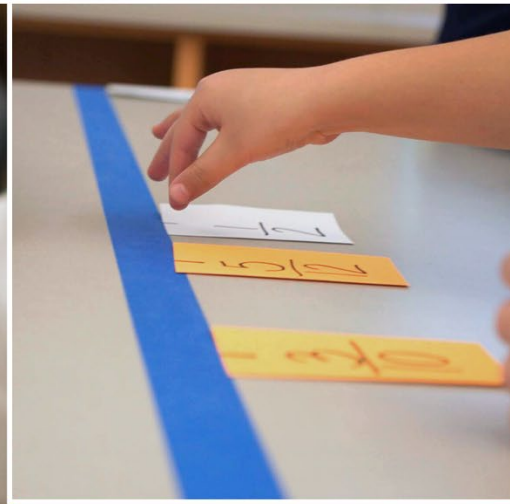
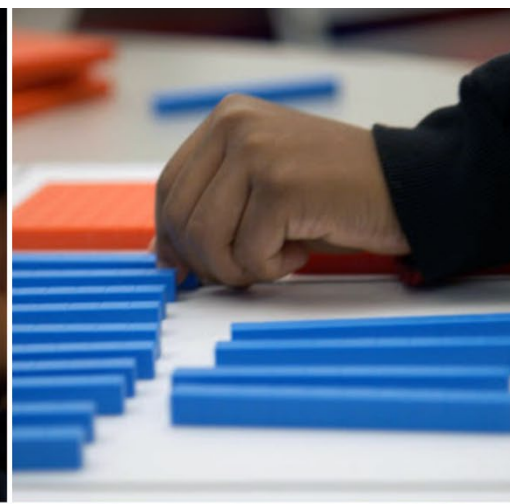
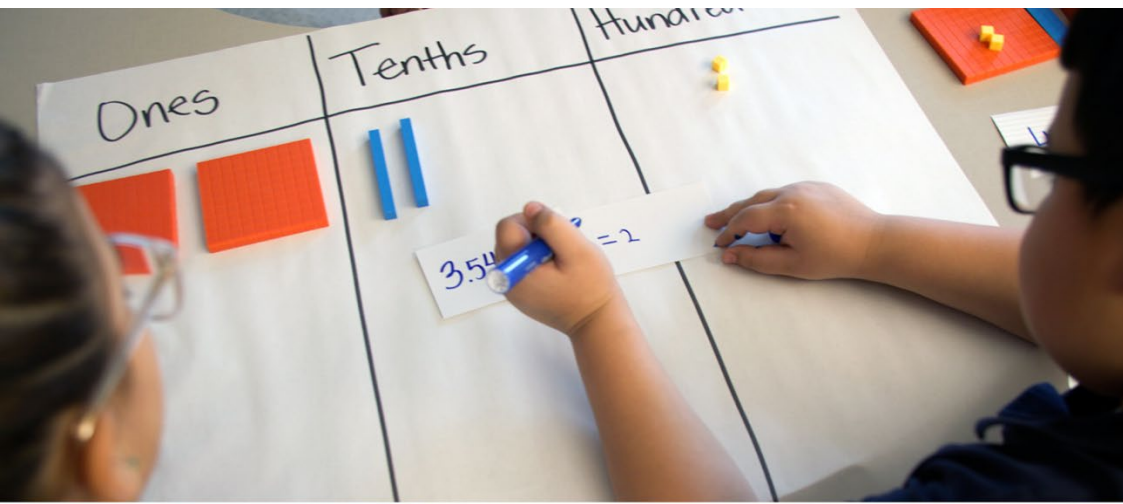


# Mathematics Intervention Toolkit: Systematic Instruction Module

## Facilitator Guide

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# Introduction to the Course

The Mathematics Intervention Toolkit provides districts with resources to implement a **professional development (PD) course** with teachers of mathematics intervention in grades 3–6. The course focuses on the evidence-based recommendations of the What Works Clearinghouse Practice Guide *Assisting Students Struggling with Mathematics: Intervention in the Elementary Grades*<sup>1</sup> (WWC Guide). These recommendations are based on a rigorous review and synthesis of research studies of effective intervention practices. The course is designed to connect this important research to classroom practice by building teachers’ knowledge and strategies for implementation with their students.

The course has a series of **modules** to support in-depth professional learning and flexibility in implementation. The sequence starts with an Introductory Module and continues with five modules, each focusing on one recommendation from the WWC Guide.<sup>2</sup> These modules actively engage participants in exploring the recommendations, implementation steps, and evidence-based strategies. The mathematical language and representations modules build a strong foundation for the later modules, number lines, and word problems. The sequence ends with systematic instruction because this recommendation brings together strategies from the full course.

## Course Sequence

Introductory Module

Module 1: Mathematical Language

Module 2: Representations

Module 3: Number Lines

Module 4: Word Problems

Module 5: Systematic Instruction\*

\*Current Module

## Participants

The course is specifically designed for **teachers of mathematics intervention in grades 3–6**. This includes teachers with different roles, such as interventionists, Title I teachers, math specialists, general educators, and special educators. The recommendations and strategies will be applicable to teachers in different intervention settings, including separate intervention classes, intervention/enrichment blocks, and designated times for intervention during core mathematics classes. Similarly, the course will support teachers who use a variety of programs/curricula or who do not have a program. Teachers will have opportunities to apply strategies with their students in their own intervention contexts.

<sup>1</sup> Fuchs, L.S., Newman-Gonchar, R., Schumacher, R., Dougherty, B., Bucka, N., Karp, K.S., Woodward, J., Clarke, B., Jordan, N. C., Gersten, R., Jayanthi, M., Keating, B., and Morgan, S. (2021). *Assisting students struggling with mathematics: Intervention in the elementary grades* (WWC 2021006). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. Retrieved from <http://whatworks.ed.gov/>.

<sup>2</sup> The course focuses on five recommendations. Information about the sixth recommendation, Timed Activities, is available in the [WWC Guide](#).

## Facilitators

The course is intended to be led by one facilitator or two co-facilitators, such as **district or school math leaders, math coaches, or teacher leaders**. Their main tasks are facilitating the professional learning community (PLC) sessions and communicating with participants. Course facilitators need expertise with elementary mathematics content and pedagogical practices, prior experience leading PD activities, and facilitation skills. They do *not* need to have already taken the course or be math intervention experts; they can learn together with the participants. The course provides ready-to-use resources, including Facilitator Guides, session agendas, slides with presenter notes, and handouts.

## Format

The course uses a **hybrid format** that combines online learning, PLC sessions (in-person or virtual), and classroom implementation. In the online sessions, participants learn about the recommendations through videos, readings, activities, and other resources. These flexible sessions are self-paced and asynchronous. At the facilitated PLC sessions, participants discuss the recommendations, try strategies, and prepare to use instructional routines with students. To connect research to classroom practice, the course

provides ready-to-use routines that incorporate evidence-based strategies. Participants use the routines with students and then share their experiences at subsequent PLC sessions.



## Mathematics Content Focus

The course focuses on key **number and operations** topics, such as **fractions**, that are a high priority for mathematics intervention. Building a strong foundation with fractions is critical for students' success with grade-level mathematics and future classes. The modules provide example activities for supporting students' learning of fraction magnitude, representations, equivalence, comparison, and operations. There are also activities on place value, decimals, number lines, and word problems with multiplication and division. In addition, participants will be able to apply the recommendations and strategies to other mathematics content areas.

Information about implementing the full course is in the [Leader Guide](#).

"Intervention is an opportunity for students to build understanding in the most critical grade-level topics... Fractions in grades 3 and 4, for example, can be difficult for students and are critical for students to understand for virtually all new mathematics learning through middle and high school."

WWC Guide, p. 10

# Module Overview

This PD module focuses on the WWC Guide’s recommendation for systematic instruction. The term systematic describes instruction that is intentional and strategically sequenced to build students’ knowledge toward identified learning outcomes. This approach is specifically designed to support students who are struggling with mathematics. Systematic instruction incorporates evidence-based strategies from the other modules, such as the use of visual and verbal supports. Focusing on systematic instruction in the final module provides opportunities to bring together and build upon ideas in the full PD course.

## Recommendation for Systematic Instruction

Provide systematic instruction during intervention to develop student understanding of mathematical ideas.

### Implementation Steps

- Review and integrate previously learned content throughout intervention to ensure that students maintain understanding of concepts and procedures.
- When introducing new concepts and procedures, use accessible numbers to support learning.
- Sequence instruction so that the mathematics students are learning builds incrementally.
- Provide visual and verbal supports.
- Provide immediate, supportive feedback to students to address any misunderstandings.

Source: WWC Guide, pp. 5–10



## Professional Learning Goals

*Participants will:*

- Build knowledge of the WWC Guide’s recommendation for providing systematic instruction to teach students struggling with mathematics.
- Build knowledge of evidence-based strategies and how to implement them effectively to provide systematic instruction.
- Strengthen your ability to plan for and implement systematic instruction with your students.
- Reflect on your learning in the full PD course and plan actions for strengthening strategies.



## Key Questions

Participants will explore these questions:

1. **What** is the WWC Guide's recommendation for systematic instruction?
2. **Why** is systematic instruction important for student learning?
3. What are **strategies** for **how to** implement the recommendation?
4. What are **ways to apply** the recommended strategies with your students?
5. What are **potential challenges** and ways to address them?



