
Session 1

Getting Started

Overview

What can we do to create the conditions that enhance professional learning?

Description

The need for collaborative professional learning is well established, but forming a group is only the first step. Collaboration can be challenging, so laying the groundwork for an effective and worthwhile experience is key. In this session, you will initiate *Teaching by Design* by establishing a common understanding of the process, group norms, and shared goals.

Key Ideas

- Some of the general practices of design have parallels with teaching.
- Well-designed lessons are often the product of several teachers working together to think deeply about their goals and strategize the best ways to help students achieve them.
- Establishing group norms helps a team to operate productively.
- Groups function best when they have a common understanding of their goals and outcomes.

Outline of Activities

- 1.1 What Is *Teaching by Design*? (15 minutes)
- 1.2 To the Finish Line (25 minutes)
- 1.3 *Teaching by Design* Themes (20 minutes)
- 1.4 Setting Group Norms (15 minutes)
- 1.5 Group Outcomes and Personal Goals (10 minutes)
- 1.6 Before the Next Session (5 minutes)

What to Bring

- A journal (see the description and suggestions in the Introduction) and writing instruments (bring these to every session)

To Complete Before Session 2

- Lesson Design Notes (Handout 1.3)

Facilitator Notes

Session 1

Getting Started

Before the session, please review the more detailed facilitator guidelines in the Introduction. As the facilitator, it is generally your job to keep the conversation flowing and watch the clock. Use your judgment to decide when it's appropriate to extend a session for good conversation or when it's time to move on to the next activity. Remember to keep the group norms posted and revise them, as a group, as necessary.

Before the Session

- Make copies of the following handouts for each team member:
 - 1.1 Design Practices
 - 1.2A To the Finish Line
 - 1.2B To the Finish Line Game Board
 - 1.2C To the Finish Line Playing Cards
 - 1.3 Lesson Design Notes
- Gather the following materials to be used in this session:
 - Chart paper
 - Markers
 - Counters or chips
 - Prepared sets of game cards (Handout 1.2C) on card stock (see Handout 1.2A)
- Remind team members to bring the following items:
 - Journal (see the description and suggestions in the Introduction)
 - Writing instruments

During the Session

- Activity 1.1: facilitate discussion; facilitate partnering and sharing, if necessary; serve as timekeeper.
- Activity 1.2: facilitate grouping, if necessary; serve as timekeeper.
- Activity 1.3: facilitate discussion.
- Activity 1.4: lead development of group norms; serve as recorder.

After the Session

- Pass the group norms on to the next facilitator.

Activity 1.1 What Is Teaching by Design?

15 minutes

Handout 1.1 Design Practices

Teaching by Design in Elementary Mathematics is a guide for professional development that helps teachers improve their knowledge for teaching mathematics. By engaging in the *Teaching by Design* process as a team, you will build a better understanding of mathematics and student learning.

We purposefully chose to link the terms *teaching* and *design* to describe this professional development experience. As noted in the Introduction, the term *design* is often associated with the applied arts, engineering, and architecture to describe the creation of a product in an artistic or highly skilled manner. Design in these contexts involves establishing goodness of fit between a product, the people who will use it, and the context in which it will be used. *Teaching by Design* is a way to describe teachers' work that focuses on planning deliberate and purposeful lessons that fit the needs of their students.

Discuss the following list of design practices with a partner. Consider how these practices might be applied to planning and teaching a lesson. Handout 1.1 provides this list in a table that can be used to record your ideas.

- Identifying and framing problems and needs
- Working collaboratively
- Gathering and analyzing information
- Determining performance criteria for successful solutions
- Generating alternative solutions and building prototypes
- Evaluating and selecting appropriate solutions
- Implementing choices
- Evaluating outcomes

Share what you and your partner listed with the whole group. In what ways does teaching include some of these design principles? Which ones have the strongest parallels to lesson design?

Activity 1.2 To the Finish Line

25 minutes

Handout 1.2A To the Finish Line

Handout 1.2B To the Finish Line Game Board

Handout 1.2C To the Finish Line Playing Cards

Counters or chips

Throughout the *Teaching by Design* experience, you will have the chance to engage in student activities that can be used in your classroom. Participating in these activities and analyzing their instructional benefits is intended to stimulate discussion of a range of teaching and learning issues. **Read** the description of the To the Finish Line game on Handout 1.2A.

Play the game with a group of two to four players for 15 minutes.

Discuss the following questions:

- What thinking processes did you use while engaging in this activity?
- What fraction and decimal concepts were reinforced while engaging in this activity?
- Is this mathematical activity similar to any activities you use in your classroom? Describe the related activities.
- Is this mathematical activity appropriate for your students? If not, what adaptations could you make so it would be appropriate for your students?

