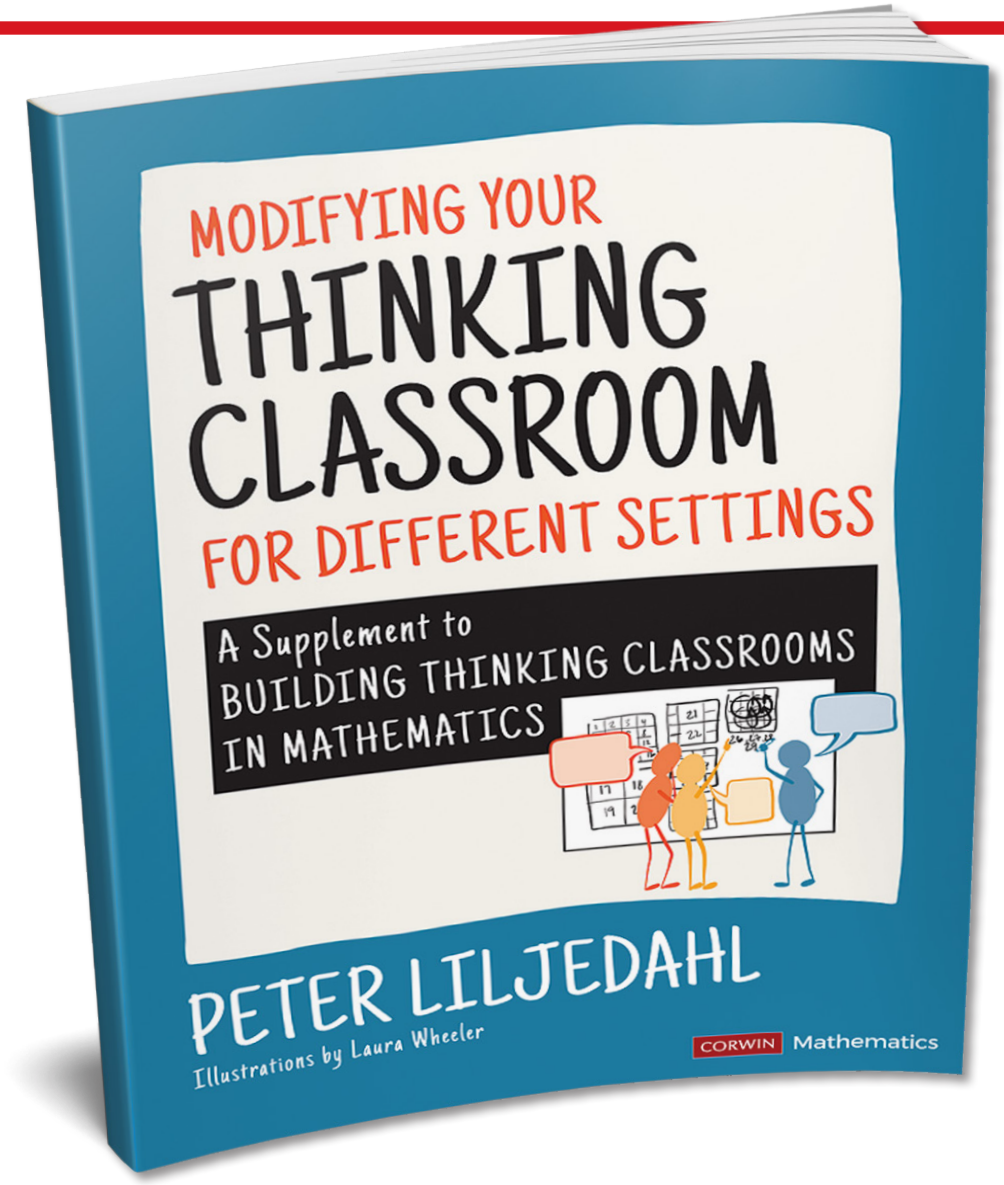

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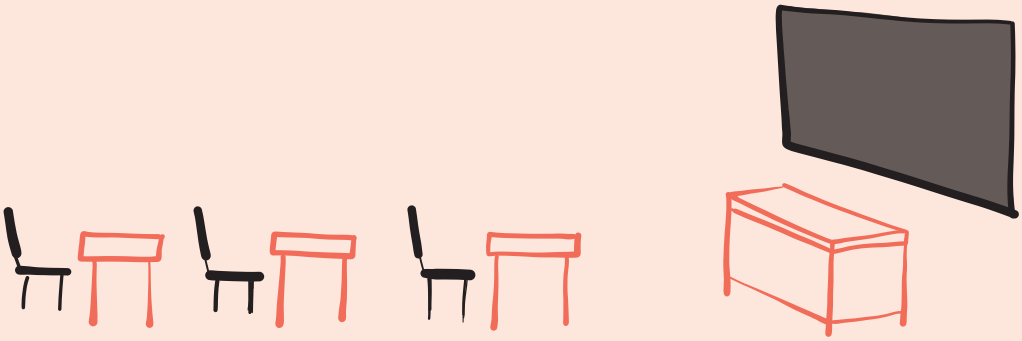
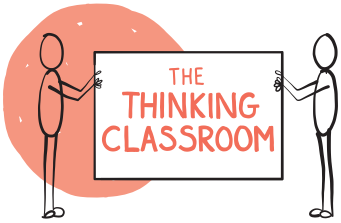


INTRODUCTION



Building Thinking Classrooms is a framework for teaching that emerged out of 15 years of work with teachers in classrooms. The result of this work is published in the anchor book, *Building Thinking Classrooms in Mathematics, Grades K–12: 14 Teaching Practices for Enhancing Learning*. That book briefly shares the inception of the idea and then talks about the 14 practices that the research shows have the most potential to increase student thinking in the classroom.

The supplement that you are now reading looks at how to adapt these practices to build thinking classrooms in settings other than the typical face-to-face setting described in the anchor book. Some of these settings have existed for a long time. Other settings emerged during the COVID-19 pandemic as ways to keep learning moving forward while adhering to regional and federal safety guidelines. In this supplement, I look at 12 such settings, divided into five categories.

Category 1: Face-to-Face Learning Environments

1. Building a Thinking Classroom With Social Distancing
2. Building a Thinking Classroom With Fixed Seating
3. Building a Thinking Classroom With Small Class Sizes

Category 2: Virtual Learning Environments

4. Building a Thinking Classroom for a Synchronous Virtual Setting

5. Building a Thinking Classroom in an Asynchronous Virtual Setting

Category 3: Hybrid Learning Environments

6. Building a Thinking Classroom for an Asynchronous Hybrid Setting

7. Building a Thinking Classroom for a Synchronous Hybrid Setting

Category 4: Other Learning Environments

8. Building a Thinking Classroom for Independent Learning

