in the dimension
1: Meets some of the criteria in the dimension
0: Does not meet the criteria in the dimension

Descriptors for Dimensions I, II, III, IV:

3: Exemplifies CCSS Quality – Meets the standard described by criteria in the dimension, as explained in criterion-based observations
2: Approaching CCSS Quality – Meets many criteria but will benefit from revision in others, as suggested in criterion-based observations
1: Developing toward CCSS Quality – Needs significant revision, as suggested in criterion-based observations
0: Not representing CCSS Quality – Does not address the criteria in the dimension

Overall Rating for the Lesson/Unit:

E: Exemplar – Aligned and meets most to all of the criteria in dimensions II, III, IV **(total 11–12)**
E/I: *Exemplar If Improved* – Aligned and needs some improvement in one or more dimensions **(total 8–10)**
R: Revision Needed – Aligned partially and needs significant revision in one or more dimensions **(total 3–7)**
N: Not Ready to Review – Not aligned and does not meet criteria **(total 0–2)**

Descriptor for Overall Ratings:

E: Exemplifies CCSS Quality – Aligned and exemplifies the quality standard and exemplifies most of the criteria across Dimensions II, III, IV of the rubric
E/I: Approaching CCSS Quality – Aligned and exemplifies the quality standard in some dimensions but will benefit from some revision in others
R: Developing toward CCSS Quality – Aligned partially and approaches the quality standard in some dimensions and needs significant revision in others
N: Not representing CCSS Quality – Not aligned and does not address criteria