## Mathematics Content Focus

This module's mathematics content focus is on **fraction equivalence, comparison, addition, and subtraction**. The example strategies and activities illustrate ways to implement systematic instruction for these key fraction topics. The recommendation and strategies are also applicable to other mathematics topics for the elementary grades.

## Module Resources

The Systematic Instruction Module includes the following resources for facilitators and participants:

- **Online Component**: Provides information, resources, and activities for the module.
- **Facilitator Guide** (current document): Provides detailed information for facilitating the module. For the PLC session, the guide includes an agenda, a preparation list, pictures of the slides with presenter notes, and facilitation tips.
- **Slide Deck for Facilitators**: Provides slides with presenter notes. Note that these are the same presenter notes that are included in this Facilitator Guide.
- **Participant Workbook**: Provides all the handouts that participants will use at the PLC session. It includes appendices with reproducible handouts and a copy of the Systematic Instruction recommendation from the WWC Guide.
- **Glossary**: Provides relevant mathematical terms with definitions for the course.
- **Leader Guide**: Provides information on implementing the course.

The **Mathematics Intervention Toolkit**, which includes all the PD Course resources, is available for free at <https://ies.ed.gov/ncee/rel/math-support-grades-3-6>.

### Online Component

The module's Online Component is organized by tabs, which are numbered to show the sequence of activities (figure 1).

**Figure 1. Tab Menu of the Online Component for All Sessions in the Module**



#### Description of tabs:

- **Tab 1. Intro**: Introduces the module's goals, key questions, and sequence.
- **Tab 2. PLC Session**: Provides key resources and activities for use during and after the session.
- **Tab 3. Wrap-Up**: Provides short reflection activities for participants to do independently.
- **Resources**: Provides a hyperlinked list of module resources and optional additional resources.

# Module Schedule

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This final module is about 1-week long, which is shorter than Modules 1–4. It has only **one** PLC session and does *not* have online activities to complete beforehand or an instructional routine to use afterward. Use the information below to plan the schedule.

- **PLC Session:** One session held on 1 day.
- The session can be held in person or virtually. Because this is the final session of the course, it can be beneficial to meet in person.
- There are agenda options for two session lengths: 90 minutes or 120 minutes. Because this is the final session, it can be helpful to allow more time for participants to reflect on their learning in the session and the full course.

**Wrap-Up tab:** Reflection activities for participants to complete *after* the PLC session.

- The two wrap-up activities will take about 20–30 minutes in all.
- Provide a time span of about 1 week for participants to complete the activities shortly after the PLC session, so the content is still fresh in their minds.

### Alternative scheduling options:

- If you would like to spend more time on the systematic instruction recommendation, consider leading two PLC sessions. Split the agenda into two sessions (Parts 1-2 and Parts 3-4) and extend the times for the activities.
- If you would like to have extended time to wrap up the full course, consider adding a separate closing session that uses activities from Part 4 of the PLC session and the Wrap-Up tab. Provide opportunities for reflection, discussion, and bringing together ideas from the full course. Engage participants in brainstorming and planning ways to continue working together to strengthen their mathematics intervention strategies.

# Professional Learning Community (PLC) Session

This PLC session focuses on the WWC Guide’s recommendation for systematic instruction. As the facilitator, you will lead discussions and activities to engage participants in learning about the recommendation and evidence-based strategies. For this final module, the wrap-up section includes an opportunity to reflect on learning in the session and the full course.

## Agenda

- Section 1.** Welcome and Goals
- Section 2.** Explore the Recommendation, Part 1
- Section 3.** Explore the Recommendation, Part 2
- Section 4.** Wrap-Up

## Session Formats and Schedule

For this final session, it is recommended, but not required, that you meet in person to close the course. The session can also be held virtually. If you are implementing the course with multiple PLC groups, you have the option of facilitating one in-person session with all the groups together, like the Kick-Off Session, or meeting with just one PLC group at a time.

There are agenda options for two session lengths: 90 minutes or 120 minutes. Because this is the final session, it can be helpful to allow more time for participants to reflect on their learning in the session and the full course. For larger groups, it’s helpful to use the 120-minute agenda because activities tend to take longer with more participants.

## Preparation Tasks

Use this list to prepare for facilitating the session.

### For Both Formats (In-Person and Virtual)

- 1. Get to know the session.**
  - **Agenda:** Review the session agenda for your chosen time (90 minutes or 120 minutes).
  - **Slides:** Review the slides and presenter notes in this Facilitator Guide or in the slide deck.
  - **Activities:** Try the activities yourself to get familiar with them. Read this guide’s tips for facilitating the activities in the presenter notes section below.
- 2. Prepare and gather materials.** See the materials list on the next page.

### For Virtual Sessions

- 3. Plan how you will implement the card sorting activity** (Section 3 of the agenda). You can use a virtual version of the activity, which is on the PLC Session tab of the Online Component. Note that this virtual activity is set up so that each person opens their own copy. It’s **not** possible for two participants to both move cards concurrently on the same screen. Here are two options for using the activity at your session:

- a. **Pairs in breakout rooms:** Move participants into breakout rooms to do the sorting activity in pairs. In each pair, partner 1 shares their screen and moves the cards for both participants. Partner 2 says where they want to place a card, and partner 1 moves it to that category for them. Make sure that participants will be able to screen share in breakout rooms.
- b. **Whole group:** Facilitate a whole-group version of the activity. Share your screen and ask participants to take turns telling you where they want to place a card and why. You will move the cards for each player. Be sure to clarify how this version is different from what students would do to sort actual cards in pairs.

## Communication Tasks

1. **Before the session.** Send email reminders to participants with the session's date/time, topic, and any materials to bring. For this PLC session, there are **no** preparation tasks for participants to do in advance.
2. **After the session.** Send emails to encourage and remind participants to complete the Wrap-Up tab activities, including the Self-Reflection Form.

## PLC Session: Materials List

### For Both Formats (in-person and virtual)

- [Slide Deck for PLC Session](#)**: Download the file to your computer. Presenter notes are provided below each slide and in this Facilitator Guide. The files is available as a PowerPoint and PDF.
- [Participant Workbook/Handouts](#)**: Provide participants with a copy of all the handouts. It is optional to print the Appendices. Participants will also have access to an electronic file version of the workbook.

### For In-Person Sessions

- Prepare chart papers for:** 1) Agenda, 2) Norms, and 3) Parking Lot. Have additional chart paper available if you want to record ideas during discussions.
- Aim Low, Aim High Games:**
  - Print copies of the two gameboards (**H4** and **H6**): One per person
  - Print copies of the spinner handout (**H5**): One per pair.
  - Provide paper clips to use to spin the spinners: One per pair.
- Equivalent Fraction card sort:** Prepare one card set per pair (**Appendix C** in [Participant Workbook](#)).
- Fraction Tiles:** One set of fraction tiles per pair.
- Other materials:** Markers for writing on chart papers and sticky notes.

### For Virtual Sessions

- Aim Low, Aim High Games:** Prepare copies of the gameboards and spinners (**H4–H6**): One per person. Provide printed copies in advance of the session.
- Equivalent Fractions card sort:** Use the virtual sorting activity that is available on the PLC Session tab of the module's Online Component. Another option is to prepare card sets to give to participants in advance, one set per person (**Appendix C** in Participant Workbook).
- Ask participants to bring the following materials to the virtual session:
  - Printed copy of the handouts you provided in advance.
  - One paper clip and a pencil/pen for spinning the spinners.
  - One set of fraction tiles (optional).

## Agenda for PLC Session

This agenda provides times for two session lengths: A) 90 minutes or B) 120 minutes. The agenda lists the four sections and suggested times. All the handouts are in the Participant Workbook.

### Agenda for PLC Session

Section and Main Activities	A. 90 min.	B. 120 min.
<p><b>1. Welcome and Goals</b></p> <p>1.1 Provide an overview of the session’s agenda, goals, and norms.</p> <ul style="list-style-type: none"> <li>• Warm-Up: Partner discussions (5 min.).</li> </ul> <p>Slides: 2–6</p>	10 min.	10 min.
<p><b>2. Explore the Focus Recommendation, Part 1</b></p> <p>2.1 Introduce the recommendation.</p> <p>2.2 Focus on three implementation steps.</p> <ul style="list-style-type: none"> <li>• Carefully sequence instruction.</li> <li>• Use accessible numbers.</li> <li>• Provide visual and verbal supports.</li> </ul> <p>2.3 Lead activity that incorporates all three implementation steps.</p> <ul style="list-style-type: none"> <li>• Activity: Play and discuss games for fraction comparison and addition. (A: 20–25 min.; B: 30–35 min.).</li> </ul> <p>Slides: 7–27 Handouts: <b>H1–H6</b></p>	40–45 min.	50–55 min.
<p><b>3. Explore the Focus Recommendation, Part 2</b></p> <p>3.1 Focus on the two remaining implementation steps:</p> <ul style="list-style-type: none"> <li>• Provide supportive feedback (10 min.).</li> <li>• Review and integrate previously learned content.</li> </ul> <p>3.2 Facilitate activity and discussion.</p> <ul style="list-style-type: none"> <li>• Activity: Use the card sorting routine for equivalent fractions. Then, plan for use with students. (A: 15–18 min.; B: 20–25 min.).</li> </ul> <p>Slides: 28–37 Handouts: <b>H7–H9</b></p>	25–28 min.	30–35 min.
<p><b>4. Wrap-Up</b></p> <p>4.1 Facilitate two discussions to reflect on in the session and the full course.</p> <p>Slides: 38–42 Handout: <b>Course Checklist</b></p>	10–12 min.	15–20 min.
	<b>90 min.*</b>	<b>120 min.</b>

\*Use the time ranges for each section to increase or decrease times to fit the needs of your group.

