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# 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 Exploring Number Patterns (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)

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## 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
  - 1.2 Creature cards (plus one extra; prepare set ahead of time)
  - 1.3 Lesson Design Notes
- Gather the following materials to be used in this session:
  - Chart paper
  - Markers
  - Adding machine tape (10 strips, each approximately 30 inches long)
  - Rulers
  - Sticky notes (3" x 3")
  - Scissors
- 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 partnering, if necessary.
- Activity 1.2: facilitate partnering, if necessary.
- Activity 1.4: lead development of group norms, and serve as recorder.

### After the Session

- Pass the group norms and other group materials (creature strips) 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 Exploring Number Patterns

25 minutes

Handout 1.2 Creature Cards

Adding machine tape cut into 10 strips each, and approximately 30 inches long

Rulers

Sticky notes (3" 3")

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. **Find** a partner to work with on this activity. Each pair will need a precut strip of adding machine tape that is 30 inches long.

**Prepare** your adding machine tape by starting at one end and marking it off into sections that are 3 inches wide. You should have 10 sections when you are finished.

**Choose** one creature card. Some of these are real animals and some are imaginary creatures. Positioning the strip vertically, write the name of your creature at the top of your strip. Pretend that you are ordering shoes for this type of creature. On the strip, begin with the number of shoes that are needed for one of these creatures. In the next space on the strip, write how many shoes would be needed for two of these creatures, then three, then four, and so on. Keep going until your strip shows the number of shoes necessary for any number of creatures from 1 to 10.

**Check** to see if there are additional strips and creature cards that have not been taken by other group members. If so, complete another strip until all cards are done.

**Share** your strips with the whole group, taking turns and hiding some of the information on the strip as follows.

- One person holds up a strip, hiding the name of the creature at the top. The rest of the group identifies the type of creature (or at least how many legs it has). Repeat for one or two more strips. Discuss the thinking group members used to do this task.
- One person holds up another strip, but first covers up some of the numbers on the strip with sticky notes (do not show the top of the strip or the bottom of the strip). Ask the group to identify the missing numbers and the type of creature (or at least how many legs it has). Repeat for one or two more strips. Discuss the thinking group members used to do this task.
- Post the strips side-by-side from left to right in ascending order by number of legs on a wall or chalkboard. Line them up so that the sections are aligned from strip to strip. Discuss any patterns or other observations group members notice. Use these discussion prompts:
  - What vertical patterns do you see? Horizontal patterns? Diagonal patterns?
  - Where do you see odd numbers? Even numbers? Does this display have more even or more odd numbers? Why?
  - Find some cyclical patterns in the digits on some strips. What relationships do you see between these cyclical patterns? Which strips are “related” to one another?
  - What common mathematical display have you created with this collection of strips arranged in this way?

**Discuss** the following questions:

- 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?
- What types of numerical patterns and relationships can this activity help students learn?

*Note:* Save these strips for use in future sessions.

## 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 number and operations? 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 second or third 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 to 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***

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

<b>Design Practices in Applied Arts, Engineering, and Architecture</b>	<b>Application of the Practice to Lesson Planning and Lesson Delivery</b>
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 1.2  
**Creature Cards**

<b>Snakes</b>	<b>One-legged robots</b>
<b>Chickens</b>	<b>Disabled dogs (3 legs each)</b>
<b>Llamas</b>	<b>Sea stars</b>
<b>Beetles</b>	<b>Mutant flies (7 legs each)</b>
<b>Spiders</b>	<b>Scary monsters (9 legs each)</b>

# 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?	