National Center on
INTENSIVE INTERVENTION
at American Institutes for Research ■

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U.S. Office of Special Education Programs

Intervention Taxonomy Brief: Fusion Whole Number Foundations Level 1

The goal of this brief is to provide educators with information they can use to evaluate the appropriateness of **Fusion Whole Number Foundations Level 1 (WNF1)** for a specific student or group of students who require supplemental and intensive intervention. The brief also may be used to guide decisions about the selection or purchase of a new intervention. We envision that the brief may allow users to examine the extent to which the program aligns to the Taxonomy of Intervention Intensity, a framework used by educators to categorize interventions along key dimensions. The information included in this brief is organized along the seven dimensions of the Taxonomy of Intervention Intensity and can assist educators in answering the following questions:

- Does evidence suggest that this intervention is expected to lead to improved outcomes in the identified area of need (**strength**)?

- Will the group size, duration, structure, and frequency provide sufficient opportunities for students to respond and receive corrective feedback (**dosage**)?

- Does the intervention match the student's identified needs (**alignment**)?

- Does the intervention assist the student in generalizing target skills to general education or other tasks (**attention to transfer**)?

- Does the intervention include elements of explicit instruction (**comprehensiveness**)?

- Does the student have opportunities to develop the behavior skills necessary to be successful (**behavioral support**)?

- Can the intervention be individualized with a data-based process to meet student needs (**individualization**)?

To learn more about the Taxonomy of Intervention Intensity and find resources to support implementation, visit https://intensiveintervention.org/taxonomy-intervention-intensity.

Program Summary

The Fusion WNF1 curriculum is a Grade 1 mathematics intervention designed for students at risk in whole number concepts and skills. Students are taught in small groups for 60, 30-minute lessons. Each lesson includes the explicit introduction of new content and systematic practice and review in 4 to 5 brief, scripted mathematics activities. Lessons utilize a variety of math models and contain teacher modeling, scaffolded instructional examples, and opportunities for academic feedback. Two mathematical domains in the first grade Common Core State Standards – Operations and Algebraic Thinking and Number and Operations in Base Ten– form the basis of Fusion WNF1 content. The first half of the curriculum emphasizes number sense, basic number combinations, and place value concepts. During the second half of the curriculum students encounter multi-digit computation without regrouping and word problem solving.

Exhibit 1. Program Information

Features of program implementation	Program recommendations
Grade level(s)	1
Group size	2–5 students
Intervention length	60 lessons
Frequency	5 lessons/week
Session duration	30 minutes
Cost	$125–$399
Training	Two 6–8 hour training sessions (for Books 1 and 2)

Evidence of Taxonomy of Intervention Intensity Dimensions

The following section presents definitions for the Taxonomy of Intervention Intensity dimensions and a summary of intervention-specific evidence for each dimension. The evidence comes from the intervention's vendor or developer. It is accurate as reported to the National Center on Intensive Intervention (NCII); it was not independently verified by NCII. Additional program evidence can be found on the NCII Tools Chart and might appear on the What Works Clearinghouse. For specific questions about the content, contact the publisher at ctl@uoregon.edu.

Taxonomy Dimension: Strength

Strength tells us how well the program works for students with intensive intervention needs, expressed in terms of effect sizes. Effect sizes greater than 0.25 indicate an intervention has value in improving outcomes. Effect sizes of 0.35 to 0.40 are moderate, and effect sizes of 0.50 or larger are strong (preferred).

Exhibit 2 provides the effect sizes for students in need of intensive intervention organized by domain and subdomain. These effect size data are calculated on low-achieving participants, those falling at or below the 20th percentile on pretest measures of achievement. If available, additional effect sizes for disaggregated data can be found on the NCII Tools Chart.

Exhibit 2. Fusion WNF1 Effect Sizes for Students ≤20th Percentile by Domain and Subdomain

Domain	Subdomain	Outcome measures	Effect size[a]
Mathematics	▪ Early Numeracy ▪ Math Concepts	▪ ASPENS	Unavailable
Mathematics	▪ Early Numeracy ▪ Math Concepts	▪ TEMA ▪ EasyCBM ▪ Profusion	Unavailable
Mathematics	▪ Early Numeracy ▪ Math Concepts ▪ Math Computation	▪ TEMA ▪ EasyCBM ▪ Profusion	Unavailable

Taxonomy Dimension: Dosage

Dosage is the number of opportunities a student has to respond or practice and receive corrective feedback. Dosage may be impacted by the size of the instructional group, the number of minutes each session lasts, the number of student-teacher interactions built into lessons, and the number of sessions provided per week.