## Options for Adjusting the Time

The agenda provides times for two session lengths: 1.5 hours/90 minutes and 2 hours/120 minutes.

If your session is 45-60 minutes long, consider these options:

- Lead two sessions by splitting the agenda into two parts: One session on Sections 1–2 and a second session on Sections 3–4. Have an extended wrap-up discussion about the full course in Section 4.
- Lead one session by shortening or skipping one or more activities. Consider these options:
  - Section 2: Play one of the two Aim Low, Aim High games. Briefly describe the second game, but do not play it.
  - Section 3: Describe the card sorting activity for reviewing equivalent fractions, but skip having participants try it themselves. Provide time for participants to use the Planner to plan ways to use card sorting activities to review content.

### Tips for Facilitators

- Feel free to communicate the information in your own words. The presenter notes are just meant to be examples of what you might say.
- To prepare for the session, read through the presenter notes. When you facilitate, please do not be concerned about remembering everything in the notes. It's okay if you do not talk about all the points. The main points are on the slides.
- Stay focused on the agenda, and avoid having the group go off on tangents. Use a Parking Lot chart paper to note topics/questions that you do not have time to discuss at the session so you can revisit them at another time.
- It's okay to adjust the times in the agenda. The times will vary for different groups — some groups are more talkative than others. In addition, a session may take longer the first time you facilitate it. In the presenter notes, there are suggestions for what to shorten or skip if time is short.
- Foster a welcoming, supportive, and collaborative learning community. Invite active participation and sharing of ideas. Revisit the goals and norms at each session to keep them in the forefront of the group's work together.
- Look for opportunities to make connections to participants' experiences and your school/district context.

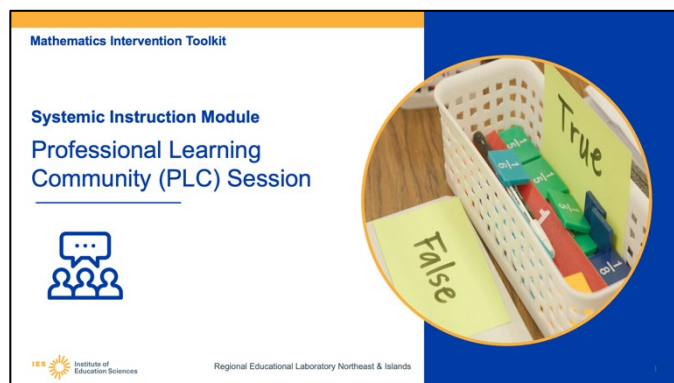
## Slides and Presenter/Facilitator Notes

This section provides a picture of each slide with corresponding presenter notes. The information is organized into these categories:

- **SLIDE NUMBER:** The slides are in sequence by number to match their order in the deck.
- An asterisk \* indicates that the slide is animated. The presenter's notes provide guidance for showing and talking about one part at a time.
- **NOTES:** Provides directions and information for the facilitator, such as how to set up an activity. Some slides do not have any notes.
- **SAY:** Provides suggestions of ideas about what to say and do. It is *not* meant to be a script. Use these examples to communicate the ideas in your own way.
- Regular text provides an example of what to **say**.
- *Italicized text indicates something you or participants should do.*
- [Highlighted text in brackets] indicates information about session dates, times, and other information that you need to fill in on the slides.
- **EXAMPLE RESPONSES:** To help you prepare for facilitating discussions, this guide includes some example responses from past participants.

### SLIDE 1

**NOTES:** Display this slide at the start of the session.



## Section 1. Welcome and Goals

**Time:** About 10 minutes for this section; includes 5 minutes for partner discussions (Slide 6).

**Slides:** 2–6

**Note:** The presenter notes for this section were written with the assumption that participants have already participated in a prior module. However, if this is the first module for participants, we suggest that you spend more time introducing the PLC goals and norms.

## SLIDE 2

**SAY:** We will begin with an introduction to the goals and agenda for this session.

Section 1  
Welcome and Goals

IES Institute of Education Sciences Systematic Instruction PLC Session

2

## SLIDE 3

**SAY:** Here is our agenda for today's session. First, we will start with the Welcome and Goals section. Next, we will delve into the focus recommendation—systematic instruction. We'll do this in two parts to explore a few implementation steps at a time. Lastly, we will close with a short Wrap-Up.

PLC Session: Systematic Instruction

**Agenda**

- Section 1. Welcome and Goals
- Section 2. Explore the Recommendation, Part 1
- Section 3. Explore the Recommendation, Part 2
- Section 4. Wrap-Up

IES Institute of Education Sciences Systematic Instruction PLC Session Source: Toolkit Authors

3

## SLIDE 4

**SAY:** Let's revisit the main goals for our PLC sessions. We aim to work together to build our strategies for supporting students who struggle with mathematics. We will collaborate on planning for classroom implementation, share successes and challenges, and brainstorm ways to strengthen our daily practice.

Revisit PLC Goals

**Group members will:**

- Learn together about the What Works Clearinghouse (WWC) Practice Guide's recommendations for supporting students struggling with mathematics.
- Plan for and implement strategies with students and debrief experiences.
- Support each other in using strategies, sharing successes and challenges, and strengthening implementation.

IES Institute of Education Sciences Systematic Instruction PLC Session Source: Toolkit Authors

4

## SLIDE 5

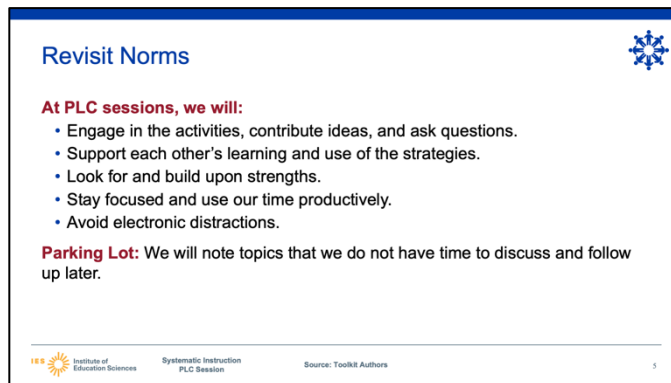
**NOTES:** You might want to highlight a particular norm based on prior PLC sessions.

**SAY:** To help us achieve our PLC goals, it is important to revisit the PLC norms that guide our work together. Let's plan to prioritize staying focused on the recommendation for systematic instruction and using our time productively. To do that, it's essential to avoid electronic distractions.

## SLIDE 6

**SAY:** The focus of today's session is on the recommendation for systematic instruction. Providing systematic instruction involves using strategies from the prior modules, such as visual and verbal supports. For the warm-up, we will move into pairs to share one or two visual or verbal supports that you find helpful for students. Discuss the questions on the slide.

*Participants move into pairs. Allow about 5 minutes for these partner discussions.*



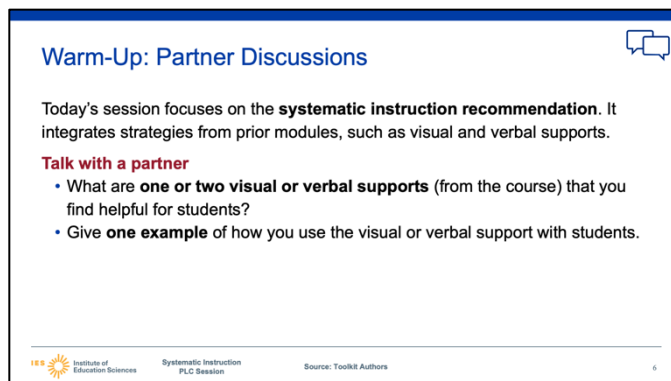
**Revisit Norms**

**At PLC sessions, we will:**

- Engage in the activities, contribute ideas, and ask questions.
- Support each other's learning and use of the strategies.
- Look for and build upon strengths.
- Stay focused and use our time productively.
- Avoid electronic distractions.

**Parking Lot:** We will note topics that we do not have time to discuss and follow up later.

IES Institute of Education Sciences Systematic Instruction PLC Session Source: Toolkit Authors 5



**Warm-Up: Partner Discussions**

Today's session focuses on the **systematic instruction recommendation**. It integrates strategies from prior modules, such as visual and verbal supports.

**Talk with a partner**

- What are **one or two visual or verbal supports** (from the course) that you find helpful for students?
- Give **one example** of how you use the visual or verbal support with students.

IES Institute of Education Sciences Systematic Instruction PLC Session Source: Toolkit Authors 6

## Section 2. Explore the Recommendation, Part 1

**Time:** Here are the times for the two session lengths: A) 90 minutes and B) 120 minutes:

- A: 40–45 minutes for the full section, including the mathematics games (20–25 minutes).
- B: 50 minutes for the full section, with more time for the mathematics games (30–35 minutes).

