

# There's a Thin Line Between Numerators and Denominators: Addressing Academic and Behavioral Needs of Students With EBD Using SRSD Fractions

Beyond Behavior

1–8

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DOI: 10.1177/10742956241263487

journals.sagepub.com/home/bbx



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## Abstract

Fractions are an imperative skill for students to master to achieve success in future mathematics concepts and classes. Yet many students, especially those experiencing math difficulties and/or characteristics of emotional and behavioral disorders, continue to exit elementary school without a concrete foundation of fractions skills required to successfully transition into higher level math courses. In this article, we present an overview of *SRSD Fractions*, a strategy instructional framework to teach adding and subtracting fractions with unlike denominators. We highlight the benefits of using the framework to promote student engagement and skill mastery and identify free-access resources for educators to successfully implement the math intervention in their own classrooms.

## Keywords

emotional and behavioral disorders, math instruction, academic interventions, behavioral interventions

*Miss Larson, a fifth-grade general education teacher, is delivering an instructional math unit for teaching fractions computation. She has completed the introductory lessons with her students and is preparing to introduce the next topic of the unit: adding and subtracting fractions with unlike denominators. Prior years have revealed this math skill to be particularly challenging for students to master due to the sustained focus, memory recall, and organized thinking involved in the multistep computation.*

*Consequently, Miss Larson is especially concerned for several of her current students, including two with emotional and behavioral disorders (EBD), who chronically exhibit difficulties with low levels of academic engagement and emotional regulation during math instruction. Despite her recent attempts to provide additional prompts and encouraging feedback throughout her math unit, she continues to observe these students daydreaming, doodling, withdrawing, and failing to complete math assignments.*

*Miss Larson opens the lesson and begins modeling the traditional algorithm for adding and subtracting fractions with unlike denominators. She uses example expression to demonstrate each step of the intricate process, pausing periodically to regain the attention of students engaging in off-task behavior. As she concludes her mini lesson, she writes problems on the board for students to solve in their math journals. As she circulates the room, the faces and*

*math journals of both of her students with EBD are blank. In fact, many of her other students appear lethargic, unresponsive, and unaware of what steps to follow to successfully complete the problems. It becomes clear to Miss Larson that she needs a new approach if her students are to master such a complex and critical computation skill.*

Fractions are a cornerstone skill for higher order mathematics and adult independence (National Mathematics Advisory Panel [NMAP], 2008). However, many students struggle to reach proficiency in fractions (National Assessment of Educational Progress [NAEP], 2017) due to deficits in both a conceptual and procedural understanding of fractions. A conceptual understanding of fractions refers to students' ability to understand how fractions relate to whole numbers (e.g., placing fractions on a number line), what they represent (e.g., drawing images to represent fractions), and how fractions compare to one another (e.g., examining equivalent fractions using fraction tiles; Siegler et al., 2010). Students with EBD may struggle with this as

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anywhere from 42% to 93% of students with EBD have math difficulties (Mazzocco, 2007). Furthermore, many students need explicit strategies to navigate the multistep procedural algorithms required when computing fractions such as adding and subtracting fractions with unlike denominators.

Instructional frameworks that address both procedural and conceptual understanding of fractions are essential. Furthermore, many teachers express unease with teaching fractions, so approaches that are easily implemented are necessary to facilitate fidelity of implementation. According to a systematic review of mathematics interventions for students with EBD, self-regulated strategy development (SRSD) is one such instructional framework demonstrating promise (Losinski et al., 2019). *SRSD Fractions*, an instructional approach utilizing the SRSD framework, demonstrates potential to improve the fraction computation for all students, including those with math difficulties and EBD (Ennis & Losinski, 2020). The purpose of this article is to provide teachers with an easy-to-implement instructional approach that can be used for all students or to support the needs of targeted students. Herein, we provide an overview of the *SRSD Fractions* framework, discuss strategies for implementing *SRSD Fractions* that promote student engagement, and identify free, online resources for teachers to use in the classroom.

## SRSD Fractions

*SRSD Fractions* is a curricular framework for teaching and remediating fractions computation. The instructional approach includes three sets of lessons that address adding and subtracting fractions with unlike denominators, simplifying fractions, and converting fractions to mixed numbers. For this article, we focus on the first set of *SRSD Fractions* lessons which employs the stages of SRSD and the mnemonic FILMS to support the conceptual and procedural knowledge of adding and subtracting fractions with unlike denominators.

