



# Study Guide

## *How I wish I'd Taught Maths:*

*Lessons Learned from Research, Conversations with Experts,  
and 12 Years of Mistakes*

**Craig Barton**

This study guide is arranged by chapter, enabling readers to work their way through the entire book or to focus on the specific topics addressed in a particular chapter. This guide is designed to help you reflect on and apply the ideas presented in *How I wish I'd taught Maths* by providing 5 questions related to each chapter. Hopefully it will serve as a useful companion piece for individuals, small groups, or an entire faculty.

Here are 5 websites directly related to the ideas in the book which you might find useful to visit as you work through this guide:

1. <https://diagnosticquestions.com/>
2. <https://variationtheory.com/>
3. <https://ssddproblems.com/>
4. <http://goalfreeproblems.blogspot.com/>
5. <https://mathsvenns.com/>

Learning Sciences International thanks you for your interest in this book, and we hope that this guide proves a valuable addition and support to your professional development practices.

## **Chapter Reflection prompts**

These prompts might help you when reflecting on the ideas and techniques that you tried from each chapter:

Which takeaways from the chapter did you try?

Which class did you choose to try it with?

What worked?

What didn't work?

What questions / concerns / advice do you have?

## **Chapter 1: How students think and learn**

What are the key differences between Working Memory and Long-term Memory?

What are the key differences between how experts and novices think?

What does Daniel Willingham mean when he says *memory is the residue of thought*?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** pick a problem and describe how both a novice and an expert learner might approach it.

## **Chapter 2: Motivation**

What are the key drivers of motivation, and which does the author argue is the most significant?

What are some of the dangers of “real life maths”?

Why might too much struggle be a bad thing, and what are the implications for the concept of a growth mindset?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** pick a topic and try to think of a way to introduce it using Dan Meyer's *headache-aspirin* approach

## **Chapter 3: Explicit Instruction**

Why does the author feel he used too many “less guided” forms of instruction in the past?

What are the key things that went wrong in the author’s circle theorems guided discovery task?

What are the arguments against always telling students why a method or procedure works before they are shown how to do it?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** make a list of 3 methods where you would teach the why first, and 3 where you would teach the how first



## **Chapter 4: Focusing Thinking**

What are Goal-Free Problems, and why might they be more effective for learning than goal-specific problems?

What are the key things to bear in mind when using written text in lessons?

What sources of redundancy might be present in lessons?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** try Silent Teacher with a non-math colleague to try to teach them a method

## **Chapter 5: Self-Explanations**

What is the Self-Explanation Effect?

Why might asking students to articulate their thoughts straight away be counterproductive?

How can we help our students benefit from the Self-Explanation Effect?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Watch a TED Talk on a topic you don't know much, and at key points pause the video and practice self-explaining

## **Chapter 6: Making the most of Worked Examples**

What are the steps involved in sharing an Example-Problem Pair with your class?

How do Supercharged Worked Examples work?

What should we be aware of when showing students examples with mistakes in them?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** try an Example-Problem Pair with a non-math colleague to try to teach them a method

## **Chapter 7: Choice of Examples and Practice questions**

What are some of the difficulties associated with trying to teach students definitions and rules?

What are SSDD Problems and why are they important?

What is the advantage of Intelligent Practice over other form of practice?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Create your own sequence of Intelligent Practice questions



## **Chapter 8: Deliberate Practice**

What are the Five Stages of Deliberate Practice

Why should practice not necessarily look like the final performance?

What are three reasons to always give students the answers to classwork?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Pick a mathematical concept and make a list of all the individual components of knowledge required

## **Chapter 9: Problem Solving and Independence**

Why does the author argue that some problem solving techniques are unlikely to be effective or transferable?

What is the rationale behind John Sweller's quote that learners can engage in problem-solving activities for extended periods and learn almost nothing?

How does the author argue we can help our students become more independent?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Create a set of SSDD Problems

## **Chapter 10: Purposeful Practice**

What does the author argue is the most difficult part of teaching?

How does Purposeful Practice activities offer a solution to giving students exercises designed just to build fluency, and activities requiring them to solve complex problems?

What is the criteria for an activity to fit the mold of Purposeful Practice?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Use some of the websites listed to find a Purposeful Practice problem for a topic you have coming up

## **Chapter 11: Formative Assessment and Diagnostic Questions**

How does a Diagnostic Question differ from other multiple choice questions?

How can Diagnostic Questions be used in class?

What makes a good Diagnostic Question?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Try writing a Diagnostic Question together with a colleague - or a group of colleagues - in the way described in the chapter



## **Chapter 12: Long-term Memory and Desirable Difficulties**

What is the difference between learning and performance, and why is that significant for teachers?

What are some of the ways teachers can make use of the Spacing and Interleaving Effects?

How does the author run his low-stakes quizzes?

Has this chapter made you think differently about any of your existing practices?

Is there anything you might do differently based on reading this chapter?

**Chapter Challenge:** Create a mixed-topic low-stakes quiz for one of your classes