EQuIP Review Feedback

Lesson/Unit Name: Deepening Understanding of the Order of Operations
Content Area: Mathematics
Grade Level: 6

Overall Rating:

E

Exemplar

Dimension I – Alignment to the Depth of the CCSS

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 series of lessons in this unit have been developed for an adult education program, to accommodate students who have gaps in their understanding of elementary concepts. The lessons are intended to align with College and Career Readiness Standards for Adult Education (CCR), which are a subset of the Common Core State Standards (CCSS) determined to be appropriate for adults. The five grade-level groupings of the CCR Standards for Mathematics are: A (K–1), B (2–3), C (4–5, 6), D (6, 7–8), and E (high school). Even though the series culminates with standards from grade 6, or Grouping C, it also teaches concepts from Groupings A and B. Therefore, the unit would be especially useful for younger students who either require remediation or would benefit from lessons that initially are concrete and progress at a more deliberate rate than usually occurs in many classrooms. Targets a set of grade-level CCSS mathematics standard(s): The lesson is intended to focus on 6.EE.3 (Apply the properties of operations to generate equivalent (e.g., apply the distributive property) and on 6.EE.4 (Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). In order to address 6.EE.2, 6.EE.3 and 6.EE.4, the author has included with variables, thus creating an instructional bridge between arithmetic expressions and algebraic expressions. In Lesson 2 for example, slides 4, 5, and 6 all connect the concept of a unit label to a variable in order to give students the idea that variables having meaning and are not just mysterious, random letters. The Pick a Number activity (slide 10 in Lesson 4) gets at the idea of "a number" being a variable, and students read, write, and evaluate algebraic expressions in this activity. Lesson 6 (see page 3) uses bingo chips to provide hands-on practice with variables. Squared numbers are addressed in Lesson 6 as well, addressing the use of 2 as a whole number exponent. The author applies concrete representation of squared numbers to the bingo chip arrays in Lesson 3 (see lesson write up pages 2 and 3) and includes squares as an extension in the lesson (see page 4). In Lesson 5 (see page 2 and 3), provides examples with exponents in the lesson introduction so that use of them can be encouraged as students work in groups. Such examples strengthen the idea of exponents in numerical expressions from 6.EE.1. This unit clearly moves beyond the Level C expectations for adult learners, as it guides student development of algebraic thinking that is based on and progresses from arithmetical thinking. Standards for Mathematical Practice: The author has listed the SMP(s) relevant to each lesson, but she does not highlight them anywhere in the lessons or demonstrate exactly how they

	are integrated in lesson activities. Teachers who use these lessons need guidance regarding the importance of SMPs in content instruction and of strategies which are useful for developing in their own students the habits of mind that characterize proficient mathematics students. This guidance is missing. Presents a balance of mathematical procedures and deeper conceptual understanding: This criteria is met.
Rating: **2 – Meets many of the criteria in the dimension**	

Dimension II – Key Shifts 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 and 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.	These lessons address adult learners functioning at a variety of levels in different areas of mathematics. The focus is on operations and algebraic thinking. The lessons align to that focus and develop coherently through identified standards in Grades 1-6. Concepts are developed in context of real world situations in a variety of activities and tasks. The development of these significant concepts in operations and their properties supports the development of fluency and skills. Focus: The lessons and units provide an especially in-depth treatment of the major content instruction in a logical, connected progression from grade 1 through grade 6. Lesson expectations are high, and the activities are engaging and make the material accessible to learners who have not been successful in the past. As noted earlier, the unit will be more closely aligned to the standards when lessons for 6.EE.3 and 6.EE.4 are added to create a bridge between numerical expressions (6.EE.1: with and without whole number exponents), (6.EE.2: reading, writing, evaluating expressions with variables). Coherence: Grade-to-grade coherence is clearly evident. The sequence of the author's lessons include instruction from grades 1, 2, 3, 4, and 5 prior to introducing content from grade 6. Lesson activities provide multiple opportunities for students to connect knowledge and skills within clusters and learning progressions. Rigor: Application: The lessons definitely provide opportunities for students to independently apply mathematical concepts in authentic situations and solve challenging problems with persistence. When the unit is considered as a whole, the lessons support students' need to choose from and apply given models/strategies to new situations. Conceptual Understanding: The lessons develop students' conceptual understanding through a variety of engaging, colorful, adult-age relevant tasks. The lessons include student-friendly problems. Questions are thoughtful and logical. Students work in varied situations, including whole-group, small-group, pairs, and independently. Moreover, students are exposed to a variety of representations and non-threatening opportunities to write and speak about their understanding. As highlighted earlier in Dimension I comments, the lessons need to include more numerous and obvious connections to the Standards for Mathematical Practice.

	One concern needs to be noted in Lesson 2. To represent the "ones unit," the author chose the letter "o" as the variable. Although use of a variable in this example is mathematically correct, some students could confuse "o" with "0" (zero). EQuIP Review Panel members urge mathematics educators who use this lesson to carefully preview the author's notes that explain the variables used and the intended purpose of the power point slides. Procedural Skill and Fluency: All of the lessons support procedural skill and fluency with core calculations and mathematical procedures. One example of practice in procedural skill and fluency is shown in Lesson 3, on page 1 when the students are asked to determine the number of candies in the photo for the opening activity. This is merely one example of many!
Rating: **3 – Meets most to all of the criteria in the dimension**	

Dimension III – Instructional Supports

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. <u>*A unit or longer lesson should:*</u> ✓ 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.	The instructional expectations in this unit are guided by the past experiences in learning math for this audience. The lessons support adult learners who may not have had positive, satisfying experiences in mathematics. Teacher supports for diverse learners include scaffolds, differentiation, varied materials, and attention to academic vocabulary. The activities and tasks follow thought provoking questions that motivate and engage the learner. Quite simply, ALL of the elements of Dimension III are present in the unit. Well done!!!

✓ 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.	
Rating: **3 – Meets most to all of the criteria in the dimension**	

Dimension IV – Assessment

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.	The assessments in this unit elicit evidence of student learning. Varied assessments are included (Pre-assessments, formative assessments, and summative assessments, etc.) and are done in a non-threatening way that support the learner in moving forward to a better understanding of the operations and their properties. Moreover, the author has created an answer key as scoring guidance for each activity. The elements in Dimension IV are clearly present.
Rating: **3 – Meets most to all of the criteria in the dimension**	

Summary Comments

Rating: 11- Exemplar

The author is to be congratulated on a thorough job of preparing her unit on "Deepening Understanding of the Order of Operations." Even though it has been prepared for adult learners, the lesson activities would be useful for students of any age, particularly students who have gaps in knowledge and need re-mediation or who simply would benefit from the hands-on approach that these lessons favor.

EQuIP

- **Dark Gray: 94, 94, 93**
- **Light Gray: 191, 188, 188**
- **Blue: 0,127, 197**
- **Light Blue: 0, 163, 226**
- **Dark Blue: 0, 76, 139**

Rating Scales

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

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)**

Rating Descriptors

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.

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.