The FILMS mnemonic is a strategy intended to direct students through the steps of adding and subtracting fractions with unlike denominators: **F**ind the denominators, **I**dentify the multiples, **L**ocate the least common multiple, **M**ultiply to make new fractions, and **S**olve the problem. The mnemonic is also used to assist students in understanding the concept of equivalent fractions. Students are told that while a movie's (or film's) scale may change as it is viewed on different devices (television, iPad, etc.), the actual content of the film does not change. Similarly, the scale of a fraction may change when finding equivalent fractions, but the value of the fraction remains the same.

The five FILMS lessons were developed under Harris and Graham's SRSD framework and encompass each of its six recursive stages (Harris & Graham, 1996): (a)

developing background knowledge; (b) discussing the strategy; (c) modeling the strategy; (d) memorizing the strategy; (e) supporting the strategy; and (f) independent practice. The lessons also integrate a variety of self-regulation components embedded in the SRSD framework including goal setting, self-monitoring, self-instruction, and self-reinforcement (Harris & Graham, 2017). Through the implementation and fading of supports (e.g., cue cards, checklists, and self-statements), students learn the strategy and attain skill mastery. While SRSD is most widely used for teaching writing across a variety of elementary, middle, and high school grade levels, there is also research to support its utility for reading comprehension (e.g., Sanders et al., 2020) and mathematics (e.g., Cuenca-Carlino et al., 2016). In fact, the very first study that evaluated the SRSD framework focused on teaching mathematical problem-solving to fifth- and sixth-grade students with learning disabilities (Case et al., 1992).

## SRSD Research

Self-regulated strategy development is an evidence-based, systematic approach shown to improve the academic skills of students with and without disabilities across a variety of educational settings and content areas. The framework has been determined to be an evidence-based practice for students with EBD for writing (Losinski et al., 2014) and reading (Sanders et al., 2020).

To date, four empirical studies have measured the effects of *SRSD Fractions* on the academic performance of elementary students with math difficulties with and without EBD. Three studies utilized a multiple baseline across participants (or groups of participants) design for students with math difficulties and students with math difficulties and EBD. Across these studies, when SRSD was taught in small groups or one-on-one, a functional relation was established for 26 of 27 fourth- and fifth-grade participants, suggesting significant effectiveness for this population of students (Ennis & Losinski, 2019; Losinski et al., 2019; Losinski, Ennis, & Shaw, 2021).

A fourth study utilized a regression discontinuity group design methodology in which students with mathematics difficulties were identified using a school's multitiered systems of support framework (Losinski, Ennis, et al., 2021). Of all fourth graders screened for the study, 16 students qualified for the intervention which resulted in a large overall observed difference in effect size for fraction computation skills. Across all four *SRSD Fractions* studies, results demonstrated an improvement of fractions computation skills for the large majority of students on the given fractions probe assessments measured in the studies.

Research on SRSD has routinely involved students with EBD who may have low levels of academic engagement, display challenging behaviors in the classroom, and have

difficulty with self-regulation (Ennis et al., 2014). The structure of the SRSD framework provides many benefits for students with EBD as it promotes student motivation and self-efficacy to engage in a task (Harris et al., 2008). Furthermore, the structure of lessons provides frequent opportunities to respond, high-probability request sequences, and opportunities for student choice (Ennis, 2015), among other behavioral strategies. Because the framework simultaneously addresses academic and behavioral components, the instructional method holds great potential for students like Miss Larson's who experience deficits in executive functioning and self-regulation.

*Miss Larson learns of the SRSD Fractions framework after attending a professional development. She decides to use the mnemonic FILMS to teach adding and subtracting fractions with unlike denominators. Since many of her students did not grasp the initial explanation, she decides to try the approach with all her students. She downloads the free lesson plans and begins preparing for the next day's instruction. Miss Larson's math time typically involves 20 min of whole group instruction, followed by 20 min of independent or partner work and 20 min of math stations. During the latter 40 min, Miss Larson often works with targeted students who need additional support. Miss Larson feels confident in her ability to instruct the new method as the lesson plans include step-by-step treatment integrity checklists to help her remember all the steps to implement for each (see Figure 1).*

## FILMS: A Step-by-Step Look

FILMS is a five-lesson sequence that seeks to address students' conceptual and procedural knowledge using the SRSD framework. Since SRSD is taught to mastery, Miss Larson may have to repeat certain lessons with all or some of her students which she plans to do during the independent/partner and/or stations portions of her math block.