Fusion WNF1 has been studied using small student groups of two and five. Assuming a group size of two students, each student in the group has an estimated 114.33 opportunities to respond and receive corrective feedback. Assuming a group size of five students, each student in the group has an estimated 92.13 opportunities to respond and receive corrective feedback.

Taxonomy Dimension: Alignment

Alignment (Exhibit 3) focuses on how well the program (a) addresses the target student's full set of academic skill deficits, (b) does not address skills the target student has already mastered (extraneous skills for that student), and (c) incorporates a meaningful focus on grade appropriate curricular standards.

Exhibit 4. Alignment With Content Areas Addressed

Instructional grade level(s)	Content area addressed	Skill strands
Grade 1	Operations and algebraic thinking	▪ Represent and Solve Problems Involving Addition and Subtraction ▪ Understand and Apply Properties of Operations and the Relationship Between Addition and Subtraction ▪ Add and Subtract Within 20 ▪ Work With Addition and Subtraction Equations
Grade 1	Number and operations in Base 10	▪ Extend the Counting Sequence ▪ Understand Place Value ▪ Use Place Value Understanding and Properties of Operations to Add and Subtract

Taxonomy Dimension: Teaching to Promote Transfer

Attention to transfer is the extent to which an intervention is designed to help students (a) transfer the skills they learn to other formats and contexts and (b) realize connections between mastered and related skills.

To build understanding of place value and relationships among two-digit numbers, three activities designed to explicitly teach for transfer include (a) composing and decomposing numbers 1–100, (b) hundreds chart practice to understand relationships among numbers, and (c) comparing numbers to determine greater than or less than.

Activity 1: Composing and Decomposing Numbers 1–100. Students use a place value chart, Base 10 blocks, and cubes to compose and decompose numbers 1–100 (Exhibit 4). This activity

promotes transfer from place value understanding to a variety of contexts, including understanding different place value representations and helping students understand that two-digit numbers are composed of tens and ones.

Exhibit 4. Composing and Decomposing Numbers Example

- Write on the PV chart: 14
  - ○ **Everyone what number?** (14)
- Point to each digit in 14 as you say:
  - ○ **Fourteen is 1 ten and 4 ones. Use your ten sticks and cubes to show 14 on your place value chart.**
- Assist as needed.
  - ○ **Check that you have 1 ten stick in the tens column.**
  - **How many ones cubes should you have in the ones column?** (4)
  - ○ **Count on from the ten stick to check that you have 14. Start with ten.** (10, 11, 12, 13, 14)
  - ○ **Right! Fourteen is 1 ten and 4 ones.**
  - ○ **Clear your boards and get ready for the next number.**

tens	ones
1	4

tens	ones
│	∷∴

Activity 2: Hundreds Chart Practice to Understand Relationships Among Numbers. Students work with the hundreds chart to understand relationships among numbers, including adding and subtracting multiples of 10 (Exhibit 5). This activity promotes transfer from place value understanding to relationships among numbers when adding or subtracting 10—for example, understanding that adding 10 to a number changes the tens column but not the ones column builds deeper understanding of place value.

Exhibit 5. Relationships Among Numbers Example

- Write on place value whiteboard:

Tens	Ones
6	5
+ 1	0

- Have students help you solve the problem and write the answer (75).
    - 65 plus 10 equals 75. Notice that we added 1 more to the _tens_ column but the _ones_ column stayed the same.
    - We can use the hundreds chart to check our answer. We'll start at 65 and count 10 more.
- Put your finger on 65 and count 1, 2, etc. as you touch each number, ending on 75.
    - Since each row is made up of ten, we don't have to count by ones. Instead we can just start at 65 and count one row forward to end up at 75. It is just like adding ten. Does 65 + 10 equal 75? (yes)
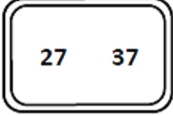- Point to 65 and then move 1 row down to 75 on the hundreds chart.