Activity 1.3 Teaching by Design Themes

20 minutes

Handout 1.3 Lesson Design Notes

As you and your team engage in the *Teaching by Design* sessions, you will discuss and explore many aspects of mathematics teaching and learning that will prepare you to work together to collaboratively plan a mathematics lesson. Each session will include opportunities for you to reflect on three key themes related to teaching and learning.

Read the following quotation about teaching and think about how it relates to your own experiences.

To teach math, you need to know three things. You need to know where you are now (in terms of the knowledge children in your classroom have available to build upon). You need to know where you want to go (in terms of the knowledge you want all children in your classroom to acquire during the school year). Finally, you need to know what is the best way to get there (in terms of the learning opportunities you will provide to enable all children in your class to achieve your stated objectives). Although this sounds simple, each of these points is just the tip of an iceberg. Each raises a question (e.g., Where are we now?) that I have come to believe is crucial for the design of effective mathematics instruction. Each also points to a body of knowledge (the iceberg) to which teachers must have access in order to answer that question . . .

By asking this set of questions every time I sat down to design a math lesson for young children, I was able to push my thinking further and, over time, construct better answers and better lessons. If each math teacher asks this set of questions on a regular basis, each will be able to construct his or her own set of answers for the questions, enrich our knowledge base, and improve mathematics teaching and learning for at least one group of children.

Sharon Griffin,
How Students Learn (2005, p. 257–258)

Discuss the three questions described in the quotation and apply them to your classroom.

Record your ideas on Handout 1.3 Lesson Design Notes.

- Where are you now?
 - What knowledge do your students currently have about fractions and decimals? What are they able to do and what do they understand?
 - Which of your students have greater needs than others? Describe the range of understanding that your students are currently demonstrating.
 - How can you find out more about each student's mathematical understanding?
- Where do you want to go?
 - What are your long-term goals for students?
 - What do you want your students to know and understand by the end of fourth or fifth grade?
 - What attitudes and beliefs about mathematics do you want your students to develop?
- What is the best way to get there?
 - What routines do you use that support student learning?
 - How do you identify and choose instructional approaches?
 - How do you use your knowledge of your students' current levels of understanding to inform your instructional decisions?
 - How do you scaffold your lessons to provide support for students who need extra help and challenge those students who finish quickly?

You will continue to add new ideas and questions to the Lesson Design Notes in future sessions. Staple or tape Handout 1.3 into your journal and set up a section with room for additional notes. This will help you capture all of your lesson design ideas in one place.

Activity 1.4 Setting Group Norms

15 minutes

Collaboration can be challenging at times, even in a group of willing and committed partners. Laying the groundwork for an effective and worthwhile experience is key to managing any bumps in the road.

Consider the following questions and **write** your answers in your journal. Treat this like a brainstorming activity. Try to get as many ideas on paper as possible.

- What expectations do you have for how the group will work together?
- What conditions get in the way of learning and sharing?
- What group features help you to feel a sense of belonging and support?

Before you share your list with the group and develop group norms, read the following ideas about effective group processes (Bray, Lee, Smith, & Yorks, 2000; Collay, Dunlap, Enloe, & Gagnon, 1998; Dufour & Eaker, 1998; Preskill & Torres, 1999). Reading this list might prompt

new ideas that you would like to add to your journal, so feel free to add to or edit your list based on the following ideas.

- *Groups work well when communication is open and honest.* Team members must feel that they are able to share their ideas and opinions without inspiring defensiveness or reprisals. It will be difficult for members to learn from each other if they cannot be honest. Although the ability to share their views openly and honestly is important, members will be unlikely to do so if they fear their contributions will be ignored or belittled. The balance between honesty and trust may not be easy to establish and maintain at first, but it is crucial to the team's work.

- *Groups work well when members both challenge and support each other.* Team members do this by asking questions, building on each other's ideas, and respectfully disagreeing. They are expected to ask for clarification, explain their reasoning, and provide evidence to back up their assertions.

- *Groups work well when methods for resolving conflict are established and agreed upon.* No team should begin its work with the assumption that it will be easy to work together. Members must agree to listen and focus on the problem rather than on the people involved, give the process adequate time, and try to see the issue from another person's perspective.

- *Groups work well when mistakes are viewed as opportunities.* It is difficult to try new things or to take risks if you fear the consequences. It may be helpful to keep in mind that mistakes are fruitful sources of learning—so, in many ways, the more the better.