### Lesson 1: Introduce FILMS

The first FILMS lesson begins with an anticipatory discussion to activate prior knowledge, address prerequisite vocabulary and concepts (e.g., numerator, denominator), and establish the context for student learning. For instance, Miss Larson will ask her students why they feel it is important to be able to solve problems involving fractions. By brainstorming ideas such as measuring, baking, and building, her students' conceptual knowledge of fractions is being solidified before advancing to the procedural learning to come.

Next, a mnemonic chart is used to introduce and discuss the five steps of the FILMS strategy. Miss Larson discusses movie scales to help students have a real-life connection to scaling fractions when setting up new fractions with

common denominators. The process of self-regulation is then initiated as students make a commitment to learn the strategy by completing a learning contract agreed upon by both the teacher and the student. For example, the contract may include short goal statements to be completed and signed off on by both the teacher and the student. The statements may include target dates and general requirements the student believes he or she will need to master the strategy (e.g., "I will have a good attitude.").

Learning contracts promote student investment and goal setting which may be highly beneficial for students like Miss Larson's who lack autonomy and intrinsic motivation. To encourage this motivation, Miss Larson tells students they will earn a reinforcer as a class once their contracts are fulfilled and goals are met. After both the teacher and student sign the proposed learning contract, the first FILMS lesson concludes with a brief recall of the strategy (memorization practice) and behavior-specific praise.

*During this lesson, Miss Larson creates a comfortable, less intimidating learning environment by providing frequent opportunities to respond in an informal class discussion rather than employing her previous introduction that instantly delved into numerical operations. The previous approach may have contributed to her students, especially those with math difficulties and EBD, appearing to shut down or disengage. Miss Larson uses behavior-specific praise and the high-interest topic of movies to activate students' attention and contributions to this discussion and new learning. She plans to revisit the motivating movie theme as she introduces subsequent lessons to capitalize on the momentum for participation. She also plans to utilize high-probability requests to keep students engaged.*

### Lesson 2: Model FILMS

The second FILMS lesson begins with reviewing the context for learning which includes recalling important concepts (such as least common denominator) and the five steps of the FILMS mnemonic. Self-regulation tools (mnemonic checklist [see Figure 2], FILMS graphing sheet, self-statements) are then introduced and the modeling phase of SRSD begins. The teacher demonstrates the entirety of the FILMS problem-solving process by thinking aloud the thought process associated with each step and modeling the use of the mnemonic checklist and self-graphing sheet to manage progress.

*During the modeling stage, Miss Larson uses frequent opportunities to respond to keep students engaged during more passive aspects of the lesson. Miss Larson uses fraction tiles and has students draw picture representations of fractions to help her solve the problems during modeling. She has her fifth graders take turns telling her the next step by looking at their checklists or other materials. Miss*

Date: _____		Instructor: _____		Observer: _____	
<b>Lesson 1 Fidelity: Introduce FILMS</b>					
<b>Materials</b>					
_____ All needed materials are present (FILMS mnemonic chart, Learning contract).					
<b>Reviewing Background Knowledge</b>					
_____ Review what the students already know about fractions.					
_____ Introduce numerator and denominator to students.					
_____ Students practice identifying numerator and denominator.					
_____ Review what a multiple is to students.					
_____ Review with students how to multiply a fraction when the fraction is equal to 1.					
<b>Set the Context for Student Learning</b>					
_____ Discuss with students the importance of understanding fractions.					
_____ Introduce the least common denominator (LCD).					
<b>Develop the Strategy and Self-Regulation</b>					
_____ Introduce the FILMS five steps acronym.					
_____ Remind students the importance of using FILMS when finding the LCD and creating new fractions.					
<b>Discuss the FILMS Steps</b>					
_____ Explain F = Find the denominator and show examples.					
_____ Show how the second letter I = Identify the multiples of the denominator.					
_____ Explain that L = Least common multiple and it will be the new denominator for the fraction.					
_____ Uncover the last step with M = Multiply to make new fractions.					
_____ Show an example and S = Solve the problem.					
<b>Obtaining Commitment</b>					
_____ Explain rationale for FILMS strategy.					
_____ Explain need for student commitment.					
_____ Pass out and review the learning contract content.					
_____ Help students complete the learning contract.					
_____ Student and teacher sign the learning contract.					
<b>Memorization Practice</b>					
_____ Ask students to tell you why it is important to use the FILMS strategy.					
_____ Tell students it is important to memorize all the steps.					
_____ Tell them they will continue to practice the strategy until they have it memorized.					
_____ On a scratch piece of paper, have the students write out FILMS with a line by each letter.					
_____ Review the five steps orally. As each step is stated, have students check off the blank space next to the corresponding letter.					
_____ Stress again this strategy will help students when working with fractions.					
<b>Wrap Up</b>					
_____ Tell students they will need to come to the next class and write out the FILMS acronym and review the steps orally.					
_____ End the session with a positive praise statement.					
<b>Total Steps Complete _____ / Total Steps Possible (28) _____ = _____ *100= _____</b>					


**Figure 1.** FILMS Lesson 1 Fidelity Checklist.

Note. FILMS = Find the denominators, Identify the multiples, Locate the least common multiple, Multiply to make new fractions, and Solve the problem.