**Slides:** 7–27

**Handouts:** H1–H6 (in the Participant Workbook)

**Suggestions Related to Time:**

- **If time is short**, have participants try just one of the two Aim Low, Aim High games. Decide whether to focus on the fraction comparison game or the fraction addition game. Make sure to provide time for teachers to discuss ways to use the game with students.
- **If you have additional time available**, consider these options:
  - Increase the time for participants to discuss the implementation steps and strategies. You may want to select specific strategies to discuss in more depth based on your participants' needs and interests.
  - Increase the time for participants to play the Aim Low, Aim High games and discuss ways to use them with their students.

## SLIDE 7

**SAY:** In this section, we will explore the What Works Clearinghouse Guide's recommendation for **systematic instruction**.

## SLIDE 8

**SAY:** In every module, we use a consistent set of key questions to focus our learning about the recommendation. Here are the questions for systematic instruction.

*Give participants time to read the slide.*

## SLIDE 9\*

**NOTES:** This slide has short versions of the implementation steps. A copy of the full text on the handout titled **H1. Reference Sheet**.

**SAY:** Let's take a deep dive into the recommendation for systematic instruction. Please take out the handout titled **H1. Reference Sheet** on pages 5-6 to see a copy of the recommendation. You can use this handout to take notes today.

*Read the recommendation aloud. Then show the implementation steps.*

The Guide provides five implementation steps for carrying out the recommendation.

*Read the short versions of the implementation steps.*

We'll take a closer look at these implementation steps and try specific strategies in today's session.

**Key Questions**

We will explore these questions:

1. What is the WWC Guide's recommendation for systematic instruction?
2. Why is providing systematic instruction important for student learning?
3. What are **strategies** for **how to** implement the recommendation?
4. What are **ways to apply** the recommended strategies with your students?
5. What are **potential challenges** and ways to address them?

**Recommendation: Systematic Instruction**

"Provide systematic instruction during intervention to develop student understanding of mathematical ideas."

Level of Evidence: Strong [WWC Guide, p. 5](#)

**Implementation Steps**

1. Carefully sequence instruction.
2. Use accessible numbers.
3. Provide visual and verbal supports.
4. Provide timely and specific feedback.
5. Review and integrate previously learned content.

**Note:** Steps can be used concurrently and in different orders.

## SLIDE 10\*

**SAY:** Let's start by focusing on sequencing instruction.

*Read the quote in the blue box.*

*Use the animation to show the suggestions.*

Devising a sequence of instruction requires careful and intentional planning for teaching high-priority mathematics content. Sequence instruction strategically to build on prior learning to reach specific learning outcomes. It's helpful to deepen your own understanding of the progression of mathematics content so that you can make sequencing decisions to support students. We'll delve into the progression of fraction concepts on the next few slides.

**Step A. Carefully Sequence Instruction**

"Structure the pace and topics in intervention in such a way that promotes learning the mathematics more deeply; this often means taking more time."  
WWC Guide, page 10

**Suggestions**

- Focus on high-priority topics.
- Use an intentional sequence that builds toward specific learning outcomes.
- Introduce concepts strategically by building on prior learning.
- Deepen your own understanding of the progression of standards.

Institute of Education Sciences | Systematic Instruction PLC Session | Source: WWC Guide | 10

## SLIDE 11

**SAY:** As we mentioned on the prior slide, it's important to focus on high-priority mathematics topics, like fractions, in mathematics intervention. This slide shows an example progression of fraction topics.

For students to have a deep and flexible understanding of fractions, they need to understand fractions as numbers with magnitude and be able to represent fractions numerically and visually. They also need to understand fraction equivalence and be able to compare fractions. These foundational topics are critical for students' success with fraction operations in the upper elementary and middle grades.

In today's session, we will focus on fraction equivalence, comparison, addition, and subtraction to provide examples for systematic instruction.

**Sequence Instruction**

**Focus on Fractions: Example Progression**

- Understand fractions as numbers.
- Represent fractions.
- Determine equivalence.
- Compare fractions.
- Add fractions.
- Subtract fractions.
- Multiply whole numbers by fractions; multiply fractions by fractions.
- Divide whole numbers by fractions or vice versa; divide fractions by fractions.

Institute of Education Sciences | Systematic Instruction PLC Session | Sources: Common Core State Standards and Toolkit Authors | 11

## SLIDE 12\*

**SAY:** Let's look at the next implementation step, which is to use accessible numbers.

*Read the quote in the blue box.*

Let's discuss what it means for fractions to be accessible by looking at examples. Do you think that  $\frac{1}{4}$  or  $\frac{1}{7}$  is more accessible to students? Why?

*Use animation to show one pair of fractions at a time and have participants share responses.*

**Step B. Use Accessible Numbers**

"When introducing new concepts and procedures, use accessible numbers to support learning."  
WWC Guide, page 6

**Let's discuss choosing accessible fractions.**

- Focus on one pair of fractions at a time.
- For each pair, which of the two fractions do you think is **more accessible** for students? Why?

a.  $\frac{1}{4}$  or  $\frac{1}{7}$  ?      b.  $\frac{3}{5}$  or  $\frac{4}{8}$  ?      c.  $\frac{11}{12}$  or  $\frac{19}{20}$  ?

Institute of Education Sciences | Systematic Instruction PLC Session | Sources: WWC Practice Guide; Activity from Toolkit Authors | 12

(See example responses below.)

### Slide 12: Example Responses

**Question:** For each pair, which of the two fractions do you think is more accessible to students?

- a.  $\frac{1}{4}$  or  $\frac{1}{7}$ ? **Answer:**  $\frac{1}{4}$  is more accessible than  $\frac{1}{7}$ .
- I think  $\frac{1}{4}$  would be more accessible because fractions with even denominators tend to be easier for students. It is more difficult to partition a whole into seven equal parts than into four equal parts.  $\frac{1}{4}$  is a friendlier and more familiar fraction for students.
  - Both fractions are unit fractions, so students need to focus on just the denominators. I think  $\frac{1}{4}$  is more accessible because it would be easier to draw and visualize fourths than sevenths.
- b.  $\frac{3}{5}$  or  $\frac{4}{8}$ ? **Answer:**  $\frac{4}{8}$  is more accessible than  $\frac{3}{5}$ .
- I think  $\frac{4}{8}$  is more accessible because it is equivalent to  $\frac{1}{2}$ . Students can reason that 4 is half of 8, so it is equivalent to  $\frac{1}{2}$ . Also,  $\frac{4}{8}$  has an even denominator. The fraction  $\frac{3}{5}$  has an odd denominator, which makes it more challenging to draw or visualize than  $\frac{4}{8}$ .
  - Students can simplify  $\frac{4}{8}$  to  $\frac{1}{2}$ , which is a benchmark fraction that students are likely to have experience with. So, I think  $\frac{4}{8}$  is more accessible than  $\frac{3}{5}$ .
- c.  $\frac{11}{12}$  or  $\frac{19}{20}$ ? **Answer:** A case could be made for each fraction. These two fractions were chosen to allow for different viewpoints about which one is more accessible.
- I think these fractions are similar in terms of accessibility. Each fraction is close to one whole.  $\frac{11}{12}$  needs one more twelfth to make one whole.  $\frac{19}{20}$  needs one more twentieth to make one whole. Both denominators are even numbers.
  - I think that  $\frac{11}{12}$  is more accessible because it has fewer parts than  $\frac{19}{20}$ . It would be more difficult to draw twentieths.

## SLIDE 13

**SAY:** Take a look at this list of suggestions for selecting accessible fractions. Some of these ideas came up in our discussion about the example fractions. Please take out the handout called **H2, Suggestions for Choosing Accessible Numbers** on page 7.

*Highlight a few points and make connections to the ideas that participants brought up in the discussion about the example fractions (Slide 12).*

Accessible Numbers

### General Strategies for Using Accessible Fractions

- Use unit fractions ( $\frac{1}{4}$ ) before moving to non-unit fractions ( $\frac{3}{8}$ ).
- Use benchmark fractions ( $\frac{1}{2}$ ) and others close to benchmarks ( $\frac{5}{8}$ ).
- Choose even-number denominators—easier to draw and partition.
- Choose denominators with smaller numbers—fewer pieces to build and draw.
- Choose fractions you can model with fraction tiles/circles:  $\frac{2}{2}$   $\frac{3}{4}$   $\frac{4}{5}$   $\frac{6}{8}$   $\frac{10}{12}$

Institute of Education Sciences Systematic Instruction PLC Session Sources: WWC Guide and Toolkit Authors Handout: H2, p.7 13

## SLIDE 14

**SAY:** Now, let's combine both implementation steps by using accessible numbers and sequencing to support student learning. The slide maps out an example sequence for comparing fractions that begins with accessible fractions and incrementally increases in complexity. It's helpful to start with students comparing fractions with the same denominators, then move to fractions with the same numerators but different denominators.