54	55	56
64	65	66
74	75	76
84	85	86

Activity 3: Comparing Numbers to Determine Greater Than or Less Than. Students use place value charts, Base 10 blocks, and cubes to determine greater than/less than and learn a rule for quickly comparing two-digit numbers (Exhibit 6). This activity promotes transfer by bringing awareness to the meaning of the numeral in the tens and the ones columns and using multiple representations to model greater than or less than.

Exhibit 6. Comparing Numbers Example

Activity 1   Greater than / Less than

Materials: Teacher whiteboard, marker
Vocabulary: Greater than, less than, tens, ones

- Write on the board:

  27   37

  - We're going to compare two numbers again and tell if one number is *greater than* or *less than* the other number.
  - Who remembers how we compare numbers with two digits?
- Call on a student to offer the idea that we compare the numbers in the tens column.
  - Right. First we compare the numbers in the *tens* column. If they are the same, then we compare the numbers in the *ones* column.
  - What do we compare if the numbers in the tens column are the same? (the numbers in the ones column)
  - Look at these two numbers. How many tens in 27? (2) How many tens in 37? (3)
  - Are 2 tens greater than or less than 3 tens? (less than)
  - So 27 is less than 37. How do you know 27 is less than 37? (It has less tens)

Taxonomy Dimension: Comprehensiveness
Comprehensiveness is the number of explicit instruction principles the intervention incorporates (e.g., providing explanations in simple, direct language; modeling efficient solution strategies instead of expecting students to discover strategies on their own; providing practice so that students use the strategies to generate many correct responses; and incorporating systematic cumulative review). Additional information can be found within the NCII Explicit Instruction course content materials.

Dimension: Prime Relevant Background Knowledge
Activity 1. Each lesson consists of a Warm-Up flashcard game (Exhibit 7) in which students build fluency with number combinations. Strategies for solving number combinations are reviewed prior to the game to remind students of the strategies for solving problems.

Exhibit 7. Warm-Up Example

Warm Up | Flashcard game | 5 minutes

Materials: + and − 0 flashcards
Vocabulary: Addition, subtraction, identity law

- Play the flashcard game.
  - Today we're going to play the flashcard game with problems that add and subtract 0.
    - Think about the strategy we learned for _addition_ and _subtraction_ problems with zero. Tell your partner the rule about how to solve these problems.
- Monitor as students share with their partner that when you add or subtract zero, the number stays the same. Have a student share her answer with the group.

$$3 + 0 \qquad 6 - 0$$

  - Yes, the _identity law_ tells us that when you add or subtract zero, the number stays the same.
  - I'll show each of you a card, and you have 3 seconds to answer. If you don't say the correct answer in time, I'll call on another student who has a hand raised.

Activity 2. Mathematics vocabulary is explicitly defined and reviewed within and across lessons. For example, students learn the name of representational tools (e.g., number line, ten-stick, place value chart, hundreds chart), and ways of describing number relationships and operations (e.g., equal, greater than, subtract).

Dimension: Strategic Integration of Content in Ways That Connect New and Existing Knowledge
Activity 1. Instructional examples are carefully sequenced to promote successful learning by increasing the difficulty of examples as students develop understanding of a concept or skill. In Exhibit 8, for example, students solve a change problem using double-digit addition, after learning about change problems using single-digit addition and subtraction.

Exhibit 8. Change Problem Example

Activity 3 | Change problem solving

Materials: Teacher and student whiteboards, markers, story problems
Vocabulary: Change, more, less, addition, equation, equal, plus

  - Today I'll show you how to solve story problems that have larger numbers. You already know how to solve _change_ problems and you know how to add and subtract larger numbers.
  - Tell your partner why some problems are called change problems.
- Monitor math talk. Call on a student to share that change problems start with an amount and then something changes.
  - What are two ways a problem can change? (getting more or getting less)
  - Listen to this problem and try to figure out if the change is about getting _more_ or getting _less_.

Lesson 57 story problem:

Zack had saved 25 dollars. He earned 12 more dollars.

How many dollars does he have now?