Larson also models self-statements aloud as she works through the multistep process (see Figure 3).

Self-statements are individualized, positive thoughts (i.e., self-talk) before, during, and after problem-solving. For students who lack the ability to self-regulate negative thinking and emotions, teaching and modeling positive self-talk provides a proactive solution when trapped in negative, debilitating thought processes that ultimately prevent work completion.

At the conclusion of the second lesson, Miss Larson leads her students in using the graphing sheet to color in a film reel for all 10 problems they used FILMS to solve. She passes out markers (letting students choose their favorite color) and has them color in their own film strip. She encourages them to be proud of their ability to solve so many problems collaboratively along with her and reminds them they can earn a reinforcer at the end of the unit if they keep working hard.

	Problem 1	Problem 2	Problem 3	Problem 4	Problem 5	Problem 6	Problem 7	Problem 8	Problem 9	Problem 10
<b>F – Find the denominators</b> <i>Remember denominators are the bottom numbers</i>										
<b>I – Identify the multiples</b> <i>List the multiples of both denominators</i>										
<b>L – Locate the least common multiple</b> <i>The smallest number in both lists is the LCM</i>										
<b>M – Multiply to make new fractions</b> <i>For both fractions, multiply the numerator and denominator by the LCM</i>										
<b>S – Solve the problem</b> <i>Add or subtract the numerators, and drag the denominator over</i>										

**Figure 2.** FILMS Checklist.

Note. FILMS = Find the denominators, Identify the multiples, Locate the least common multiple, Multiply to make new fractions, and Solve the problem; LCM = least common multiple. The film reel and clapboard art was created by one of the authors in Canva under a pro subscription license.

### Lesson 3: Collaborative Practice

In the third FILMS lesson, the teacher facilitates guided practice of the strategy and encourages the use of the FILMS graphic organizer, cue cards, checklist, and additional self-regulation supports. Students and teacher works collaboratively to solve fractions equations as memorization of the strategy develops.


After modeling a few problems, Miss Larson allows her students to work in pairs and teach each other how to solve problems. Miss Larson walks around the room acknowledging students for working, offers behavior-specific praise for students who use self-statements (e.g., “This is getting hard, but I use my steps to get through the problem.” “I’m proud of myself for solving this problem correctly. I can do fractions now.”), and provides suggestions on when to use self-statements for students encountering difficulty. Again, students track their completed problems using markers to color in their film reels.

The third lesson concludes with memorization practice to help students internalize the steps of FILMS. Miss Larson is pleased to see that many of her students have already memorized what FILMS stands for since they have completed a series of practice problems. She asks students to not only memorize each step but also articulate what each step means and why that step is needed.


### Lesson 4: Peer Practice

Students practice the strategy with peers during the fourth FILMS lesson. A short assessment where students list the steps (either verbally or written) of the strategy is given and learning contracts are reviewed and signed to signify strategy completion. A goal is set to use each step of the FILMS strategy on every problem during the lesson, and students are encouraged to use any of their self-regulation supports. The teacher monitors student progress and provides additional assistance when needed. This lesson is





### My Self Statements



**Before starting:**

- ☐ I can use the FILMS mnemonic to keep me on track as I solve the problem.
- ☐ I can draw a picture of my problem on my number line.
- ☐ Fractions are fun. I've got this!

**While I work:**

- ☐ When work gets hard, I will remember my goals.
- ☐ I found the least common multiple, now what? I will check my FILMS steps.
- ☐ If I need help, I can ask my teacher!

**To check my work:**

- ☐ Let me look at my checklist, did I complete all the steps?
- ☐ Even though this problem took a long time, I'm really proud of myself and my work!
- ☐ Yay! I'm done. I solved it correctly!

**Figure 3.** FILMS Self-Statements.

Note. FILMS = Find the denominators, Identify the multiples, Locate the least common multiple, Multiply to make new fractions, and Solve the problem; LCM = least common multiple. The film reel and clapboard art was created by one of the authors in Canva under a pro subscription license.

repeated until the student demonstrates consistent understanding of the strategy.