Accessible Numbers and Sequencing

### Creating a Sequence for Fraction Comparison

Compare fractions with:

1. Same denominators.  $\frac{1}{8}$   $\frac{5}{8}$
2. Same numerators.  $\frac{3}{8}$   $\frac{3}{10}$
3. Different denominators and different numerators.
  - One denominator is a **multiple** of the other.  $\frac{3}{4}$   $\frac{5}{8}$
  - Not multiples but have **common factors**.  $\frac{4}{6}$   $\frac{6}{8}$
  - Denominators are **relatively prime** (no common factors except 1).  $\frac{3}{4}$   $\frac{2}{7}$

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## SLIDE 15

**NOTE:** This is the first of two slides on fraction addition. Have participants discuss the sequence on this slide before moving on to the next slide.

**SAY:** Look over this example sequence of fraction addition problems. How does this sequence progress from simpler to more complex? Think first individually.

*Give participants a moment to think about the sequence. Then, ask participants to share ideas.*

Accessible Numbers and Sequencing

### Fraction Addition: Example Sequence

**Discuss:** How does this sequence progress from simpler to more complex?

a.  $\frac{1}{8} + \frac{3}{8}$       b.  $\frac{1}{8} + \frac{3}{4}$       c.  $\frac{1}{8} + \frac{5}{6}$       d.  $\frac{1}{8} + \frac{2}{5}$

f.  $\frac{9}{8} + \frac{5}{4}$       g.  $1\frac{3}{8} + 2\frac{1}{4}$       h.  $1\frac{7}{8} + 2\frac{3}{4}$

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Let's share ideas. What do you notice about how the sequence progresses from simpler to more complex?

*Participants share ideas. Then, move on to the next slide to show information about the sequence.*

## SLIDE 16\*

**SAY:** Let's look at more information about the sequence of fraction addition problems.

*Use animation to show one part of the sequence at a time. Make connections to the ideas that participants brought up in the prior discussion. Highlight any ideas that didn't come up in the discussion.*

We could create a similar sequence for fraction subtraction problems.

Accessible Numbers and Sequencing

### Fraction Addition: Example Sequence

Look at the labels below the problems to see how the sequence progresses.

a. $\frac{1}{8} + \frac{3}{8}$ Like denominators	b. $\frac{1}{8} + \frac{3}{4}$ Unlike denominators, multiples	c. $\frac{1}{8} + \frac{5}{6}$ Unlike denominators, common factors	d. $\frac{1}{8} + \frac{2}{5}$ Unlike denominators, relatively prime
f. $\frac{9}{8} + \frac{5}{4}$ Fractions are greater than 1	g. $1\frac{3}{8} + 2\frac{1}{4}$ Mixed numbers, no regrouping	h. $1\frac{7}{8} + 2\frac{3}{4}$ Mixed numbers, with regrouping	

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## SLIDE 17

**NOTE:** The purpose of handout **H3** is to provide participants with a resource for future use. It summarizes the information on the slides and provides examples. There isn't enough time in this section for participants to read the handout.

**SAY:** We can use this guidance on accessible numbers and sequencing to select problems strategically to address students' needs. For example, if students are having difficulties with a problem type, we can select more foundational problems. Similarly, we can create sequences to move forward incrementally to more complex problems.

What's one way you might use sequencing or accessible numbers to support students? Share ideas that you would like to try or that you currently use.

*Participants share ideas.*

The handout titled **H3. Example Sequences for Fraction Problems** has the information from this section. It's a resource that you can use in the future for planning instruction.

Accessible Numbers and Sequencing

### Select and Sequence Problems Strategically

Support student learning by selecting problems to:

- Provide more practice with similar problems.
- Move forward incrementally to more complex problems.
- Move back to more foundational problems.
- Gather formative information about students' understandings and difficulties.

**Share:** How might you use sequencing and/or accessible numbers to support students?

**Resource:** Handout with sequences for fraction problems (H3).

IES Institute of Education Sciences Systematic Instruction PLC Session Handout: H3, pp. 8-10 17


## SLIDE 18

**SAY:** The next implementation step is to use visual and verbal supports. Here is a quote from the What Works Clearinghouse Practice Guide.

*Read the quote on the slide.*

Throughout the course, we have focused on using visual and verbal supports to help students build understanding of mathematics concepts and procedures. These strategies are intended to support students in actively doing mathematics and explaining their ideas. The caution is to avoid supports that “tell too much,” such as using leading questions or prompts that tell students what to do to get the answer. It’s essential for students to do the work of solving the problems themselves, with support as needed, so that they can make sense of the mathematics.


### Step C. Use Visual and Verbal Supports




“At the heart of all interventions for students who struggle with mathematics are efforts to support student learning. This can be done using visual and verbal supports.” WWC Guide, p. 7

**Examples**

- **Visual Supports:** Manipulatives, drawings, and number lines.
- **Verbal Supports:** Sentence starters, questions, and vocabulary charts.




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## SLIDE 19

**SAY:** We have focused on three of the five implementation steps: Carefully sequence instruction, use accessible numbers, and provide visual and verbal supports. Now, we will explore example activities that incorporate strategies for these steps. Then, we will move to the last two implementation steps in the next section.

### Let's Explore Example Activities




**We have focused on these implementation steps:**

1. Carefully sequence instruction. ✓
2. Use accessible numbers. ✓
3. Provide visual and verbal supports. ✓

**Next, we will try example activities that incorporate these steps.**

- Use a sequence of two games on fraction comparison and addition.
- Play the games first and then discuss ways to use them with students.

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## SLIDE 20

**SAY:** Mathematics games are a helpful and engaging strategy that we have not yet focused on in the course. The Aim Low, Aim High game can be used for a variety of mathematics topics. We’ll start with a version for comparing fractions that works well in a strategic sequence of instruction. After lessons on comparing fractions by using manipulatives, number lines, and other approaches, playing this game provides a way to review and reinforce understanding. Let’s get ready to play the game by taking out the materials.

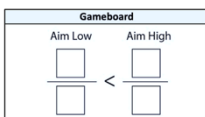
*Use the directions below for your format.*

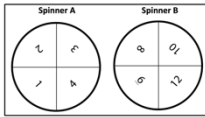
### Example Activity 1


#### Aim Low, Aim High: Comparing Fractions

**Get Ready to Play: Materials**

- **Gameboard (H4)**
  - Each player has their own gameboard.
- **Handout with 2 Spinners (H5)**
  - Numbers selected so all fractions can be modeled with fraction tiles/circles.
  - Choice of spinners to promote use of strategies.
- **Paper clip and pencil** for spinning spinners.
- **Optional:** Fraction tiles or circles to use as needed.





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- **FOR IN-PERSON SESSIONS, SAY:** We will play the game in pairs. Each person needs their own gameboard, which is on handout **H4**. Each pair will share a copy of handout **H5**, which has two spinners. Each pair also needs one paper clip and a pencil to spin the spinners.
- **FOR VIRTUAL SESSIONS, SAY:** Each person needs their own copy of the gameboard on handout **H4** and the two spinners on handout **H5**. You also need one paper clip and a pencil to spin the spinners.

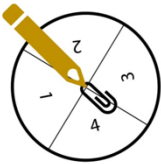
## SLIDE 21 (Optional)

**NOTES:** This optional slide explains how to use a paper clip and a pencil to spin the spinners.

**SAY:** I'll do a quick demonstration of how to use a paper clip and a pencil to spin the spinners. Place the paper clip on the spinner and put the pencil point inside the paper clip at the center point of the circle. Hold the pencil in place and use your finger to flick the paper clip so that it spins around the spinner.

**Example Activity 1**  
**How to Use a Paper Clip and Pencil to Spin the Spinners**

- Place the paper clip on the spinner.
- Place the pencil point inside the paper clip at the center point of the circle.
- Hold the pencil in place and use your finger to flick the paper clip.



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## SLIDE 22

**NOTES:** Go over the directions for the game and then have participants play two rounds in pairs. Read the guidance below for your format:

- **FOR IN-PERSON SESSIONS:** Move into pairs to play the game. They take turns, and each player writes on their own gameboard. A benefit of playing in person is that players can see each other's gameboards and the fractions their opponent is creating. It's still important for players to say where they are placing each number and to read their final fractions aloud, because this models what students will do.
- **FOR VIRTUAL SESSIONS:** Use breakout rooms to play the game in pairs. The players will take turns, each using their own gameboard and spinners. Because players cannot easily see their opponents' gameboards in the virtual setting, it's particularly important for players to say where they are placing each number and to read their final fractions aloud. It's also helpful for participants to hold up their completed gameboard so it is visible to the other player.

**SAY:** Let's go over the directions on handout **H4**, page 11, and then we will play the game. Students have two key decisions to make on each turn: Which spinner to use and where to place the number. The spinners were designed to make accessible fractions with denominators that students can build with the fraction tiles. I want to clarify that it's okay to make fractions that are less than 1, equivalent to 1, or greater than 1.

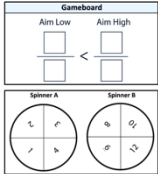
**Example Activity 1**  
**Play the Game**

**Goal:** Make the Aim Low fraction **less than** the Aim High fraction.

**Directions: Take Turns**

1. Choose Spinner A or Spinner B. Spin to get a number.
2. Write the number in a box on your gameboard. Say where you put it.
  - It's okay to make fractions greater than 1.
  - After you write a number in a box, you cannot change it.
3. Take turns until each player has filled all four boxes on their gameboard.
4. Decide: Is your Aim Low fraction **less than** your Aim High fraction? Yes No
  - Read your fractions out loud. Explain how they compare.