Activity 2. Lessons include both positive teaching examples and nonexamples, when appropriate, to help students learn to discriminate between similar concepts. In Exhibit 9, for example, the concepts of more and less are juxtaposed to build conceptual understanding.

Exhibit 9. More Versus Less Example

Activity 2	Identify numbers that are more/less than a given number

Materials: Number cards 0–10, number line
Vocabulary: More than, less than

- Place all the number cards in front of the students in random order.

  3   6   1   2   9   7   10   8   4   0   5

- Pick up the number card for 5.

  5

- Ask each student:
  - Look at this number. I want you to choose a number that is *more than* 5.
- After all the students select a number, ask each student about their card.

  ✔ What number did you choose? (#) Is # more than or *less than* 5? (more than 5)

CORRECT RESPONSE	⚡ STUDENT ERRORS
Yes, # is more than 5.	Place a number line in front of the students and touch the numbers 6-10 as you say, **These numbers are more than 5.** Touch the numbers 1-4 and say, **These numbers are less than 5.** Your number is less than 5. Find a number that is more than 5.

Dimension: Conspicuous Strategies That Make Steps of Learning Explicit
Activity 1. Students are explicitly taught the underlying mathematical structure of three types of word problems. In Exhibit 10, for example, students learn about group problems and a strategy to identify the problem type.
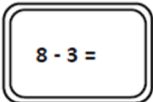
Exhibit 10. Group Problem Solving Example

Activity 2	Group Problem Solving

Materials: Whiteboard, marker, 2 blue cubes, 3 yellow cubes, 4 red cubes, 2 white cubes
Vocabulary: Group, total, equation, plus, equal, addition

- ○ We're going to learn how to solve story problems called *group* problems. What kind of problems are we going to learn about? (group problems)

- ○ They're called group problems because they have two smaller groups that make up a larger group.

• Place 2 blue cubes and 3 yellow cubes on the table.

- ○ I have a group of 2 blue cubes and a group of 3 yellow cubes. Thumbs up when you know how many cubes I have altogether. How many? (5)

- ○ Right. There are 5 cubes altogether. The 5 cubes are made up of 2 smaller groups: blue cubes and yellow cubes. When I put them together, the larger group is the *total* number of cubes. The total is 5.

- ○ This is a group problem because there are two smaller groups (point to each group) that make up a larger group (point to all cubes). What kind of problem is this? (group)

- ○ What are the smaller groups? (blue cubes and yellow cubes)

- ○ What is the larger group or total? (5 cubes altogether, cubes altogether)

- ○ Let's do this again, but this time we'll write an *equation* to show how we can solve group problems.

Activity 2. Students are taught explicit strategies for solving number combinations accurately. In Example 11, for example, the teacher introduces and models the Counting Up strategy for solving subtraction problems.

Exhibit 11. Counting Up Example

- ○ We can also solve *subtraction* problems by counting up. Watch.

• Write on the board:

$$8 - 3 =$$

- ○ Sometimes you need to do subtraction problems but you don't know the answer in your head. You can solve these kinds of subtraction problems by trusting the smaller number and counting up.

- ○ You need to remember that for addition, we trust the bigger number, but for subtraction, we trust the smaller number.

- ○ Which number do we trust for subtraction? (the smaller number)

- ○ Read this problem. (8 - 3 =)

- ○ Listen to me. I trust the smaller number, which is 3, and count up to 8. I have to use my fingers to help me figure how many numbers I count up.

- ○ Threee, (hold up your fingers as you count each number to 8) 4, 5, 6, 7, 8.

• Keep 5 fingers up as you say the following:

- ○ I started with 3, and counted up to 8. I used my fingers to keep track of how many numbers I counted. I counted up 5 numbers, so my answer is 5. Eight minus 3 equals 5.

Dimension: Mediated Scaffolding
Activity 1. Lesson scripts include clear, concise language to promote student understanding of the tasks (Exhibit 12).

Exhibit 12. Scaffolding Example

Activity 4 — Identify numbers that are less
Materials: Number cards from previous activity
Vocabulary: Less, smaller

- ○ I'm going to show you two numbers and you're going to point to the number that is _less_.
- Place number cards 6 and 9 from the previous activity in front of the group.