Miss Larson uses mixed ability groups of three to four students to work on problems together and quiz one another on the steps of FILMS without looking at the FILMS materials. Students are encouraged to draw pictures and use fraction tiles and other manipulatives as they work together. Miss Larson works with targeted students during this time to ensure they are demonstrating proficiency utilizing the steps of FILMS. She also encourages them to talk through the steps and provides a rationale for each one to facilitate conceptual understanding.

### Lesson 5: Fading Supports to Independence

In the final FILMS lesson, students demonstrate independent practice using only minimal supports. For example, if needed, students are encouraged to write the word FILMS at the top of their page and check off steps as they are completed rather than using the checklist or mnemonic chart.

During this lesson, Miss Larson encourages her students to use the FILMS mnemonic any time they must solve problems with fractions (at home, on standardized tests, etc.). She also leads students in a discussion about their feelings about using a strategy to help them in math where the group decides to try more strategies in the future. Miss Larson is proud of her students and tells them they have undoubtedly earned their reinforcement. The students choose to earn extra recess the following day.

Miss Larson reflects on her success with the FILMS lessons. She was able to teach adding/subtracting fractions to mastery in only five days and was able to solidify some underlying conceptual understanding that her students had not previously mastered. She decides that next she wants to use the free, truncated CUT lesson plans for simplifying fractions (Calculate the greatest common factor [GCF], Underline the GCF, Time to divide both numbers by the GCF) and EDIT lesson plans for converting fractions to mixed numbers (Examine whether the numerator is bigger than the denominator, Divide the numerator by the denominator, Insert the quotient as a whole number, Turn the remainder into your new numerator). She is excited to continue using the SRSD framework that had worked so well and is confident her students will continue to relate to the movie metaphor interwoven in the new mnemonics.

### Tips for Teachers

As we have demonstrated throughout this article, SRSD Fractions can be utilized to teach fractions computation to either a whole group/classroom or targeted students. To ease teacher preparation of both content knowledge and materials, all SRSD Fractions lessons can be accessed at <https://www.teachersrsdmath.com>. The website provides additional research detailing the success of the strategy approach and allows educators to download all instructional materials and plans free of expense. Step-by-step procedures are provided to ensure intervention fidelity is achieved. The website also provides resources for using the framework for teaching long division.

## Seek Training in the SRSD Framework

Although minimal training is required to implement *SRSD Fractions*, there are a variety of resources available to support educators throughout the process. SRSD Online (<https://srsdonline.org/>), for example, provides teacher training courses, consultation, and general SRSD information. Within the site, the SRSD Champions Initiative also aims to provide support and encouragement to both individual teachers and whole schools through self-paced and group activities. In addition, the national IRIS Center has developed an online instructional module (<https://iris.peabody.vanderbilt.edu/module/srs/>) outlining each step of the SRSD framework and provides a case study example to further understand implementation procedures.

## Implement Behavior Strategies Whenever Possible

Researchers using SRSD with students with EBD have routinely employed behavioral interventions in tandem with SRSD to support the complex needs of these unique students (Ennis & Jolivet, 2014). Furthermore, all students can benefit from the use of strategies to increase academic engagement. The lessons suggest the implementation of several low-intensity behavioral strategies such as behavior-specific praise, opportunities to respond, choice, and high-probability request sequences, which have been historically paired with SRSD instruction (Ennis, 2015; Sanders et al., 2018).

For instance, offering choice (as Miss Larson utilized in her positive reinforcement reward integrated in her behavior contract) has been effective in prior described studies to increase student commitment and motivation. In addition, self-monitoring progress through the graphing of film reels and correctly solved problems allows students to track their own successes and increases awareness and motivation. A 2018 special issue of *Beyond Behavior* on effective low-intensity strategies to enhance school success provides step-by-step guidelines for implementing such strategies within academic contexts (Lane et al., 2018). These articles also provide details for access to free, online training materials to help increase teacher's repertoire of effective low-intensity strategies.

## Conclusion

Due to the high correlation between fractions and future success in mathematics, fractions computation is a critical skill set to master in the elementary years (Siegler et al., 2012). As such, research- or evidence-based instructional approaches are required to deliver the sound conceptual and procedural foundation required for future mathematics tasks and classes, especially for students experiencing math difficulties and/or

characteristics of EBD. The *SRSD Fractions* program satisfies this need through a series of lessons and strategies that provokes student interest, teaches and promotes self-regulation skills, and establishes skill independence through scaffolded support.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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