The Mathematics Lesson-Planning Handbook, Grades 6–8 at a Glance

A step-by-step guide to walk you through every facet of planning cohesive, standards-based mathematics lessons, including...

CHAPTER 2

YOUR 6–8 BLUEPRINT
Planning Mathematics Lessons for Coherence, Rigor, and Purpose

I was working as a beginning substitute in a sixth-grade mathematics class. During my first stop, the class was working on a group project involving finding the area, volume, and surface area of three different prisms. As I began a second tour of the classroom and started to look through the materials, I was struck by the apparent complexity of the problem and the amount of time the students were spending on each of the tasks.

Using your curriculum to think about all of your lessons as a cohesive progression across units, throughout the year

CHAPTER 5

DECIDING ON PURPOSE
Why Are You Building This Lesson?

Making a series of learning intentions and success criteria for your students, only the singular process of lesson planning. Your learning intentions define the content of the lesson. Informed in a Chapter, there are three types of mathematics lessons organized by specific conceptual understanding, lessons that are focused on the development of skills and practices, and lessons that are focused on the development of mathematical understanding.

Determining whether you're designing a lesson to focus on conceptual understanding, procedural fluency, or transfer of knowledge

CHAPTER 9

FRAMING THE LESSON
Formats

As a middle school teacher in Family and Consumer Sciences, one of my students wanted to create a lesson on baking in his family's kitchen. He asked me to help him get started. I suggested that he think about what he already knew about baking and what he wanted to learn. He thought about his family's baking and the types of recipes they used. He then started to look up recipes and found one that he liked. He decided to bake a cake. He brought in the ingredients and started to follow the recipe. As he worked, he realized that he needed to measure the ingredients accurately. He also noticed that the recipe called for a certain amount of time in the oven. He knew that he needed to pay attention to the oven's temperature and that he needed to watch the cake to make sure it was done.

Lesson need structure. Lessons format give you that structure. They can help you organize your thoughts, follow a logical sequence, and provide a clear framework for your instruction. Some lessons work better when students are collaborative groups, and some are more effective when students move around to different centers. In middle school, the lesson sequence is critical to success. Lessons format help you organize your instruction. They become a scaffold in your lesson planning. For instance, middle school mathematics lessons for 30 to 45 minutes each, what you would normally do is to start with a warm-up activity, perhaps a problem of the day or a quick review. Then, you would move on to a larger task, such as a project or a game. Next, you would have students work in pairs or small groups to solve the problem. Finally, you would present the solution to the class and discuss the different strategies that students used.
Choosing how to launch, facilitate, and close your lesson

CHAPTER 11

PLANNING TO LAUNCH THE LESSON

I love thinking about my lesson launches. I have come to find them an integral part of each lesson plan. I see the launch as part of the brainstorming process of the lesson, which requires me to do research and consider the needs of my students. I then put together a plan that will capture the students’ attention and allow them to think independently. The launch must be engaging, meaningful, and interesting. I try to think of ways to make my launch relatable to the students’ lives.

In my story, the tiger gives the dog a head start. The tiger knows that he runs 7 feet per second and the dog runs 5 feet per second. The students started calling out questions:

- Who wins the race?
- Who runs the furthest?
- What is a lesson launch?
- Why do I need a lesson launch?
- What are some different lesson launches?

In my mind, I was already planning the math questions that would come out of the race. It was an investigation in slope-as-a-rate-of-change and the graph was the key.

We will explore the following questions:

- How do you facilitate productive struggle?
- How do you facilitate meaningful mathematical discourse and facilitate learning for all students?
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This chapter explores ways to launch your lesson. We will explore the following questions:

- What is a lesson launch?
- Why do I need a lesson launch?
- What are some different lesson launches?

Illustrative vignettes at the start of each chapter focus on a specific part of the lesson-planning process.

CHAPTER 12

PLANNING TO FACILITATE THE LESSON

I think about it a lot more: a lesson being well planned and executed where it is important, meaningful, and engaging. I want my students to be thinking and solving problems creatively and independently, which is what I call meaningful discourse. I want to foster a classroom environment that is safe, supportive, and inclusive, where students feel comfortable expressing their ideas.

I want my students to be engaged in the learning process. This involves selecting tasks that are meaningful and relevant to their lives. I am always looking for ways to make the learning experience more meaningful and interesting. I believe that when students are engaged, they are more likely to be successful in the long run.

We will explore the following questions:

- How do you facilitate productive struggle?
- How do you facilitate meaningful mathematical discourse and facilitate learning for all students?
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- How do you facilitate meaningful mathematical discourse and facilitate learning for all students?

This chapter will discuss closure and several different formats while exploring strategies for capturing those moments when students are engaged and productive in mathematical thinking, reasoning, and problem-solving.

CHAPTER 13

PLANNING TO CLOSE THE LESSON

I am a bell-to-bell teacher and do not have extra time in my schedule to plan and facilitate a closure. This means that I have to be intentional about the planning and execution of the lesson in order to make sure that the students have a summary and reflection of what they have learned.

I have found that when I take the time to plan and execute a closure, my students are more engaged and reflective during the lesson. This is especially true when I use the closure to reinforce the key concepts and skills that were taught during the lesson.