9. Building a Thinking Classroom for Homeschooling

Category 5: Supporting Learners

10. Supporting Students With Unfinished Learning of Previous Concepts in a Thinking Classroom

11. Supporting Students With Unfinished Learning of Current Concepts in a Thinking Classroom

12. Supporting Students Through One-on-One Teaching Using Thinking Classroom Practices

Each of these chapters begins with a detailed description of the setting that it is written about. I hope that whatever setting you are teaching in matches one of these. But the spectrum of what teaching and learning can look like is wide. So, there is a chance that your work as a teacher takes place in a setting other than what is captured in this supplement—for example, small classes with fixed seating. If this is the case, I am hopeful that you will be able to combine ideas from different chapters to be able to still build a thinking classroom within your unique situation.

Some of these settings require the adaptations of just a few of the 14 thinking classroom practices. Others will require adaptations of more than a few. And almost all of them require an adaptation in the order in which the practices are implemented.

14 Teaching Practices for Enhancing Learning

1. Give thinking tasks.
2. Frequently form visibly random groups.
3. Use vertical non-permanent surfaces.
4. Defront the classroom.
5. Answer only keep-thinking questions.
6. Give thinking task early, standing, and verbally.
7. Give check-your-understanding questions.
8. Mobilize knowledge.
9. Asynchronously use hints and extensions to maintain flow.
10. Consolidate from the bottom.
11. Have students write meaningful notes.
12. Evaluate what you value.
13. Help students see where they are and where they are going.
14. Grade based on data (not points).

