CORE: K-2 Course 3: Place Value

EDUO 9589

1 Semester Credit/Unit

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Syllabus

Course Overview

The Place Value course is the third course in a series of three courses for grades K–2 educators on Foundations for Numeracy. The courses support teachers in developing a deeper understanding of the mathematical content and pedagogy that leads to student proficiency with early number sense.

Course Learning Objectives:

Content and Concepts

In this course you will:

- Make sense of how facts and procedures connect to concrete and visual models for addition and subtraction.
- Learn how concepts of place value develop in early grades.
- Discover strategies and activities that support students in understanding patterns of a base-10 system.
- Explore activities that deepen understanding of place value.
- Connect strategies based on place value to solve addition and subtraction problems.
- Connect place value concepts to the completion of multi-digit addition and subtraction operations.
- Investigate strategies to address common misconceptions.
- Acquire skills to integrate routines, good questioning, and the Concrete, Pictorial, Abstract (CPA) sequence to support students in mastering grade level place value standards.

Pedagogical Content Knowledge

● Recognize that how students learn and work with math has a strong impact on what they learn about math.
● Apply and connect the Concrete, Pictorial, Abstract (CPA) sequence and strategies to build an understanding of numbers.
● Recognize the importance of varied and consistent practice with models, explanations, number relations, and counting.
● Focus on equitable practices which provide access for all students to reach proficiency in mathematics during grades K–2.
● Learn strategies to address common challenges.
● Gain ideas for activities you can use in the classroom.
● Connect to valuable resources to enhance your knowledge and provide additional ideas and activities for teaching and learning.

Course Organization

The course is divided into seven modules (numbered 0–6). Each week you will be assigned 1–2 modules to complete at your own pace. You may complete more than is scheduled in a week, or you may sometimes lag a bit behind due to your personal schedule that week. If you fall behind, it is important to catch up as soon as possible. If you work ahead, then it is important to return to discussions in modules you completed to reply to responses from your colleagues. Although this is an asynchronous course it is "self-paced" within specific pacing guidelines (two modules per week). Your course facilitator will check in with you from time-to-time, add comments to discussions, and make sure you are okay if you happen to fall behind. The course includes a pre-assessment and post-assessment of your knowledge of the teaching and learning of counting and number relationships in grades K–2. At the beginning of the course you will be given an application assignment (with three options for the type of application assignment to complete) that must be completed and uploaded by the end of the course, but may be completed and uploaded at any time throughout the course.

Each module focuses on one or two big ideas around place value understanding and application in grades K–2. The course, modules, and sections generally follow a launch—explore— summarize instructional model. Within the focus on each big idea standard elements appear within the modules:

1. Initial ideas around a key concept
2. Sharing information, research, and resources
3. Descriptions of student-facing activities
4. Knowledge checks
5. Discussions
6. Journal entries
7. Exploration of ideas or resources—especially examples of learning through the Concrete, Pictorial, Abstract (CPA) approach.
8. End-of-module assessment

Schedule

• Week 1 complete Modules #0 & 1
• Week 2 complete Modules #2 & 3
• Week 3 complete Modules #4 & 5
• Week 4 complete Modules #6 & 7

Work time

Average time typically spent working on the course is about four hours per week or two hours per module. Overall, the course is expected to take 15–18 hours to complete.

Grading

This is a pass/fail course unless otherwise requested. You are allowed multiple attempts to complete assignments if you would like to improve your score. Grading is based on the following assignments:

- Four discussions
- Seven journal entries
- Five end-of-module summary assessments
- One choice application assignment
- Completion of pre- and post-assessments
- Completion of all 37 sections (Modules are broken into sections)

Course Outline/Learning Modules

Course Outline

The modules are designed to deliver content in a sequence that builds in complexity while showing coherence from Kindergarten through Second grade.

Module 0: Introduction, Orientation, and Overview

Learn about how the course is set up, assignments, routines for learning, navigating the course, completing knowledge checks regarding learning routines, introduce yourself to colleagues, and complete a course pre-assessment. Also, dive into background information that is important content and pedagogical foundations for the course.