We will explore the following questions:

- What are some different closure activities?
- Why do you need closure in a lesson?
- What are some different closure activities?
- Why do you need closure in a lesson?
In every chapter you will find

Figure 6.3 (Continued)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>1 (Highest Rating)</th>
<th>2</th>
<th>3 (Lowest Rating)</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Problem solving in nature</td>
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<tr>
<td>Authentic/interesting</td>
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<td>Equitable</td>
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<td>Connects to Standards for</td>
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<tr>
<td>Mathematical Practice or Process</td>
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<td>Standards</td>
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Thinking about Jose and Carin and their tasks, rate the tasks using the checklist in Figure 6.3. Discuss your results with a colleague. Whose example is a worthwhile task and why? Note your thoughts below.

HOW DO YOU ADAPT TASKS?

You may have experienced a time when you encountered a textbook or school district task that did not match the multiple needs of your learners. Many teachers choose to adapt tasks to increase the cognitive demand (Smith & Stein, 2011) and to provide more entry points for students to reason mathematically. Here are a few examples.

Example: Michael

Michael, a sixth-grade teacher, found the task in Figure 6.4 in his textbook and adapted it to incorporate process standards.

WHAT IS THE ROLE OF REPRESENTATIONS IN MATHEMATICS LESSONS?

The Annenberg Learner Foundation (2003) offers this definition:

"Mathematical representation” refers to the wide variety of ways to capture an abstract mathematical concept or relationship. A mathematical representation may be visible, such as a number sentence, a display of manipulative materials, or a graph, but it may also be an internal way of seeing and thinking about a mathematical idea. Regardless of their form, representations can enhance students’ communication, reasoning, and problem-solving abilities, help them make connections among ideas, and aid them in learning new concepts and procedures. (para. 2)

Mathematical concepts are abstract and can be difficult to get across to students. Representations of these concepts can be helpful. Representations can be thought of as a broad category of models. According to Van de Walle, Karp, and Bay-Williams (2016), there are seven ways to represent or model mathematical concepts:

1. Manipulatives
2. Pictures or diagrams
3. Symbols
4. Language (written or spoken)
5. Real-world situations
6. Graphs
7. Tables

Selecting a representation is a vital part of your decision making while lesson planning. You must decide, "What representations will help me achieve the learning intentions of my lesson?" Here is an example of a teacher using a representation to help students make sense of absolute value.

Example: Alfonso

Alfonso, a sixth-grade teacher, showed his students this number line to teach that absolute value is the distance from zero on the number line.

Alfonso asks his students to work with a partner to answer the following questions using the number line:

- What is the opposite of a?
- What is the opposite of f?
- What is the opposite of h?
- What is the opposite of c?

After the students share and discuss their responses, Alfonso asks this follow-up question: What do you notice about the relationship of your pairs of opposites to the number line? During the class discussion of this question, Alfonso guides his students to discover that each number in a given pair of opposites is the same distance from zero on the number line. Once students have made that connection, Alfonso introduces the symbol | | for absolute value using the letters along with the vocabulary term absolute value.

For example, he shows that |a| = 2 and |e| = 2. He then replaces the letters on the number line with integers and encourages the students to use the absolute value symbol with the integers such as |−6| = 6, |9| = 9, |5| = 5.

In this example, Alfonso used a number line with letters as a representation for students to discover the concept of absolute value.
Now that you have been introduced to the three lesson purposes, reflect on the lessons in your current grade level textbook, or supplemental materials. Can you categorize the lessons into these three categories? Do you notice any type being more prevalent than the others? Note any thoughts or concerns here.

How features of a lesson are interrelated to build cohesiveness across a unit

How do identity and agency influence lesson planning?

Identity and agency are two concepts that help teachers understand the dynamics that take place in a classroom, which, in turn, helps teachers better understand their students and how best to assist their needs. Identity is how individuals know and see themselves (i.e., student, teacher, good at sports, like math, etc.) and how others know and see us (i.e., short, smart, African American, etc.). When defined broadly, identity is a concept that encompasses not only how individuals know and see themselves but also how others know and see us. Identity is a dynamic concept that is in constant motion, which, in turn, helps teachers better understand their students and how best to meet their needs. Identity is an important factor that influences lesson planning because it helps teachers to develop lessons that are more relevant and engaging for their students. By understanding the identity of their students, teachers can design lessons that are more meaningful and relevant to their students. Additionally, lessons that are designed with the needs and interests of students in mind can help to build a sense of agency and ownership over the learning process. Agency is the ability to make choices and have control over one's own learning. By giving students agency over the learning process, teachers can help to build a sense of motivation and engagement. Therefore, understanding both identity and agency is critical for effective lesson planning.
How a lesson plan builds across the course of the book through snapshots of sixth-, seventh-, and eighth-grade classrooms

A place to consider each facet of a lesson in your own classroom, building your own complete lesson across the course of the book.
Appendix A shows how the complete lesson plan has come together for each grade.

Appendix B includes a blank lesson-planning template for your ongoing use (also available for download at resources.corwin.com/mathlessonplanning/6-8).

Appendix C includes additional key reading and online resources.

### Further Reading/Resources

**Online**

- Mathematics Content, Standards, and Virtual Manipulatives
  
- [Mathematics Content, Standards, and Virtual Manipulatives](http://nlvm.usu.edu)
  
- [Mathematics Content, Standards, and Virtual Manipulatives](http://www.achievethecore.org)
  
- [Mathematics Content, Standards, and Virtual Manipulatives](http://www.pz.harvard.edu/projects/visible-thinking)

**Appendix C 213**