How To Read This Supplement

The first working assumption is that you are familiar with the anchor book, so this supplement will make the most sense if you have read that. The second assumption is that you will not read this cover to cover but will consult the chapters most relevant to your situation at any given time.

The first nine chapters present the adaptations that are necessary to build a thinking classroom within that particular setting. For example, Chapter 1 looks at building a thinking classroom in a setting where students are face to face, but there is a restriction that requires them to maintain a social distance. All 14 of the thinking practices in the anchor book are still relevant to this setting, but four of them will need

to be adapted to be effective within this context. What is discussed in Chapter 1, then, are the four practices that need adaptation and what adaptations are necessary. What is not discussed are the 10 practices that can still be enacted as in the anchor book.

Chapters 10 through 12 are different in that they are about how to use some of the thinking classroom practices within various situations where you are offering students support. These chapters only discuss the practices that are relevant.

Once you identify the setting(s) most relevant to your particular context, you can simply read the relevant chapter(s). While it may appear that there is some redundancy between some chapters, be aware that many adaptations are only partially similar and have some aspects that are unique. For example, there is a similarity between how consolidation is modified in Chapters 6 and 7. But there are also a lot of differences between these two adaptations. Do not assume that because you are familiar with the adaptations for one setting that you know the adaptations for the other.

The other modification you'll see is to the order that practices should be implemented for each of these 12 settings. As such, each chapter ends with a modified pseudo-sequenced order of implementation. In some cases, this modification results in more toolkits. In others, it results in fewer.

The ideas that are presented in each of these 12 chapters come from a number of different sources. In some cases, they are extrapolations of the over 15 years of face-to-face research that produced the results presented in the anchor book. In other cases, they are the results of having field-tested these modifications in these types of settings described in this supplement. And in other cases, they are a combination of both—extrapolations and field testing. But in no case is the ideas grounded in the kinds of long-term and robust empirical research that the anchor book is based on. Having said that, we are in the same state we were while doing the research into how to build thinking classrooms in face-to-face settings. We have tried some things, we have learned some things, and we have more things to try. So, rather than reading this supplement as the result of a long journey, read it as a journey still in progress. And join in on the journey. Join in on the research. Try it, learn from it, adapt, and try again. In short, use the ideas that are here to begin your own research into how to build a thinking classroom within your own unique classroom setting.

GLOSSARY OF TERMS

There are a number of terms used throughout this supplement that would be useful for you to understand upfront.

Anchor book: The anchor book is the original book written about how to build thinking classrooms—*Building Thinking Classrooms in Mathematics, Grades K–12: 14 Teaching Practices for Enhancing Learning.* It is the book to which this is a supplement.

Asynchronous: This means *not* at the same time. For example, if you are teaching in an asynchronous online setting, this means that your students are accessing you and the course resources at different times from each other.

Hybrid: This is where some of your students are in person in the classroom and some of your students are elsewhere (typically at home). In some hybrid settings, the students that are at home are connecting virtually and synchronously to what is happening in the face-to-face lesson. Other times, they are not connecting at all or are connecting asynchronously to what is happening in the face-to-face lesson.

Jamboard: A Jamboard is a Google-based digital whiteboard that allows students to draw with a stylus or a mouse, add text boxes or sticky notes, add images, and erase. It also allows for students to use text boxes, sticky notes, and images as manipulatives.

Knowledgefeed: A knowledgefeed is, in essence, a chat window with the capability to post text, images, and screen captures in a linear and non-chronological order. A knowledgefeed is populated with things that students would see on vertical non-permanent surfaces (VNPSs) in a face-to-face setting.

Normal: Despite the fact that there is no such thing as a normal thinking classroom, this description is sometimes used in this supplement to distinguish between the settings presented in this supplement and the face-to-face synchronous setting described in the anchor book.

Online: This is a reference to how students are connecting to you, the lesson, or the course resources through the internet.

Supplement: What you are reading now is the supplement. Think of it as an appendix to the anchor book.

Synchronous: This means at the same time. For example, if you are teaching in a synchronous online setting, this means that all of your students are connecting at the same time.

Unfinished learning: This is a phenomenon wherein a student has not yet learned mathematics that they have been exposed to. All students have learning that is unfinished. In some cases, they have minimal and recent unfinished learning. In other cases, the unfinished learning is more substantial and could relate to concepts they were exposed to a long time ago.