**Score Points:** Get 1 point for each Yes.



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Read directions and play one round together (four turns) as a whole group. If time is short, play two turns with the whole group and then move into pairs.

Now let's play the game in pairs. Pairs play two rounds of the game. If time is short, play one round.

## SLIDE 23

**NOTES:** Have a whole-group discussion.

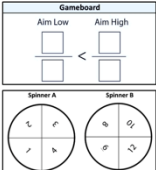
**SAY:** Here are examples of questions to ask students to support them in communicating their strategies and understanding of fractions. Let's use these questions to discuss our strategies for making Aim Low and Aim High fractions.

*Ask the questions on the slide and have participants share ideas.*


**Example Activity 1**  
**Ask Students Questions about Strategies**

**Discuss:**

1. Where is a helpful spot to place the number 1? Why?
2. Where is a helpful spot to place the number 12? Why?
3. What **strategies** did you use to make a **greater** fraction?
4. What **strategies** did you use to make a **lesser** fraction?
5. How did you decide **which spinner** to use?



The diagram shows a gameboard with two columns labeled 'Aim Low' and 'Aim High', each with two empty boxes. Below the boxes is a less-than sign (<). To the right are two spinners, Spinner A and Spinner B. Spinner A has four quadrants with numbers 1, 2, 3, and 4. Spinner B has four quadrants with numbers 1, 2, 3, and 4.

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 Source: Toolkit Authors   
Handouts: H4, p.13    23

**Slide 23: Example Responses**

**Question 1.** Where is a helpful spot to place the number 1? Why?

- It is helpful to place the number 1 in the denominator of the Aim High fraction. This way you are likely to make a fraction that is greater than 1 or equal to  $\frac{1}{1}$ . For example, the fraction  $\frac{12}{1}$  is 12 wholes.
- I would put a 1 in the numerator of the Aim Low fraction, so the fraction will have just one part of the whole. Then, I would try to spin a larger number for the denominator. This strategy will help me to make a lesser fraction.

**Question 2.** Where is a helpful spot to place the number 12? Why?

- I would place 12 in the numerator of the Aim High fraction because it is a large number and gives you a good chance of making a greater fraction.
- I think a good place for 12 is the denominator of the Aim Low fraction. Then, I would try to spin a low number for the numerator.

**Question 3.** What strategies did you use to make a greater fraction?

- My strategy was to have a larger number in the numerator and a lesser number in the denominator of the Aim High fraction. That strategy helped me make a greater fraction.

**Question 4.** What strategies did you use to make a lesser fraction?

- I tried to place a smaller number in the numerator and a greater number in the denominator of the Aim Low fraction. This made the fraction have smaller sized pieces.

**Question 5.** How did you decide which spinner to use?

- For my Aim Low fraction, my strategy was to use Spinner B for the denominator, because I would have smaller sized pieces, and use Spinner A for my numerator, because I wanted to make a lesser fraction. For my Aim High fraction, it was the opposite. I used Spinner B for the numerator, then Spinner A for the denominator.

## SLIDE 24

**SAY:** The Aim Low, Aim High game is versatile because there are different gameboards for different mathematics concepts. Let's try the Fraction Addition version.

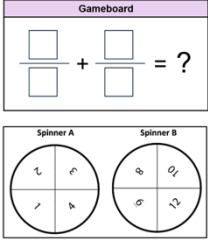
*Say the directions below for your format.*

- FOR IN-PERSON SESSIONS, SAY:** We will play the game in pairs. Each person needs their own Fraction Addition gameboard, which is on handout **H6**, page 16. We'll use the same two spinners from handout **H5**, page 14. You also need one paper clip and a pencil to spin the spinners.
- FOR VIRTUAL SESSIONS, SAY:** Each person needs their own copy of the Fraction Addition gameboard on handout **H6**, page 16, and the two spinners on handout **H5**, page 14. You also need one paper clip and a pencil to spin the spinners.

*Example Activity 2*  
**Fraction Addition Game**

**Get Ready to Play: Materials**

- Gameboard: Aim High Game (H6)**
  - Each player has their own gameboard.
- Handout with 2 Spinners (H5)**
  - Numbers chosen to make accessible fractions that can be modeled with manipulatives.
- Paper clip and pencil** for spinning spinners.
- Fraction tiles/circles** to use as needed.



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## SLIDE 25\*

**NOTES:** Go over the directions for the game, and then have participants play one round in pairs. Read the guidance below for your format:

- FOR IN-PERSON SESSIONS:** Move into pairs to play the game. Each player writes on their own gameboard, and they share the spinners. A benefit of playing in person is that players will be able to see each other's gameboards and the fractions that their opponent is creating. It's still important for players to say where they are placing each number and to read their final fractions and sum aloud, because this models what students will do.
- FOR VIRTUAL SESSIONS:** Use breakout rooms to play the game in pairs. The players will take turns, with each using their own gameboard and spinners. Because players cannot easily see their opponents' gameboards in the virtual setting, it's particularly important for players to say aloud where they are placing each number and to read their final fractions and sum. It's also helpful for participants to hold up their completed gameboard so it is visible to the other player.

**SAY:** Let's go over the directions for the Fraction Addition game. We will play the Aim High version. The goal is to make a greater sum. Choose which spinner to spin. Spin it and write the number in a box. You can make fractions that are greater than 1. Remember that after you write the number in a box, you cannot change it.

Keep taking turns until both players have filled all four boxes, then determine your sums. Students could find the sums by using fraction tiles, calculating, or other strategies.

Then each player reads their fractions and the sum aloud. Compare the two sums to determine which player got the greater sum. Answer the Yes/No questions on the gameboard. You score one point for each Yes that you selected.

Let's move into pairs to play the game.


*Participants play one round of the game.*

**Example Activity 2**  
**Play the Fraction Addition Game**

**Aim HIGH: Try to Make a Greater Sum**

- Take turns. Choose **one** spinner to spin.
- Write the number in a box. Say where you put it.
  - It's okay to make fractions greater than 1.
  - After you write a number in a box, you cannot change it.
- Keep taking turns until each player fills all four boxes. Determine sums by using fraction tiles, calculating, or other methods. Read your fractions and sums out loud and compare them.
- Answer Yes/No questions about your sums.

**Scoring:** Get 1 point for each Yes you selected. Maximum points: 3



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Source: Toolkit Authors

Handouts: H5-6, pp.14-16

## SLIDE 26

**SAY:** Here are examples of questions to support students in explaining their strategies for making sums. Let's use these questions to discuss our strategies.

*Ask the questions on the slide and have participants share ideas.*

After the discussion, it's helpful to play another round so that students can apply the strategies. A fun extension is to ask students if they can rearrange their numbers to make an even greater sum.

We played the Aim High version of the game. In the Aim Low version, the goal is to place the numbers to make a lesser sum.

**Example Activity 2**  
**Ask Students Questions about Strategies**

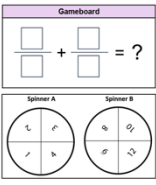
**Discuss:**

1. What **strategies** did you use to make a **greater sum**?
2. Where is a helpful spot to place the number **1**? **12**? Why?
3. How did you decide to put a number in a **numerator or denominator** box?
4. How did you decide **which spinner** to use?

**After discussion,** have students play another round to apply the strategies.

**Extension:** Rearrange the numbers to make a greater sum than the one you have.

**Aim Low Version:** Make a lesser sum.



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### Slide 26: Example Responses

**Question 1.** What strategies did you use to make a greater sum?

- I tried to make each fraction greater than 1 so that the sum would be greater than 1.
- I tried to put smaller numbers in the denominators and larger numbers in the numerators so that each fraction was more than 1 whole.

**Question 2.** Where is a helpful spot to place the number 1? The number 12?

- It's helpful to place the number 1 in the denominator to make a fraction that is greater than or equal to 1. That way, you are likely to make a sum that is greater than 1.
- I would place 12 in the numerator to get 12 pieces of the size of fraction that was in your denominator. For example, if the denominator is 3, then you would have 12 of the thirds, which is equal to 4 wholes.

**Question 3.** How did you decide to place a number in a numerator or denominator box?

- I decided where to put a number based on its value. So, the lesser numbers I would put in the denominator and the greater numbers in the numerator. That gave me a good chance of making a greater sum.

**Question 4.** How did you decide which spinner to use?

- My strategy was that I would first use Spinner A for a denominator. Then, I would use Spinner B for a numerator. For example, if you have 12 in the numerator and 1 in the denominator, that would be 12 wholes, which would be the greatest number you could get for one fraction.

## SLIDE 27

**SAY:** The Aim Low, Aim High games were designed to incorporate strategies for systematic instruction. Take a look at this summary of strategies.


*Highlight one or two points.*

💡

**Summary of Recommended Strategies in the Games**

- a. Carefully sequence instruction**
  - Sequence of games focuses on high-priority fraction content.
- b. Use accessible numbers**
  - For the spinners, the numbers were selected to make fractions that can be built with manipulatives.
- c. Use visual and verbal supports**
  - Questions support students in explaining their strategies.
  - Fraction tiles to use as needed for comparing and adding fractions.

