The *Math for All* Professional Development Program
Course Outline for Grade K–2 Workshops

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

We will introduce participants to a neuro-developmental framework[1] and a case lesson on numbers and operations. The case lesson is a 1st grade classroom in which students use addition and subtraction skills by composing and decomposing numbers using manipulatives and other visual aids. Participants will use the neuro-developmental framework to explore the mathematical demands of the case lesson, to observe the work done by one student, Gabby, a student who has a high IQ and a learning disability (working memory deficit). Teachers will have the opportunity to reflect on instructional strategies to support Gabby and other students in the classroom who have different strengths and needs.

Participating teams will select a focal child from their own classrooms 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 a process for planning accessible math lessons that maintain the integrity of the mathematical goals and build on individual students' strengths and needs.
2. Learn how to analyze the demands of a mathematical task using the neuro-developmental framework.
3. Learn how to use the neuro-developmental framework to guide their observation of students' strengths and needs.
4. 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 and how it affects the learning of data collection. 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 1st grade case lesson on data analysis to analyze the language demands of the focal task, a

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

guess my rule game with attribute blocks. They will also observe Ephraim, a focal student with a speech and language disability, 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 Ephraim as well as other students in this lesson.

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. Teams will record and reflect on the implementation of their adaptations and share their experiences at 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 examine and 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 measurement conducted in a mixed 1st and 2nd grade classroom, participants will analyze the memory demands of the focal activity, which involves measuring and comparing the length of paper cut-outs of different size feet. They will observe Gauthier, a bilingual student with a working memory deficit, to assess his strengths and needs in memory function. They will also observe video clips of the teacher 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
Kindergarten 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, using pattern blocks to fill outlines of
different geometric figures and shapes. They will view video of Francesca, a child with a
spatial disability 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 lessons.

Building on Workshops 2 and 3, participants will work in teams to plan for an upcoming
math lesson, incorporating adaptations for children who need support in psycho-social
functions. They will teach this lesson before the next workshop. At the last workshop
they will share and reflect on the implementation, and discuss the implications for their
mathematics teaching in general.

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 and its impact on
children's access to mathematical knowledge. The case lesson for this workshop is a 2nd
grade lesson on pre-algebra. Participants will examine the higher order thinking demands
of the focal activity, which requires students to using snap cubes as a model to determine

the number of apartments in a building of a given shape and with different number of floors. They will observe Eva, a bilingual student who is "at risk" in math, to assess her strengths and needs in higher order thinking. They will also watch video clips of the teacher to identify and discuss specific strategies for supporting the higher order thinking for Eva and other students in the class.

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.