  6   9

- ○ Look at these two numbers. Think in your head which number is _smaller_ or less.
- Provide wait time and monitor as students look at both choices.
  - ○ Point to the number that is less.
- Confirm correct responses and call on a student who answered correctly:
  - ○ How do you know this number is less?

Activity 2. Lesson scripts introduce new skills and concepts in an "I do, We do, You do" sequence (Exhibit 13). When introducing new skills, the teacher provides a model, including modeling mathematical thinking, and then guides student practice, gradually removing supports to ensure high rates of student success.

Exhibit 13. Using Scripts Example

- Place the number line on the table in front of the students.
  - o Let's use our number line to learn how to add 1 to a number the *fast way*.
  - o When we add or plus 1, we say the next number on the number line. Watch me
  - o Remember, we had 3 red cubes, so I start at 3, and add 1 more, so I say threeeee, four.
- Touch and hold 3 on the number line, then loop over to four.
  - o 3 plus 1 equals 4. I don't have to count from the beginning again. When I touch 3, I trust it by saying it longer. Listen again. Threeeee, four.
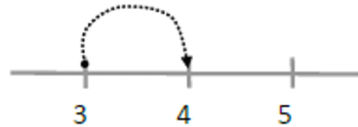
  - o Do it with me. Trust the 3 and say the next number. (Threeeee, four) Yes, 3 plus 1 equals 4. That's the same answer we got with our cubes. It works!
  - o Now let's add 1 to some more numbers using the number line.

- Write on the board: 2 + 1 =
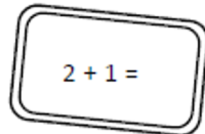
  - o Read this equation. (2 + 1 =) Yes, 2 + 1 =.
- Touch and hold 2 on the number line, then loop to 3 as you say the following.
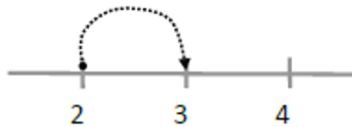
  - o Watch. I trust the 2 and say the next number.
  - o Everyone, what number do I trust? (2) I trust the 2 and say the next number. Do it with me. Trust the 2 and say the next number. Get ready. (Twoooo, three)
  - o Your turn. Get ready. (twoooo, three)
  - o Everyone, what does 2 plus 1 equal? (3) Yes, 2 + 1 equals 3.
- Complete the equation on the board: 2 + 1 = 3
  - o Listen to me read this equation. 2 + 1 = 3. Your turn, read this equation. (2 + 1 = 3) Yes, 2 + 1 = 3. Let's check to see if it worked.
- Use the cubes to confirm the equation.
  - o It worked! 2 plus 1 equals 3!
  - o We are going to add 1 to some more numbers.

Dimension: Judicious Review
Activity 1. Each lesson includes a 5-minute Warm-Up routine involving a quick flashcard review of number combinations. This activity promotes maintenance of previously learned math facts and builds fluent recall of number combinations across time (Exhibit 14).

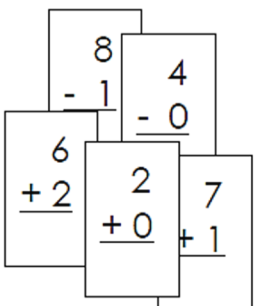**Exhibit 14. Flashcard Game Review Example**

Activity 2. Concepts are reviewed across multiple lessons to promote retention. In Exhibit 15, for example, students review the critical features of change problems, a problem type that was introduced and practiced in multiple preceding lessons.

Exhibit 15. Change Problem Solving Review Example

Taxonomy Dimension: Behavioral Support

Behavioral support addresses the extent to which the program incorporates (a) self-regulation and executive function components and (b) behavioral principles to minimize undesired behavior. Additional information can be found within the [NCII behavioral support course content](#).

Activity 1. The Fusion WNF1 Teacher's Guide recommends teaching and reinforcing group behavioral expectations of being safe, respectful, and responsible. Instructors are encouraged to teach group expectations (Exhibit 16) during the first lesson and review them briefly at the beginning of each lesson until students remember and understand them.