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## Section 3. Explore the Recommendation, Part 2

**Time:** Here are the times for the two session lengths: A) 90 minutes and B) 120 minutes:

- A: 25-28 min. for the full section, including the card sorting activity/Planner (15-18 min.).
- B: 30-35 min. with more time for the card sorting activity/Planner (20-25 min.).

**Slides:** 28–37

**Handouts:** H7–H9 (in the Participant Workbook)

**Suggestions Related to Time:**

- **If time is short**, consider these options:
  - Describe the card sorting activity for reviewing equivalent fractions, but skip having participants try it themselves. Provide time for participants to use the handout titled **H9. Planner** to consider ways to use card sorting activities to review mathematics content.
  - Choose one of the two implementation steps to focus on and discuss with participants.
- **If you have additional time available**, consider these options:
- Increase the time for the discussions about specific implementation steps and strategies to fit your participants' needs and interests. Provide opportunities for participants to share their experiences using strategies.
- Increase the time for participants to play the card sorting activity and to use the handout titled **H9. Planner**.

## SLIDE 28

**SAY:** Let's continue to explore systematic instruction by focusing on two more implementation steps.

## SLIDE 29

**SAY:** The next implementation step is about feedback.

The recommendation emphasizes the importance of giving feedback to students in mathematics intervention. In the box, there are several purposes of feedback, including that feedback can help students move their learning forward, as well as self-correct and revise their thinking.

*Ask:* What's one idea that resonates with you or that you would add to this list?

## SLIDE 30

**SAY:** Giving specific feedback to students requires finding out about their understandings and difficulties. For this reason, asking questions is integral to the feedback process.

*Read the quote.*

Questioning can support students in elaborating on their ideas. It's important to ask follow-up questions when students are incorrect and correct— not just when they are incorrect. Many teachers notice that strategic questioning, paired with adequate wait time, allows students to process, reflect, and even self-correct their thinking.

Section 3  
Explore the Recommendation, Part 2

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Step D. Provide Timely and Specific Feedback

The recommendation emphasizes the importance of providing feedback, particularly for students struggling with mathematics.

**Purposes of Feedback**

- Move learning forward.
- Help students to self-correct.
- Build on strengths.
- Address misunderstandings.
- *Add your ideas.*

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Source: Adapted from WWC Practice Guide by Toolkit Authors

Questioning is Integral to the Feedback Process

"When students are solving problems, encourage them to articulate their thinking so that you can identify their strengths. **Ask probing questions** to identify any misconceptions and build on their strengths..."

[WWC Guide, p. 7](#)

**Use questioning strategies to:**

- Support students in explaining and elaborating on ideas.
- Follow up on both correct and incorrect responses.
- Probe for understandings.
- Identify strengths to build upon.
- Provide opportunities for students to self-correct.

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Sources: WWC Guide and Toolkit Authors

## SLIDE 31

**NOTES:** Give participants about 3–5 minutes to read the handout and then bring the group together for a discussion.

**SAY:** Let's explore some suggestions for providing feedback. Please take out the handout titled **H7. Provide Feedback to Students**. We'll take a little time to read the suggestions on our own. Star ideas that stand out for you and add ideas. Then, we'll share ideas with the group. We'll also discuss what is important to keep in mind when giving feedback to students struggling with mathematics. You can get started.

*Give participants time to complete the reading and reflection, then ask:*

What's one idea about providing feedback that stood out for you? Why?

*Participants share ideas.*

Students struggling with mathematics may be particularly sensitive to feedback from their teachers. What is important to keep in mind when giving feedback to students struggling with mathematics?

*Participants share their suggestions.*

### Suggestions for Providing Feedback


**Work Individually**

1. Read the handout, **Provide Feedback to Students (H7)**.
2. **Star\* ideas** that stand out for you. Add more ideas.

**Share with the Group**

3. What is **one idea** that stood out for you? Why?
4. What is important to keep in mind when giving feedback to students struggling with math?

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### Slide 31: Example Responses

**Question 3.** What is one idea that stood out for you? Why?

- One idea that stood out for me is to ask follow-up questions when students are correct and incorrect. Students overgeneralize that they are only asked questions when they are incorrect. It is important to both reinforce students' understandings and uncover students' misconceptions by asking probing questions for both types of responses.
- It is so important to use wait time in class discussions because it helps students to formulate and explain their understandings. It also allows the teacher to identify students' strengths and difficulties and provide specific feedback.

**Question 4.** What is important to keep in mind for giving feedback to students struggling with mathematics?

- It is very important to keep in mind that all students come with strengths. I want to remember to identify and build upon those strengths and use them to address student misunderstandings.
- I plan to be mindful of using different ways to provide feedback in my practice. This can come in the form of questions, comments, or gestures, and can be done both orally and in writing. I think using multiple approaches gives students many ways to access the feedback.

## SLIDE 32

**SAY:** Now, let's focus on the implementation step for reviewing content that you have previously worked on with students. Here are some suggestions. First, it's helpful when preparing review activities to include a mix of current content and previously learned content. Ask questions that help students connect concepts and use engaging review activities that provide opportunities for students to explain ideas. Here are several examples of review activities that will be familiar from the course.

*Read a few of the example activities.*

## SLIDE 33


**SAY:** Card sorts are an effective approach for having students review and recall their understanding. Let's explore how to use them as review activities in a sequence of systematic instruction. Imagine that it's been 4 weeks since your students worked on fraction equivalence. Let's explore ways to review fraction equivalence by using the card sort routine from prior modules. We'll use the same steps but a different card set.

## SLIDE 34

**NOTES:** Go over the directions and sort one card together as a group. Have participants work in pairs to sort cards (about 5–7 min.). It's not necessary to sort the full deck. Read the information below for your format:

- **FOR IN-PERSON SESSIONS:** Have participants move into pairs to sort physical cards. They need space on a desk/table to place the cards in two categories.

### Step E. Provide Opportunities to Review Content




**Suggestions**

- Use a mix of previously and newly learned material within and across lessons.
- Ask questions to help students connect new concepts to prior ones.
- Use engaging activities to review content and have students explain ideas.


**Example Activities**

- Card sorting routine.
- Games such as Aim Low, Aim High.
- Which one doesn't belong?
- I Have, Who Has activity.



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Sources: WWC Practice Guide and Toolkit Authors
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### Review Content Card Sorts Work Well to Review Content



Imagine that it has been 4 weeks since students worked on fraction equivalence. Let's use the Card Sorting Routine as a **review activity**.

**Card Sorting Routine**

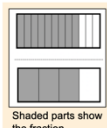
**Steps**

1. Sort cards and explain reasons.
2. Discuss and generalize.
3. Wrap-up and reflect.

**Content Focus:** Fraction equivalence.

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### Review Content Step 1. Sort Cards and Explain Reasons



**Directions: Take Turns**

- Turn over a card. Look at the two fractions on the card.
- **Decide:** Are the two fractions equivalent or not equivalent?  
Place the card in a category:

Equivalent Fractions

Not Equivalent Fractions

- **Explain why** by using **one** sentence starter:
  - The fractions are **equivalent** because ...
  - The fractions are **not** equivalent because ...

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Handout: H8, p. 20

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- **FOR VIRTUAL SESSIONS:** Participants can use a virtual version of the sorting activity, which is available on the PLC Session tab of the Online Component. Each participant will get their own copy of the virtual activity— it’s not possible for two players to both move cards concurrently on the same screen. Here are two options:
  - a. Pairs in breakout rooms:** Move participants into breakout rooms to do the sort in pairs. In each pair, partner 1 shares their screen and moves the cards for both participants. Partner 2 says where they want to place a virtual card, and partner 1 moves it to that category for them. For this option, make sure that participants will be able to screen share in breakout rooms.
  - b. Whole group:** Facilitate a whole-group version of the activity. Share your screen and ask participants to take turns telling you where they want to place a card and why. You will move the cards for each player. Be sure to clarify how this version is different from what students would do to sort physical cards in pairs.

**SAY:** This card deck for equivalent fractions uses different representations, including area models, number lines, and numbers. Students need to determine whether the pair of fractions on the card is Equivalent or Not Equivalent. They place the card in that category and explain their reasons by using a sentence starter. Let’s look at the example card on the slide. The shaded parts show the fractions. Are these fractions equivalent or not equivalent? Why?

*Have a volunteer say where they would place the card and use a sentence starter to explain their reasoning. See example responses below.*

Now, we’ll move into pairs to do the card sort in the role of students who are doing a review activity on fraction equivalence. Take turns turning over a card and use the sentence starter to explain where you are placing the card and why. Then, the other partner will say, “I agree because...” or “I disagree because...”

#### Slide 34: Example Responses

- **The fractions are equivalent because** the size of the large bars is equivalent, and the shaded parts cover an equal area on both bars.
- **The fractions are equivalent because** you can see that the length of nine of the  $\frac{1}{12}$  pieces is equal to three of the  $\frac{1}{4}$  pieces. So,  $\frac{9}{12}$  is equivalent to  $\frac{3}{4}$ .

