

The *Math for All* Professional Development Program

Course Outline for Grades 3–5 Workshops

Workshop 1: *Planning Math Lessons that Reach All Learners*

We will introduce participants to a neuro-developmental framework¹ and a case lesson on pre-algebra. The case is a 3rd grade lesson in which students use interlocking cubes to determine the factors of a number and examine patterns in factor families. Participants will use the neuro-developmental framework to explore the mathematical demands of the case lesson. They will use video to observe the work done by Jashendeeep, a student who has difficulties with organizing her thoughts and her work on paper. They will also reflect on instructional strategies to support Jashendeeep and other students in the classroom who have different strengths and needs.

Participants will select a focal child from their own classroom and work with the members of their team to plan for an observation of this child, which will be guided by the neuro-developmental framework and carried out before the next workshop session. Participants will record their observations, reflect on them, and share their work at the beginning of Workshop 2.

Participants will:

1. Learn how to analyze the demands of a mathematical task using the neuro-developmental framework.
2. Learn how to use the neuro-developmental framework to guide their observation of students' strengths and needs.
3. Enhance their understanding of instructional strategies that support students with strengths and needs in different neuro-developmental functions.

Workshop 2: *Supporting Language Use in Math*

In this workshop we will focus in depth on one of the neuro-developmental functions, language

use and communication. Participants will explore the role of language in learning mathematics

and learn about different components of language function. Participants will use video and other materials from a 4th grade case lesson on data analysis to analyze the language demands of the focal task, which involves gathering numerical data and representing it. They will also observe Ariel, an English Language Learner student who is easily distracted, to assess his strengths and needs in language function. Using video of the case lesson's teacher as a spring board, participants will consider instructional strategies that will support the language function of Ariel as well as other students in this lesson.

¹ Levine, M. (2002). *A Mind at a Time*. New York: Simon & Schuster.

Participants will work in teams to select a lesson that they will teach before the next workshop to plan language adaptations for a focal child. They will analyze the goals and language demands of the lesson, think about their focal child's strengths and needs in language functions, and plan for adaptations to help insure that their focal child will be able to meet the learning goals of the lesson. Participants will record and reflect on the implementation of their adaptations and share their experiences at the beginning of Workshop 3.

Participants will:

1. Deepen their understanding of the many uses of language in mathematics.
2. Learn how to analyze the language demands of a mathematical task.
3. Learn how to use the neuro-developmental framework to assess a student's strengths and needs in relation to using language in math.
4. Broaden their understanding of specific instructional strategies for supporting language use in math.
5. Learn to use their analyses of the neuro-developmental demands of the task and the strengths and needs of their students to guide planning of adaptations for their math lessons.

Workshop 3: *Supporting Memory Functions in Math*

The focus of this workshop session will be on memory function. Participants will reflect on the role of memory in learning mathematics and learn about the various aspects of memory function. In the context of a case lesson on finding the factors of 100, participants will analyze the memory demands of the focal activity, which requires students to use coins to model how different factor pairs make \$1 (=100 cents). They will observe Luis Carlos, a bilingual student with expressive and receptive language delays, to assess his strengths and needs in memory function. They will also observe video clips of the teachers from the case lesson to reflect on the implementation of specific teaching strategies that support memory function.

Using the same process as in Workshop 2, participants will work in teams to plan memory adaptations for a lesson that they will teach before the next workshop. Participants will record and reflect on the implementation of their adaptations and share their experiences at beginning of Workshop 4.

Participants will:

1. Deepen their understanding of the role of memory functions in mathematics.
2. Learn how to analyze the memory demands of a mathematical task.
3. Learn how to use the neuro-developmental framework to assess strengths and weaknesses in student's memory function.
4. Broaden their understanding of specific instructional strategies that support students' memory functions in math.
5. Learn to use their analyses of the neuro-developmental demands of the task and the strengths and needs of their students to guide planning of adaptations for their math lessons.

Workshop 4: *Supporting Psycho-Social Functions in Math*

This workshop will focus in-depth on psycho-social functions. Participants will discuss the role of social behavior and social language in learning mathematics and learn how the neuro-developmental framework describes the components of psycho-social functions. A 3rd grade lesson on geometry serves as the case lesson for this workshop. Participants will analyze the psycho-social demands of one of the focal activities of this lesson, which requires children to work in pairs, finding the lines of symmetry of various geometric shapes. They will view video of Shamira, a student who has difficulties with receptive language, to assess her strengths and needs in psycho-social functions in this activity. They will then consider how different kinds of instructional strategies could be used to support psycho-social functions in this lesson.

Using the same process as in Workshop 2 and 3, participants will work in teams to plan psycho –social adaptations for a lesson that they will teach before the next workshop. Participants will record and reflect on the implementation of their adaptations and share their experiences at beginning of Workshop 5.

Participants will:

1. Deepen their understanding of the role of psycho-social functions in mathematics.
2. Learn how to analyze the psychosocial demands of a mathematical task.
3. Deepen their understanding of how to assess a student’s strength and needs in psychosocial functions in math.
4. Broaden their understanding of specific instructional strategies that support psycho-social functions in math.
5. Learn to use their analyses of the neuro-developmental demands of the task and the strengths and needs of their students to guide planning of adaptations for their math lessons.

Workshop 5: *Supporting Higher-Order Thinking in Math*

This workshop focuses on higher order thinking. Participants will consider the role of higher order thinking in learning math, and learn about how the neuro-developmental framework describes various components of higher order thinking. The case lesson for this workshop is a 5th grade lesson on multiplication. Participants will examine the higher order thinking demands of the focal activity, which requires students to solve a multiplication cluster problem. They will observe Michael, a student with autism, to assess his strengths and needs in higher order thinking. They will also watch video clips of the teacher to identify and discuss specific strategies for supporting higher order thinking in this lesson.

Using the same process as in previous workshops, participants will work in teams to plan higher-order thinking adaptations for a lesson that they will teach in the near future.

Participants will:

1. Deepen their understanding of the role of higher-order thinking in mathematics.
2. Learn how to analyze the higher order thinking demands of a mathematical task.
3. Deepen their understanding of how to assess a student's strength and needs in higher order thinking in math.
4. Broaden their understanding of specific instructional strategies that support higher order thinking in math.
5. Learn to use their analyses of the neuro-developmental demands of the task and the strengths and needs of their students to guide planning of adaptations for their math lessons