

Math Recovery
Additional Information
for Kentucky Teachers
April 26, 2006

What is a Math Recovery Specialist?

The Math Recovery Specialist is the teacher trained and certified to implement the Math Recovery program and is synonymous with the term Mathematics Intervention Teacher (MIT) used by the Kentucky Department of Education.

What are the formal and informal assessments in the Math Recovery (MR) program?

- ❖ 6 diagnostic interviews with all 1st grade students. The Math Recovery program utilizes six assessment schedules (Wright et al., *Early Numeracy*, 2006) to diagnose multiple depths of knowledge in the areas of:
 - Forward number word sequence
 - Backward number word sequence
 - Numeral identification
 - Early arithmetical strategies
 - Base-ten arithmetical strategies
 - Combining and partitioning numbers in the range to 20
 - Combining and partitioning numbers in the range to 100
 - Early multiplication and division
- ❖ The Math Recovery learning and assessment framework consists of six models each of which contains multiple levels of number knowledge (Wright et al., *Early Numeracy*, 2006, p. 20).
- ❖ Teacher/student discourse
- ❖ Review of videotape

How are the MR diagnostic assessments reliable and valid?

- ❖ **Inter-rater reliability**
University of Strathclyde (Munn, P., in preparation, *Math Recovery Inter-rater – reliability study*.)
Munn's study determined the inter-rater reliability of seven pairs of experienced Math Recovery teachers. Each observer scored 10 videotaped Math Recovery assessments for a total of 140 observations of 70 children. The agreement between observers, calculated as $a/(a+d)$, was 85%.

❖ **Construct validity**

Math Recovery assessment incorporates Steffe's stages of children's construction of arithmetical counting strategies (Steffe, Cobb & von Glasersfeld, 1988. *Construction of arithmetical meanings and strategies*. New York: Springer-Verlag; Steffe, L., von Glasersfeld, E., Richards, J. & Cobb, P. 1983, Children's counting types: Philosophy, theory and application. New York: Praeger.)

Math Recovery assessment incorporates the model of children's initial understandings of ten and utilizes specific assessments tasks used in the development of that model. (Cobb, P. & Wheatley, G. 1988. Children's initial understandings of ten. *Focus on learning problems in mathematics*, 10(3), 1-28.)

Math Recovery assessment utilizes the learning framework in number. (Wright, R. J. (1994). A Study of the Numerical Development of 5-year-olds and 6-year-olds. *Educational Studies in Mathematics*, 26, 25-44. Wright, R. J. (1991). The role of counting in children's numerical development. *The Australian Journal of Early Childhood*, 16 (2), 43-48. Wright, R. J., Martland, J., & Stafford, A. (2006). *Early numeracy: Assessment for teaching and intervention* (2nd Ed.). London: Paul Chapman Publications /Sage.

❖ **Empirical validity**

The Math Recovery assessment schedule and the learning and assessment framework are used widely by school systems across the United States and internationally to diagnose children's early number knowledge. Use of the assessments with many thousands of students has provided empirical data which underlines the validity of the Math Recovery assessment process.

How are the MR diagnostic assessments continuous and varied?

- ❖ Math Recovery includes initial, comprehensive assessment and ongoing assessment through intensive observation and continual micro-adjusting or fine-tuning of teaching based on the teacher's observation. (Wright et al., *Early Numeracy*, 2006, p. 4-5).
- ❖ Math Recovery assessment includes videotaped, interview-based assessment; assessment through teacher observation; assessment based on review of videotaped record of daily instruction; collegial and leader review of assessments using videotaped records; and use of initial screening assessments aligned with the assessment schedules.
- ❖ Math Recovery assessment is age-appropriate because it is not dependent on the ability to read; the ability to write arithmetical notation; the ability to complete scanned bubble-sheets, or computer skills. Math Recovery assessment is age-appropriate because it allows the assessor to rephrase tasks or items in the child's vernacular.

How does an MIT assist primary students who are struggling in mathematics?

- ❖ The Math Recovery program is a short-term intervention involving intensive, one-on-one teaching. The program uses a comprehensive and inter-related set of key teaching topics, thirty topics in all. Each of these 30 topics consists of typically six instructional procedures, making a total of 183 procedures. The key topics and the instructional procedures are linked directly to the diagnostic assessments and the assessment and learning framework. Each procedure includes exemplary teacher dialogue, and appropriate scaffolding to facilitate advancement of student knowledge.
- ❖ The MIT prescreens primary students twice a year to determine the lowest quartile and then spends ½ hour four or five days per week working individually with each identified student for approximately one semester to develop the student's basic knowledge of the structure of numbers.

How are student performance goals determined in MR?

The goal of Math Recovery intervention is to accelerate student learning so that students meet or exceed grade-level expectations in 12 to 15 weeks.

What happens if a student does not make progress in the MR program?

- ❖ There is an option to furlough a participant to be picked up later in the year if it seems appropriate.
- ❖ Often lack of progress can also indicate that the child has some learning difficulties and can be discontinued from the program until a full assessment has been made to determine any special needs.
- ❖ Considerable thought and care is made in the selection of students for inclusion in the intervention program.

What are the roles and responsibilities of the MIT as stipulated by MR?

