The 5Es of Learning

The 5Es of Learning: Engage, Explore, Explain, Elaborate, Evaluate

The 5E instructional model is based on the idea that children learn best when they are able to work out concepts for themselves over a period of time, through various learning activities structured by the teacher. This idea is informed by a constructivist view of learning, in which students build connections between existing and new knowledge.

The way in which *Making Maths Accessible* incorporates the 5E instructional model is based upon research findings about how students learn maths. These findings indicate that students learn best when they have an opportunity to engage in explorations in a hands-on, minds-on environment in which they make and pose explanations for their discoveries.

See chapter five for an in-depth discussion of the 5E instructional model and a detailed 5E lesson plan on fractional parts. Chapter six explains how to adapt a traditional textbook lesson to create high-quality instruction according to the 5Es of learning. Lesson plan templates are included as appendices.

Transformational Change

Making Mathematics Accessible to Students With Special Needs subscribes to the fundamental premises supported by mathematicians and mathematics educators in both the direct instruction and inquiry learning communities. These premises include the following:

- Students must be able to formulate and solve problems, including understanding the problem, translating the problem into a precise mathematical question, identifying and using appropriate methods to solve the problem, interpreting and evaluating the solution, and recognising problems that cannot be solved mathematically.
- Mathematical reasoning, justifying mathematical statements, and using mathematical terms and notation with degrees of precision appropriate to particular year levels are fundamental.
- Basic skills are vitally important for everyday uses, and serve as a critical foundation for higher-level mathematics. Students need both computational fluency and an understanding of the underlying mathematical ideas and principles (Ball et al., 2005, p. 2).
- Teachers' ability to help students understand and succeed with maths depends on their ability to hear and understand what students are thinking and to explain or show ideas in ways that are accessible to the students (Serwach, 2005).

Making Mathematics Accessible to Students With Special Needs is designed to increase teachers' capacity in making mathematics accessible to all students and supports changes in the delivery and support of special education services.

Here are three recommendations for reform to those services:

1. Focus on results—not on process.
2. Embrace a model of prevention—not a model of failure.
3. Consider children with disabilities as general education children first (President's Commission on Excellence in Special Education, 2001).

These recommendations are reflected in educational policies that have as their purpose to produce better outcomes for all children and to apply procedures with strong scientific bases to a wide range of decisions,

actively engage readers and can be used as a self-study professional development tool or as a group book study.

The first three chapters of *Making Maths Accessible for Students With Special Needs* lay the foundation for working with students with special needs in mathematics classrooms. In chapter 1, we will focus on the rationale for making mathematics accessible to all students, including those with special needs. We will introduce the students we will be following throughout the book, whose needs will be a focus in each chapter. In chapter 2, we will look at creating a supportive classroom environment, which shows how affective supports and a positive classroom environment enhance learning. Chapter 3 is designed to provide teachers with a deeper understanding of high-quality, effective instruction in the mathematics classroom.

Chapter 4 centres on providing accommodations and modifying mathematics for students with special needs. We will highlight both foundational instructional strategies that can be used with all students as well as specific needs of special learners, how these needs affect learning, and specific supplemental instructional strategies to address each need.

Chapters 5 and 6 are designed to connect the fundamental supports outlined in chapters 1 to 4 with real-life classrooms. In chapter 5, we will use a lesson developed using the 5E instructional model, a teaching sequence that meets the needs of students with special needs. The five phases of the sequence are:

1. **Engage**—The purpose is to pique students' interest, get them involved, and connect to their prior knowledge.
2. **Explore**—The purpose is to build understanding by allowing students to actively participate in exploring the concept.
3. **Explain**—The purpose is to formalise students' understanding of the concept to this point in the lesson. Communication among students and between the students and teacher is a key element of the phase.
4. **Elaborate**—The purpose is to extend or apply what students have learned to related concepts.
5. **Evaluate**—The purpose is for students and the teacher to determine if the desired outcome (learning) has taken place.

Table 5.1: A 5E Lesson Plan Template

Learning Phase	Developmental Progression	Type of Discourse	Activity Description	Facilitation Questions
Engage	How does this phase stimulate curiosity? How does this phase activate prior knowledge? What accommodations could I include in this phase to make learning more accessible? What questions might students raise?	Student–Student Student–Teacher Teacher–Student		
Explore	What concept(s) will students explore? What new vocabulary will students need for this phase of the lesson? What accommodations could I include in this phase to make learning more accessible?	Student–Student Student–Teacher Teacher–Student		
Explain	What connections are essential for the student to understand? What new vocabulary is introduced in this phase? What algorithms (computational procedures) are connected to the concept? What accommodations could I include in this phase to make learning more accessible?	Student–Student Student–Teacher Teacher–Student		
Elaborate	How is the new concept applied or extended? How will I encourage the use of vocabulary? What concepts and processes must students understand to be successful with this phase of the lesson? How (if at all) must the algorithms be applied? What accommodations could I include in this phase to make learning more accessible?	Student–Student Student–Teacher Teacher–Student		
Evaluate	What concept(s) will I assess? What additional skills must students have to complete this phase successfully? What accommodations could I include in this phase to make learning more accessible?	Student–Student Student–Teacher Teacher–Student		

You can also use a weekly checklist, such as the one in table 5.2, to verify that you've addressed each of Gardner's intelligences as discussed in chapter 4 in each learning phase.

Making Maths Accessible to Students With Special Needs examines two mathematics lessons. In this chapter, we will examine a lesson on fractional parts and show how its approach meets the needs of students with special needs. In chapter 6, we will examine a traditional textbook lesson and show how to adapt it.

Explore Phase

1. Distribute one set of the Set Model Mats to each pair of students.

Facilitation Questions

How can you describe the Set Model Mats?
Possible average student response: The Set Model Mats are rectangles divided into equal parts, and the parts are labelled with fractions.
Possible struggling student response: The Set Model Mats have numbers on them.

What else do you notice about the Set Model Mats?

In what ways are the Set Model Mats similar?
Possible average student response: The Set Model Mats are all rectangles divided into equal parts.
Possible struggling student response: They all have parts.

How can you describe the parts of each rectangle?

How does one part of each rectangle compare to the other parts of the same rectangle?

In what ways are the Set Model Mats *different*?
Possible average student response: The Set Model Mats are divided into different numbers of equal parts, and the parts on each of the rectangles are different sizes.
Possible struggling student response: The parts of the rectangles are different.

How do the parts on the Set Model Mat: Halves compare to the parts on the Set Model Mat: Quarters?

2. Distribute twelve counters (such as beans or centimetre cubes) to each pair of students.
3. Prompt the students to divide the counters evenly between the parts on the Set Model Mat: Halves.
4. Prompt the students to discuss their findings with their partners and record their conclusions.
5. Prompt the students to repeat steps 3 and 4 for each Set Model Mat.