- *Groups work well when all members are held accountable for their actions.* Part of engaging in collaborative learning is making a commitment to the other team members. All must agree to fulfill their specific responsibilities, to share the work as equally as possible, and to support each other and maintain productive and respectful interactions.

Share your list with the group. The facilitator will keep a running list on chart paper as each person takes turns sharing. Keep going around the room until all ideas are represented on the paper. **Discuss** and **refine** the list so that it reflects the consensus of the group.

Maintaining Group Norms

This list of group norms will serve as a charter for your team. The final list should be posted each time the group meets or it can be transferred to a handout that group members keep in their journals.

Remember that establishing group norms is only the first step. You will need to continually monitor your own participation and hold your colleagues to the norms. Do not wait until a problem arises to review the list and reflect on your collaborative practices.

Activity 1.5 Group Outcomes and Personal Goals

10 minutes

Teaching by Design in Elementary Mathematics has the following expected outcomes.

Expected Outcomes for *Teaching by Design*

1. Teachers will deepen their content knowledge of important mathematical concepts for the grade level they teach.
2. Teachers will increase their understanding of how students learn these mathematical ideas.
3. Teachers will use their knowledge to develop effective lessons and improve instruction.
4. Teachers will enhance their collaboration skills.

Discuss what each outcome means to you. Do these outcomes match your own expectations for this professional development process? What additional goals do you have for the group?

Write your answers to some of the following questions in your journal:

- How do you expect this professional development process to impact your teaching?
- In what ways do you think this process will impact your relationships with your colleagues in this group?
- What personal goals do you have for your work with *Teaching by Design*?

Activity 1.6 Before the Next Session

5 minutes

Write additional questions and ideas on your Lesson Design Notes. As you work with your students between now and the next sessions, find out more about their mathematical understanding and add this data under “Where are you now?”

Read the Introduction to *Teaching by Design in Elementary Mathematics* if you have not done so already. This will give you a broader sense of the intent of this type of professional development as well as some tips for facilitating your time together. Consider how your personal goals are connected to the *Teaching by Design* process.

References and Resources

- Bray, J. N., Lee, J., Smith, L. L., & Yorks, L. (2000). *Collaborative inquiry in practice: Action, reflection, and making meaning*. Thousand Oaks, CA: Sage.
- Collay, M., Dunlap, D., Enloe, W., & Gagnon, G. W., Jr. (1998). *Learning circles: Creating conditions for professional development*. Thousand Oaks, CA: Corwin.
- Dufour, R., & Eaker, R. (1998). *Professional learning communities at work: Best practices for enhancing student achievement*. Bloomington, IN: National Educational Service.
- Griffin, S. (2005). Fostering the development of whole number sense: Teaching mathematics in the primary grades. In M. S. Donovan & J. D. Bransford (Eds.), *How students learn: Mathematics in the classroom* (pp. 257–308). Washington, DC: National Academies Press.
- Preskill, H., & Torres, R. T. (1999). *Evaluative inquiry for learning in organizations*. New York: Doubleday.

Handout 1.1

Design Practices

Design Practices in Applied Arts, Engineering, and Architecture	Application of the Practice to Lesson Planning and Lesson Delivery
Identifying and framing problems and needs	
Working collaboratively	
Gathering and analyzing information	
Determining performance criteria for successful solutions	
Generating alternative solutions and building prototypes	
Evaluating and selecting appropriate solutions	
Implementing choices	
Evaluating outcomes	

Handout 1.2A

To the Finish Line

Materials: Handout 1.2B To the Finish Line Game Board for each player; Handout 1.2C To the Finish Line Playing Cards; one prepared deck of cards on cardstock; seven chips for each player

Groups: To be played in groups of two to four students

Purpose: For players to move as many playing pieces as possible to the right of the number lines to reach the finish line