Virtual: *See* Online.

KNOWLEDGEFEED

One of the big advantages of having students work on vertical non-permanent surfaces (VPNSs) in a "normal" or typical face-to-face classroom is that it so well facilitates the movement of knowledge between groups. When groups get stuck, they can passively look to the work of others to get a hint—whether that hint is a type of notation, a way to organize data, a partial solution, or a path to a solution. Alternatively, if a group has completed a problem or task, they can passively look around the room to get an extension to the task from another group. If this passive interaction with the work of other groups is inadequate, a group may choose to more actively engage with that group by asking for help or interrogating them about things they have seen in their work but do not fully understand. Whether passive or active, this gathering of hints and extensions creates a type of knowledge mobility that is instrumental in helping keep groups in flow as they work through a series of curricular or non-curricular tasks.

In many of the settings discussed in this supplement, we can still do random groups, and we can use digital whiteboards in place of VNPSs. The problem is that these digital whiteboards do not allow for the same level of passive interaction that a glance over your shoulder in a face-to-face classroom affords. To compensate for this, you can make a *knowledgefeed*. A knowledgefeed is just a collaborative GoogleDoc that you create and that students keep open on their desktop while working in certain settings and is populated with the kinds of things that students would see on VNPSs in a face-to-face classroom. This includes everything from the task at hand to hints, extensions, and (pictures of) student work. When you first start to

use a knowledgefeed in your setting, it is something that you, as the teacher, posts to. However, in many settings, it becomes advantageous to work toward having students also post to it. They can post their own images of work, hints, questions, and answers to questions.

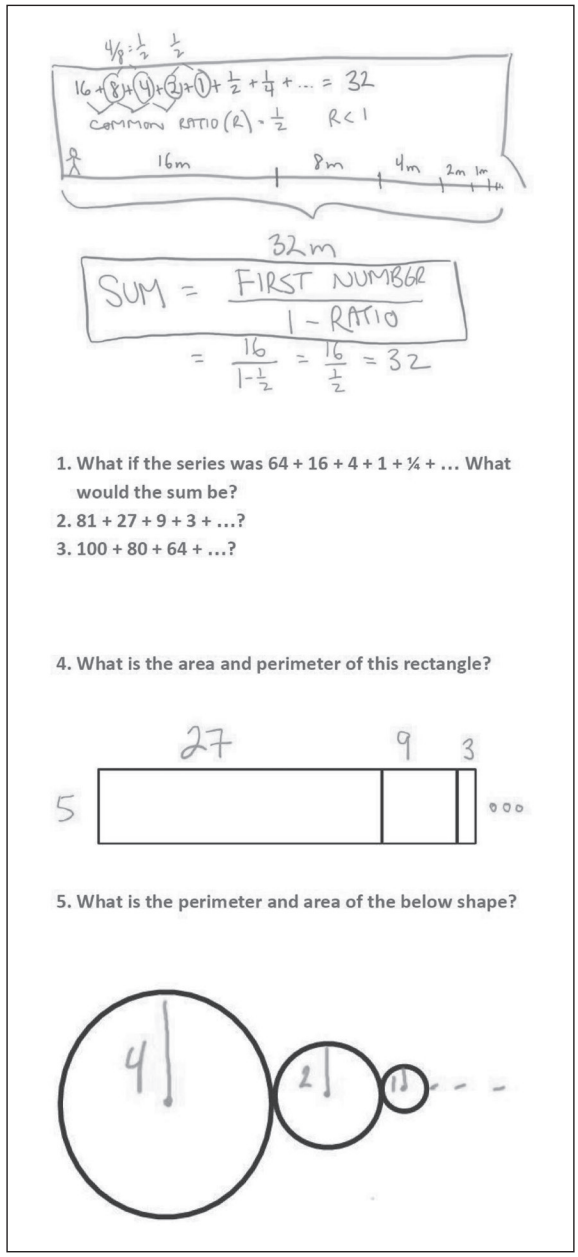


Figure i.1 An Example of a Knowledgefeed

In Chapters 2, 4, 5, 6, and 7 of this supplement, I discuss very specific ways to set up and organize a knowledgefeed as well as how to move students toward using it as a source for knowledge mobility.