## SLIDE 35

**SAY:** In the routine, the teacher would reveal the answers for one category at a time. Students check their work, ask questions, and move cards, if needed. It's important for students to have the correct cards in each category before they discuss the characteristics of equivalent fractions in Step 2 of the routine.

Take a look at the categories. Any questions?

**Review Content**  
**Answer Key**

- Teacher reveals the correct cards in each category.
- Students check their work, make corrections, and ask questions.
- It's important for students to have correct categories before discussing them.

**Equivalent Fractions:** 6 cards  
A, C, D, F, I, J

**NOT Equivalent Fractions:** 4 cards  
B, E, G, H

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## SLIDE 36

**NOTES:** If time is short, skip discussing the questions. Instead, give an overview of what the teachers and students will do.

**SAY:** In Step 2 of the routine, the teacher first reveals the answers so that students can check their work and ask questions. Then, the teacher leads a discussion about the cards in the “equivalent” category to support students in generalizing about the meaning of equivalence. Students explain how they determine whether two fractions are equivalent by using visual and numeric models. Then, they discuss the category of fractions that are **not** equivalent. Let's discuss these questions ourselves.

*Lead a discussion by using the questions on the slide about equivalent fractions.*

**Example Routine**  
**Step 2. Discuss and Generalize**

**Here's an overview of what the teacher and students will do.**

- Teacher shows answers and students can ask questions.
- Discuss the **equivalent fractions** category.
  - Look at the visual models. How do you know which pairs are equivalent?
  - Look at the numbers. How do you know which pairs are equivalent?
- Discuss the **not equivalent fractions** category.
  - Look at the visual models. How do you know which pairs are not equivalent?
  - Look at the numbers. How do you know which pairs are not equivalent?

**Resources:** Appendix B has resources for using the routine, including fraction cards.

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## SLIDE 37

**NOTES:** If time allows, have participants start working on the Planner in pairs and then share ideas with the group. If time is short, introduce the Planner as a resource for future use, but skip the partner work.

**SAY:** Let's discuss ways to use card sorts as review activities and how to integrate them into a plan for systematic instruction. The Planner on handout **H9**, pages 22-24, can be used with any of the card sorts in the course. It includes planning questions shown on this slide.

*Read questions.*

We will plan ways to use a card sort to review fraction equivalence as an example.

**Review Content**  
**Planning Questions: Use Card Sorts to Review Content**

**Discuss questions and add ideas to the Planner (H9).**

- How** might you use this card sort for review of equivalent fractions?
- When** would you use the card sort in your sequence of instruction?
- Which representations** of fractions would you use?
- What would you look for, listen for, and ask** to check for students' understanding of equivalent fractions?

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Have participants start working on the Planner in pairs. Give participants a little time to discuss the questions and write down ideas.

Then, ask participants to share ideas and discuss ways to use the Planner:

- Share one idea from your plan.
- How might you use this Planner in the future?

## Section 4. Wrap-Up

**Time:** About 10–12 minutes (in a 90-minute session) or 15-20 minutes (in a 120-minute session)

**Slides:** 38–42

**Handouts:** Course Checklist

**Suggestions Related to Time:**

- **If time is short**, facilitate one discussion instead of two. Decide whether to have a wrap-up discussion about systematic instruction (Slide 39) or the full course (Slide 40).
- **If additional time is available**, extend the time for the wrap-up discussion of the full course (Slide 40). Provide more time for participants to reflect on and share their learning in the course. Then, have participants plan one or two concrete actions they will take to continue building their knowledge and strategies for supporting students struggling with mathematics. It's also helpful for the group to brainstorm and plan ways to collaborate and support each other with this important work.

### SLIDE 38

**SAY:** We'll do a short wrap-up about systematic instruction and then reflect on the full course because this is the final session.



### SLIDE 39

**SAY:** Here's a summary of the implementation steps for systematic instruction that we focused on in today's session. What's one idea from today's session that you will use with students?


Take a moment to think individually, and then we will share ideas. *Have participants share in pairs, with the whole group, or by posting on chart paper or a virtual board.*

## SLIDE 40

**SAY:** It's an exciting accomplishment to be at the end of the full course. As a culminating activity, let's revisit the course goals and take a little time to reflect on our learning. Then, we'll share with the group. Choose one sentence starter to use for sharing ideas.

*Give participants individual think time. Then, ask them to share with the group.*

### Course Wrap-Up: Reflect and Share




**Revisit the Goals**

- Build knowledge of the WWC Guide's recommendations for supporting students struggling with mathematics.
- Build knowledge of how to implement evidence-based strategies effectively.
- Plan and implement strategies with students.
- Support each other in using strategies, sharing successes/challenges, and strengthening implementation.

**Reflect** on your learning. **Share** ideas by using *one* sentence starter:


- Before the course, I... Now I...
- Two important ideas that I will take away are...

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## SLIDE 41


**SAY:** After today's session, please finish the module by doing two short activities on the Wrap-Up tab of the Online Component. Reflect on your learning by completing the Teacher Self-Reflection Form for Systematic Instruction. Please complete this form by [date] so that the module is still fresh in your minds.

### Final Tasks



**Finish the Systematic Instruction Module.**

- Complete the reflection activities on the **Wrap-Up tab** by **[Date]**.
- Optional: Extend your learning by exploring the additional resources.

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Course Checklist 41

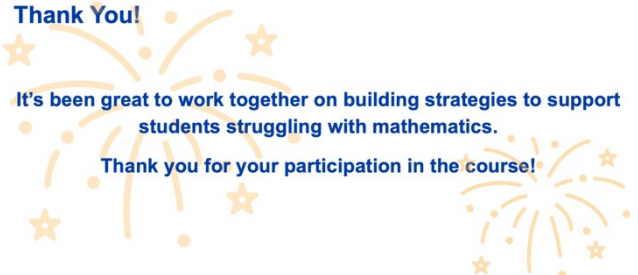
## SLIDE 42


**NOTES:** Display the slide and thank the group for participating in the full course.

### Thank You!

**It's been great to work together on building strategies to support students struggling with mathematics.**

**Thank you for your participation in the course!**



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## Wrap-Up for the Module

The module closes with an opportunity for participants to reflect on their learning about the recommendation for systematic instruction. The Wrap-Up tab of the Online Component provides directions for the reflection tasks and a list of additional resources. Because this module is shorter than the prior ones, the tasks are a little different. The two tasks are:

- **Recap strategies.** Participants review a list of strategies and add examples to the handout titled **H10. Recap Strategies for Systematic Instruction**.
- **Reflect and plan next steps.** Participants fill out the handout titled **H11. Self-Reflection Form** to reflect on their understanding of strategies from the module.

### Self-Reflection Form

The form's purpose is to provide participants with an opportunity for self-reflection to support professional learning; it is not evaluative. Participants are *not* expected to submit this form. The form has two parts. In part 1, the questions ask participants to self-assess their understanding of strategies from the module. Participants are not expected to have a "strong understanding" of every strategy at the end of a module. Ratings of "little" and "some" are anticipated because professional learning takes time. Participants can continue to learn about and apply the strategies in their classrooms after the course ends.

**Part 1. Reflect on your understanding of strategies.**

**Directions:** The table has a list of recommended strategies for implementing systematic instruction. Read each strategy and self-assess your level of understanding by using this **rating scale**:

1. **A Little Understanding:** Have a vague sense of the strategy.
2. **Some Understanding:** Able to explain the strategy in general terms.
3. **A Strong Understanding:** Able to explain it in detail and give examples.

N/A: Have not learned about the strategy yet.

Strategies	Select Your Rating
What is your current level of understanding for each strategy?	
a. How to use an intentional sequence of instruction to reach specific learning goals.	1 2 3 NA
b. How to choose accessible numbers.	1 2 3 NA
c. How to sequence fraction comparison problems to move from simpler to more complex problems.	1 2 3 NA

In part 2, participants answer open-response questions about their professional learning. They are asked to identify *one* instructional strategy to strengthen and describe two actions they will take. Focusing on *one* strategy tends to make the process feel actionable and manageable for participants.

### Facilitator's Tasks

Participants are expected to work independently on completing the two wrap-up activities (about 20–30 minutes). As the facilitator, your main task is to communicate with participants.

- **Set a completion date.** Select a date about one week *after* PLC-Session-B. The date is to support participants in completing the reflections while the module is still fresh in their minds. The Self-Reflection Forms are not intended to be collected.
- **Send reminders to participants.** Communicate with participants to encourage them to fill out the Self-Reflection Form by the completion date. Remind them that the form is not evaluative and will not be collected. Provide reassurance that they are not expected to select a "strong understanding" for every strategy and that it's okay to select "little" and "some." It's helpful to offer to provide support and answer questions about strategies and next steps.

- **Optional: Provide support to participants.** You may want to offer opportunities for participants to share their ideas from their reflection form and discuss ways to carry out their next steps for strengthening strategies. Consider ways to provide support that fit your role and availability. Here are some suggestions:
  - Share resources on specific strategies from the course or other sources.
  - Have a co-planning session with teachers to plan for using specific strategies in an upcoming lesson.
  - Observe a teacher when they use a strategy in a lesson and have a debriefing conversation afterward.
  - Provide coaching on using specific strategies.
  - Co-teach with a teacher to model and support their use of specific strategies.
  - Schedule opportunities for teachers to observe each other's classes and then debrief.