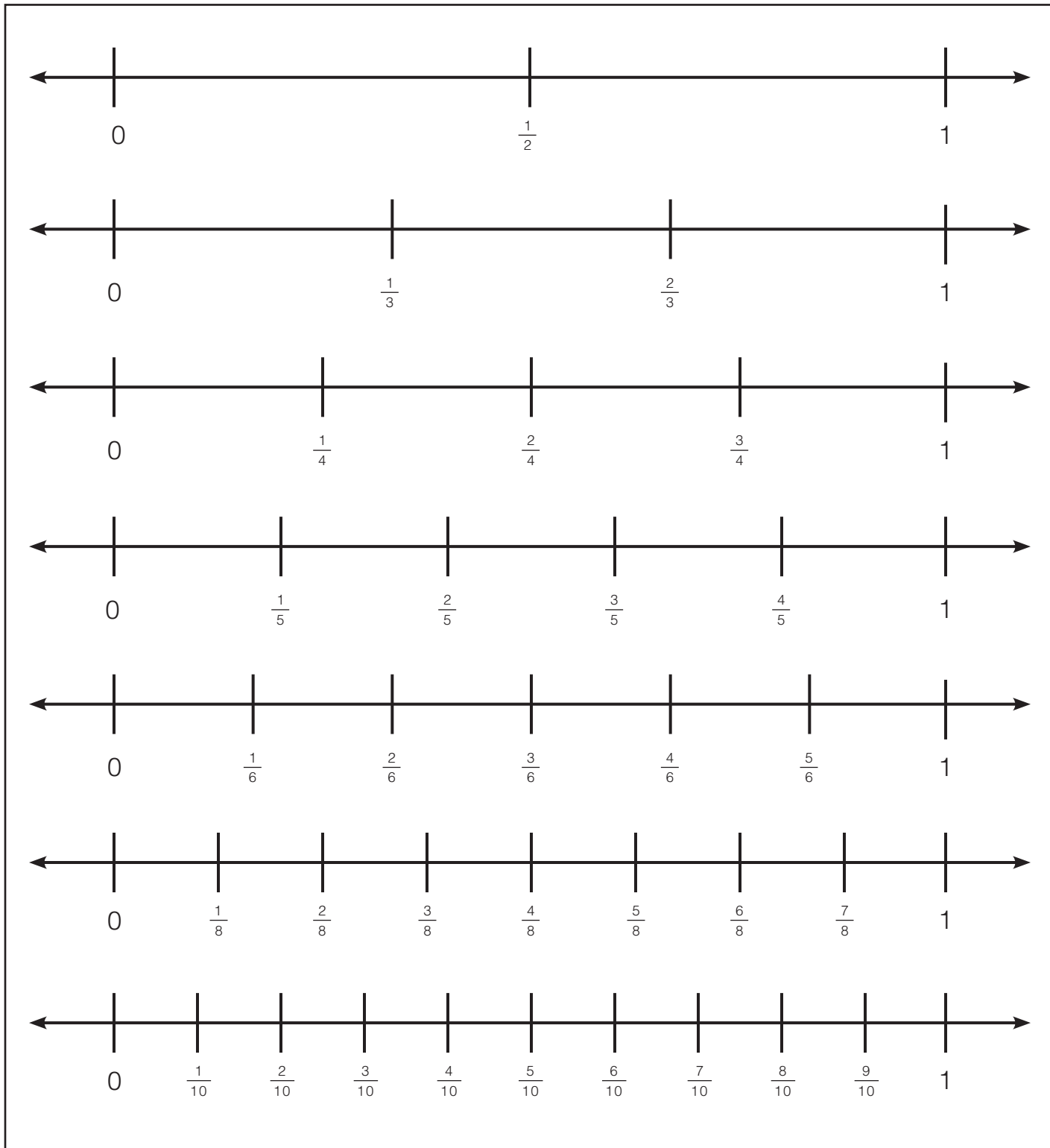
- Each player receives one game board and seven chips.
- Players each place one chip on the zero of each number line on their game board.
- One player shuffles the fraction and decimal cards and places the stack facedown on the table.
- The first player takes the top card and places it faceup on the table. The player may move one or more chips to the right on one or more number lines on the game board as long as the sum of the moves is equal to or less than the value on the card. The player explains the moves, while other players verify that the sum of the moves is equal to or less than the value on the player's card. At the end of each turn, players place the cards in a discard pile.
- The game continues with each player taking a turn.
- If the stack of cards becomes depleted, one player shuffles the cards in the discard pile and places them facedown on the table.
- The winner is the first person to move all of their individual chips to the finish line.

Sample

If the player selected the card $\frac{3}{4}$, the player may move $.25 + \frac{1}{3} + \frac{1}{6} = \frac{3}{4}$ which is equal to the value on the card. The player might also choose to move $\frac{1}{2} + .1 = .6$, which is less than the value of the card. There are many different combinations that the player may move, as long as the sum of the moves is equal to or less than the value of the card.

Handout 1.2B

To the Finish Line Game Board



Handout 1.2C

To the Finish Line Playing Cards

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$
$\frac{2}{4}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{6}$	$\frac{2}{6}$
$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{1}{8}$
$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{5}{8}$

$\frac{6}{8}$	$\frac{7}{8}$	$\frac{1}{10}$	$\frac{2}{10}$
$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$
$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$	2
1	.2	.4	.6
.8	.25	.5	.75

Handout 1.3

Lesson Design Notes

	Ideas and Questions
Where are you now?	
Where do you want to go?	
What is the best way to get there?	