Sections and Lessons for Module 0: Introduction, Orientation, and Overview

Sections	Lessons
Course Welcome	Lesson 1: Welcome
Course Orientation	Lesson 1: Orientation Introduction Lesson 2: Routines for Learning and Sharing
Course Objectives	Lesson 1: Objectives for the Course
Background Knowledge and Big Ideas	Lesson 1: Research on Foundations for Whole Number Place Value Lesson 2: Focus and Big Ideas

Module 1: Foundations of Place Value

In this module we'll look at foundational understanding of place value with a focus on three key ideas, ten-ness, unitizing, and exchanging. Place value is not a single concept but a complex mathematical topic with many connected concepts that need to be understood for students to become experts.

Sections and Lessons for Module 1: Foundations of Addition

Sections	Lessons
Foundations for Place Value Understanding	Lesson 1 - Developing a Foundation for Place Value Understanding
Ten-ness	Lesson 1 - Understanding "Ten-ness"
Unitizing	Lesson 1 - Introduction to Unitizing
Exchanging and Equivalence	Lesson 1 - Building an Understanding of Exchanging through Equivalence
Student-Facing Foundational Activities	Lesson 1 - Explore and Analyze Student-Facing Activities

Counting Based on Place Value	Lesson 1 - Counting Based on Place Value Journal: Decade Number Words and Values
Student-Facing Counting Activities	Lesson 1 - Student-Facing Activities to Support Counting Based on Place Value Lesson 2 - Revisit Jonathan's Counting
Module 1 Summary	Lesson 1 - Summary of Foundations for Place Value Module 1 Summary Assessment

Module 2: Place Value in the Partitioning Phase

In this module we'll examine place value as an efficient grouping or partitioning system for recognizing, comparing, and operating with numbers. Objects can be grouped and counted in many ways. As a society, we have chosen to group objects by tens based on the number of fingers we have. Each counting number has a unique spoken name and can be represented by a unique written symbol. The symbols for the initial ten digits are called 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Understanding how place value works requires understanding the face value and place value of a number.

Sections and Lessons for Module 2: Place Value in the Partitioning Phase

Sections	Lessons
Place Value and MultiDigit Numbers	Lesson 1 - Welcome Lesson 2 - Factors or Powers of Ten
Student-Facing Activities	Lesson 1 - Student-Facing Activities to Understand Place Value Patterns Journal - Ideas for Using Virtual Manipulatives to Support Place Value Understanding
Partitioning Two- and Three-Digit Numbers	Lesson 1 - Partitioning Two- and Three-Digit Numbers
Additional StudentFacing Activities for Multi-digit Numbers	Lesson 1 - Explore Activities to Support Decomposing Multi-digit Numbers Discussion: Reflect and Share Activity Experiences
Module 2 Summary	Lesson 1 - Summary of Place Value in the Partitioning Phase Module 2 Summary Assessment

Module 3: Magnitude

In this module we'll examine the facets of magnitude as they apply to K–2 students with gaining a deep understanding of place value. procedures. Magnitude is comprised of many mathematical concepts. Magnitude refers to the size of something, or how big or little a quantity is. The act of counting helps students understand that 36 is more than 28.

Understanding place value helps students recognize without counting that 36 is more than 28. Understanding of magnitude comes by diving into mathematical concepts such as comparing, place value, powers of ten, estimation, rounding, and reasoning. Young children's symbolic magnitude understanding, or knowledge of how written numerals and number words can be ordered and compared, is an important role in their mathematical development.

Sections and Lessons for Module 3: Magnitude

Sections	Lessons
Introduction to Magnitude	Lesson 1 - Welcome
Comparing Numbers	Lesson 1 - Comparing Numbers Journal: Closed and Open Number Lines
Student-Facing Activities	Lesson 1 - Explore and Analyze Student-Facing Activities Lesson 2 - Comparing Numbers Based on Place Value
Estimating	Lesson 1 - Estimating to Support Magnitude
Module 3 Summary	Lesson 1 - Summary for Magnitude Module 3 Summary Assessment

Module 4: Flexible Strategies for Computation

In this module we'll examine using place value to complete calculations of multi-digit addition and subtraction. Students in First and Second grades continue to build on their understanding of adding and subtracting with single-digit numbers to adding and subtracting two- and threedigit numbers. To do this, they initially begin to use their understanding of place value, decomposing and composing numbers into multiple ways to complete mental computations.