- ❖ The MIT prescreens all 1st graders twice a year to identify students who need intervention services during the coming semester.
- ❖ The MIT works with primary students individually for one half hour each, 4 or 5 days per week for a total of 40 to 60 hours, all of which is recorded on video.
- ❖ The MIT reviews the daily footage of video in order to reflect, record observations, and plan for the next day's instructional activities.
- ❖ The MIT collects and analyzes data regarding the child's progress.
- ❖ The MIT collaborates with the regular classroom teacher regarding the student's progress in the comprehensive math program.

- ❖ The MIT communicates with families to facilitate their understanding of their child's needs and progress, including sending home video of the child and sending home math games.
- ❖ The MIT serves as a faculty resource for effective mathematics instruction.
- ❖ The MIT participates in professional development to gain knowledge and skills of mathematics teaching and learning.
- ❖ The MIT will share the MR program with the school community and beyond for the purpose of raising awareness of the effectiveness of the diagnostic intervention services for improving student performance.

How can the school's administration support the MIT?

- ❖ Provide permanent space for the intervention station with a table and two small chairs
- ❖ Provide a cabinet for storing videotapes/DVDs and materials
- ❖ Provide a camera, tripod, wireless microphones, blank tapes/DVDs, and a media playback/editing system
- ❖ Provide daily time for the MIT to work with individual students, to review the video, to plan, to communicate with families, and to collaborate with other teachers
- ❖ Provide opportunities for the MIT to share the Math Recovery program with the entire faculty
- ❖ Allow release time for the MIT to engage in professional development as required by Math Recovery and the Kentucky Center for Mathematics

What are some implementation models of MR?

- ❖ The MIT should work individually with identified primary students for at least half the day. In addition the MIT may...
 - ❖ Work individually with additional primary students
 - ❖ Work with small groups of students
 - ❖ Work collaboratively with other teachers
 - ❖ Work in a regular classroom
- ❖ The Math Recovery program has had extensive successful implementations to meet the needs of the following student populations:
 - ❖ Low socio-economic status
 - ❖ Title I
 - ❖ Special education and students with 504 plans
 - ❖ English language learners
 - ❖ Minority populations
 - ❖ Transient populations
 - ❖ At-risk students
 - ❖ Under-achieving students

What is a possible daily schedule for the MIT?

- ❖ 1 ½ hours—3 individual MR students, 5 days per week for thirty minutes each session
- OR
- 3 individual MR students, 4 days per week for thirty minutes each session and 3 to 4 first grade math students in a small group, 3 days per week for thirty minutes each session
- ❖ 2 hours—video watching (lesson analysis, reflection, on-going assessment) and lesson planning
- ❖ ½ hour—communication with teachers and parents, preparing teaching materials, progress reports, student records, data collection, classroom observations, etc.
- ❖ 3 hours—working with second through fifth grade students in small groups (3 to 5 students in each), 4 days per week for thirty-minute sessions.
- ❖ 1 hour—additional planning and collaboration for second through fifth grade students
- ❖ After school—1/2 hour three days a week working with a small intervention group

What materials does an MIT need to implement MR?

- ❖ The MR kit for \$1000 plus \$100 shipping
- ❖ Math games for family involvement
- ❖ Video camera, tripod, playback/editing system, blank tapes/DVDs
- ❖ Storage space for saved video footage
- ❖ A teaching station with a table and chairs
- ❖ KCM also requires meeting time using the Centra online communication system for \$1000
- ❖ Maintain membership in the US Math Recovery Council (\$50 per year)

How does the Math Recovery program support the comprehensive school mathematics program?

- ❖ Since the MIT will have in-depth understanding of the constructs of early numeracy, s/he will serve as a mathematics instructional support leader for special education teachers and regular classroom teachers
- ❖ The Math Recovery program has proven to be adaptable to and supportive of a wide variety of established curricula. Math Recovery professional development ensures that teachers become wise consumers of their school mathematics program and resources.

What are the professional development/certification requirements for the MIT?

- ❖ 10 days of training—5 in the summer and 5 during the school year
- ❖ 100 hours of videotaped intervention
- ❖ 3 onsite visits from the MR leader
- ❖ 3 video review collaborative meetings with other MITs
- ❖ Continuing support and dialogue with their Math Recovery instructor is provided throughout the 12-month course.
- ❖ Math Recovery professional development adheres to all eleven KDE Standards for High Quality Professional Development
- ❖ Recertification requires a 2-day training update every 3 years
- ❖ KCM also requires weekly online meetings

Why should a MIT collect daily video footage?

Unlike reading intervention, which allows for recording student progress during tutoring, math intervention requires teachers to be focused on verbal responses to guide the student's thinking. The daily video footage allows a teacher to work verbally with the student during the individual tutoring session and later reflect and observe the development of the student's thinking, which leads to the determination of appropriate activities for the next lesson.

What does a MIT do with the collected video footage?

- ❖ The MIT's video library should include teaching excerpts, case studies, and assessment exemplars to:
 - Review for self-reflection
 - Present to administrators and teachers
 - Send home with students
 - Shared with the MR team

How can the MIT involve families?

- ❖ Conference with parents in person and/or on the phone
- ❖ Send home video clips with progress reports
- ❖ Send home family math games

What paperwork must be submitted to the Math Recovery Council?

A Students Data Sheet for each child is submitted to the US Math Recovery Council. Submission of student data for at least one child is required annually to maintain certification.