Exhibit 16. Group Expectations

Group Expectations

Be Safe
　　Keep hands, feet, and objects to self
Be Respectful
　　Sit in "Get Ready" position
　　Eyes on teacher
　　Hands on table
　　Four on the floor
Be Responsible
　　Follow teacher directions the first time
　　Do your best work

Activity 2. The Teacher's Guide also recommends reinforcing desired behaviors by providing praise when students meet behavioral expectations. Praise should clearly state specific student behaviors linked to the group expectations (e.g., "Great job being responsible by following my directions the first time.")

Activity 3. The Teacher's Guide provides instructors with techniques for using clear group response signals to ensure that all students respond in unison and maximize practice for each student. Exhibit 17 illustrates the five-step signaling technique that instructors are taught to use: Focus (the teacher presents the question/task), Think Time (time for students to think of their response), Cue (e.g., "Get ready"), Interval (pause), and Signal (e.g., snap, tap).

Exhibit 17. Using Signals
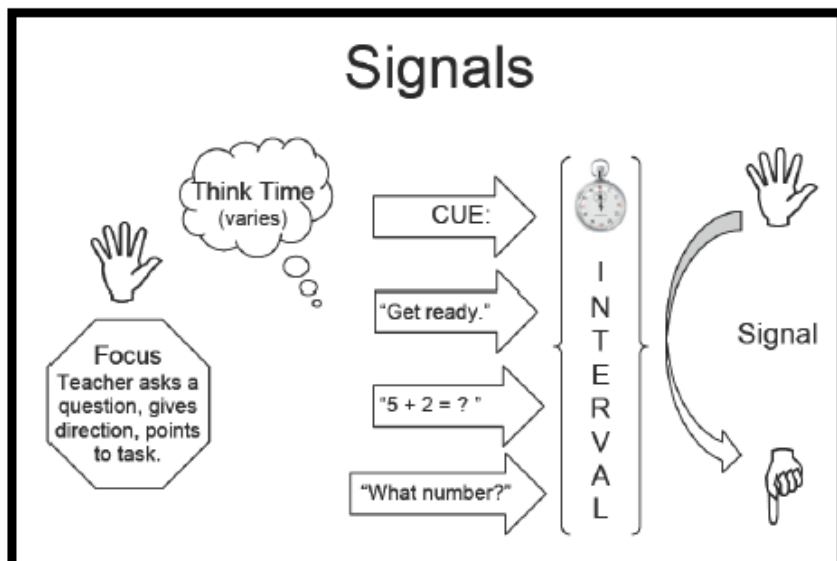
Activity 4. The Teacher's Guide encourages instructors to use appropriate instructional pacing for the group. Instructors are encouraged to keep a lively pace that increases academic engagement and opportunities to respond but not to move so quickly that students have difficulty responding when signaled.

Activity 5. Confirmatory feedback and corrective academic feedback are included in teacher scripting throughout lessons. For example, during numeral identification activities (Exhibit 18), the teacher script includes wording for confirming correct responses (e.g., "Yes, 4") or correcting errors by presenting and having students practice the correct response (e.g., "This number is 4. What number?").

Exhibit 18. Feedback Example

CORRECT RESPONSE	⚠ STUDENT ERRORS
Yes, 3 + 2 = 5.	What is the bigger number? Let's *trust* the # and count 2 more. What does # + 2 equal? (#) Yes, #.

Additional Information About Fusion WNF1

In Fusion WNF1, students complete a Wrap-Up activity at the end of each lesson. The goal of these activities is to increase independent practice opportunities and build fluency with number combinations. In the first several lessons, the Wrap-Up activity consists of number writing worksheets for students to practice numeral formation to develop fluency with writing numbers. After students have been introduced to number combination strategies (e.g., ± 0, ± 1), the Wrap-Up worksheet changes to a 1-minute timed Math Facts practice sheet. These practice sheets are aligned with the current number combination strategies that students are learning in the program. Students first complete the practice sheet that includes the targeted number combination (e.g.,

+1 facts). If students meet the criteria for passing, they move on to a cumulative review sheet in subsequent lessons that includes all previously learned number combinations.

Fusion WNF1 also includes progress monitoring Quick Checks after every 10 lessons. These brief, untimed assessments assess skills that students have recently learned in the program. Teachers use these checks to assess what students have learned and areas where students might need additional practice. The checks also can be used to help teachers determine student placement in the program.