"Using strategies based on place value" is a phrase found within First and Second grade Numbers and Base Ten standards. The word "strategy" emphasizes that computation is approached thoughtfully with an emphasis on student sense-making. In this module we will focus on a number of strategies and models students can use to support addition and subtraction computation based on understanding number relationships.

Sections and Lessons for Module 4: Flexible Strategies for Computation

Sections	Lessons
Intro to Developing Flexible Strategies for Computation	Lesson 1 - Welcome Lesson 2 - CPA Sequence for Addition and Subtraction

Strategy 1 Direct Modeling of Addition and Subtraction	Lesson 1 - Direct Modeling of Addition and Subtraction (Strategy 1)
Strategy 2: Counting On (Incrementing)	Lesson 1 - Counting On with Increments of Ten and a Hundred (Strategy 2) Journal: Benefits and Challenges with Counting On with an Open Number Line
Strategy 3 Partition Based on Place Value	Lesson 1 - Partitioning Based on Place Value (Strategy 3)
Strategy 4: Make a Ten, Make a Hundred	Lesson 1 - Make a Ten, Make a Hundred (Strategy 4) Lesson 2 – Student-Facing Activities for Make a Ten, Make a Hundred Journal: Highlight an Aspect of Partitioning Ideas
Strategy 5: Compensate	Lesson 1 - Compensate (Strategy 5) Discussion: Reflect on Using Computation Strategies
Module 4 Summary	Lesson 1 - Summary for Developing Flexible Strategies for Computation Module 4 Summary Assessment

Module 5: Connect Models to Numerical Notation

In this module we'll examine learning that supports students in completing multi-digit addition and subtraction problems by connecting pictorial/visual models with horizontal and vertical numerical models. As students work to develop strategies to complete addition and subtraction computations they are introduced to the vertical algorithm. The foundation and beginning steps toward proficiency with standard algorithms begins in grades K–2. This includes written methods that include "extra helping steps to record the underlying reasoning," sometimes referred to as helping or alternate algorithms.

Sections and Lessons for Module 5: Connect Models to Numerical Notation

Sections	Lessons
Intro to Connect Visual Models to Numerical Notation	Lesson 1 - Welcome to Module 5: Connect Models to Numerical Notation Lesson 2 - Introduction to Vertical and Helping Algorithms
Sequence to Connect Visual Models with Algorithms	Lesson 1 - Direct Modeling
Linking to Vertical Notation	Lesson 1 - Linking Horizontal to Vertical Notation with Number Bonds

Additional Scaffolding and Labeling	Lesson 1 - Scaffolds to Support Understanding Vertical Algorithms Journal: Supporting Owen's Understanding with Multidigit Subtraction
Module 5 Summary	Lesson 1 - Summary of Vertical Notation of Addition and Subtraction Discussion: Which Models Will You Use? Module 5 Summary Assessment

Module 6: Course Review and Wrap-up

In this course wrap-up module, we will review the course objects and some key ideas, and then connect learning to "Big Ideas" in math. We will also share a list of activities and a list of website resources in the course. Finally, you can complete and upload your Choice Assignment if you have not done so already; complete a course post-assessment; and complete the course feedback survey.

Sections and Lessons for Module 7: Course Review and Wrap Up

Sections	Lessons
Course Review	Lesson 1 - Review of Understanding Whole Number Place Value Journal: Connect Learnings to "Big Ideas"
Course Activities and Resources	Lesson 1 - Activity and Resource Charts Course Post-Assessment Complete and Upload Choice Application Assignment
Final Remarks and Feedback	Lesson 1 - Concluding Remarks Provide Course Feedback