

Intervention Taxonomy Brief: Fraction Face-Off!

The goal of this brief is to provide educators with information they can use to evaluate the appropriateness of **Fraction Face-Off!** 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

Fraction Face-Off! is a math program focused on improving student’s knowledge and understanding of fractions and decimals.

Exhibit 1. Program Information

Features of program implementation	Program recommendations
Grade level(s)	4
Group size	2–4
Intervention length	39 lessons
Frequency	Three times per week
Session duration	30 minutes
Cost	\$90 for manual and supplemental materials

Training	For information on professional development opportunities and costs, contact FuchsTutoring@air.org .
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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 lynn.a.davies@vanderbilt.edu or visit https://frg.vkcsites.org/what-are-interventions/math_intervention_manuals/.

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. Fraction Face-Off! Effect Sizes for Students \leq 20th Percentile by Domain and Subdomain

Domain	Subdomain	Outcome measure	Effect size ^a
Mathematics	Fractions & Decimals	Fraction Calculations	2.48*
Mathematics	Fractions & Decimals	Comparing Fractions	1.64*
Mathematics	Fractions & Decimals	Fraction Number Line	1.07*
Mathematics	Fractions & Decimals	NAEP	0.85*

^a To ensure comparability of effect size across studies, NCII uses a standard formula to calculate effect sizes across all studies and outcome measures—Hedges g , corrected for small-sample bias.

* $p \leq .05$.

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.

Assuming a group size of four students, each student in the group has an estimated 97.14 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 3. Alignment With Content Areas Addressed

Instructional grade level(s)	Content area addressed	Skill strands
Grade 4	Fraction magnitude understanding	<ul style="list-style-type: none">▪ Comparing fractions▪ Ordering fractions▪ Placing fractions on number lines (0–1 and 0–2)▪ Finding fraction equivalencies
Grade 4	Fraction calculations	<ul style="list-style-type: none">▪ Understanding fraction addition, subtraction, and multiplication▪ Executing fraction addition and subtraction problems
Grade 4	Fraction word problems	<ul style="list-style-type: none">▪ Word problems reflecting multiplicative reasoning

Note. The program’s focus includes mixed numbers and number lines that span 0–1 and 0–2.

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.

For solving fraction word problems (one of three main instructional targets), activities are designed to explicitly teach for transfer by providing students instruction and practice in recognizing problems with novel (unexpected) problem features. This includes recognizing problems within a problem type when relevant information is in graphs and tables, when problems include irrelevant information in word-problem narratives and graphs/tables, when the problem type is contextualized in a two-step word problem that combines different problem types, and other features. The focus and activities are designed to broaden students’ conceptualizations of word-problem categories and promote transfer of word-problem skill.

Activity 1. Explicit instruction on word-problem features that make problems seem unfamiliar but do not alter the solution strategy for the taught word-problem type.

Activity 2. Word-problem sorting activities, in which students sort problems into word-problem categories (without solving problems) and systematic practice with mixed problem types, in which students solve word problems with novel (unexpected) features.

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: Provide Explanations in Direct, Simple Language

Activity 1. Each lesson is scripted to provide tutors direct, simple language for effectively communicating the program’s explanations. Tutors review and practice scripted explanations. They do not read or memorize scripts.

Activity 2. Throughout the program, students practice using direct and simple language to explain solution strategies as they solve problems.

Dimension: Model Efficient Solution Strategies

Activity 1. Throughout the program, each time a new problem type is introduced, the tutor models the program’s efficient solution strategy for solving that problem type. The manual thoroughly describes each problem type and its solution strategy. The concept of problem types applies to not only word problems but also the calculation solutions needed to solve word problems and different types of fraction magnitude activities (e.g., ordering two and three fractions; placing fractions on number lines).

Activity 2. Throughout the program, students receive ongoing practice applying the taught strategies, as each problem type gradually increases in complexity. Help cards provide support for student’s application of correct solution strategies. Help cards are gradually faded and eventually invoked as needed to help students correct errors.

Dimension: Ensure That Students Have the Necessary Background Knowledge and Skills to Succeed

The program is designed systematically so that (a) problem types are introduced only after the prerequisite skills are taught and (b) activities build fluency with foundational skills to ease students’ cognitive load. Fluency activities are conducted in the small group: Students take turns responding as quickly as they can as the tutor proceeds through flash cards; when a student makes an error, that student explains the correct solution strategy and corrects the error as seconds elapse. This encourages careful but quick responding.

Activity 1: An example of a fluency activity is naming equivalent fractions for important benchmark fractions (e.g., $\frac{1}{2}$).

Activity 2: Another example of a fluency activity is sorting word problems into problem types.

Dimension: Incorporate Systematic Review, With Problem Sets That Mix Problem Types (Interleaved Practice)

Activity 1. The program is designed systematically so that each session provides students with supervised independent practice that cumulatively reviews previously taught problem types while mixing problem types across independent problem sheets. This helps build student skill in distinguishing among problem types and supports the retention of previously taught material. Independent practice is timed, and corrective feedback is provided for incorrect responses.

Activity 2. Each independent practice set incorporates predetermined bonus problems, only known to tutor until students have completed work. Students receive bonus points within the

program's motivational system for answering bonus problems correctly. Tutors delay revealing bonus problems to ensure students are motivated to complete every problem intentionally and carefully.

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. *Fraction Face-Off!* includes a self-regulation system to encourage students to work hard and accurately, listen carefully, and follow directions. Tutors set a timer to beep three times per lesson at random intervals. When the timer beeps, tutors check if all students are on task. If so, a checkmark, each worth a “half dollar,” is added in their “Checkbook.” Students also can earn “half dollars” (and later “quarter dollars”) for accurately completing “bonus problems” on the lesson’s “Individual Contest.” To promote hard work on all problems, tutors do not inform students which practice problems are eligible for bonus points until all work is completed. Tutors distribute each student’s earned fraction money at the end of the lesson. On the third lesson each week, students can buy a prize from the “Fraction Store” or save money. Prices are listed in whole-dollar amounts; students convert fraction money to whole dollars, providing additional practice with fraction equivalencies. This self-regulation system is implemented throughout each session.

Activity 2. Interweaved throughout the program is growth mindset instruction to help students understand that they can improve performance when they work hard.