Response to Intervention Case Study

Riley is a 10 year old in 4th grade.
He was identified as performing below grade level in Math.
Riley's parents note that his poor math grades are inconsistent with the B's and C's he receives in his other academic classes.

Family Situation:
Riley is an only child and lives with both parents in Beijing. English is the only language spoken at home. Mrs. Riley's mother reports that he met developmental milestones as expected and is in good health but is absent from school on occasion due to asthma. He uses an inhaler on an as needed basis, typically no more than five days per month. Riley's father is a college graduate and does not report any learning difficulties as his mother.

Academic History:
Riley attended kindergarten and first grade in another school, but has been on this campus since the beginning of second grade. He has never been retained but attended summer school for math following second and third grades. His mother noted that math has always been more difficult for him, and that he was notably slower than others his age in learning skip counting and in grasping the concept of subtraction with regrouping. In second grade he struggled with time and money concepts and he now has considerable difficulty recalling his multiplication facts and in solving problems using fractions.

Riley's Behavior :
They conducted a classroom observation during Riley's math class. The lesson was a review of adding fractions with unlike denominators, and the teacher was demonstrating how to apply this skill to solve real world problems. Riley sat at the front of the room and appeared to be engaged however, he did not volunteer answers nor did he ask questions.
Students were assigned five word problems to complete in 10 minutes. Riley spent the entire time working at his desk. When called on by his teacher to answer the first problem, Riley replied that he doesn't know. When his work was reviewed, he had attempted to draw out each fraction using pie charts, but was unable to perform any calculations. During this evaluation Riley was attentive and on task. He responded well to encouragement although his initial response was to give up when challenged. He was not impulsive but was limited by the number of alternative solutions or strategies he used.

Assessment Plan:
1. Parent, teacher, and student interviews
2. Classroom observation
3. Review of RTI benchmark and progress monitoring data

4. Review of KeyMath™–3 Diagnostic Assessment

Riley demonstrates many cognitive strengths, especially in verbal fluid reasoning, lexical and semantic knowledge, and oral expression. However, his educational history including his response to intervention; parent, teacher, and student interviews; classroom and testing observations; and standardized test scores consistently indicates the presence of a Specific Learning Disability in mathematical reasoning and calculation. His specific problems, which appear to be limited to math, are:

- General cognitive weaknesses related to nonverbal concept formation and fluid reasoning, visual-spatial organization and imaging, abstract categorical or sequential reasoning, and deficits in working memory and processing speed.
- Math-related processing deficits related to rapid automatic switching, quantitative and spatial working memory, and executive functions (sustained and switching attention, multi-tasking, and self-monitoring).
- Math-specific skill deficits related to automaticity of number fact retrieval, understanding part whole relationships, knowledge of algorithms that apply to more complex problem solving, and use of adaptive strategies to solve math problems.

- Math specific anxiety and frustration that exacerbate problems with attention and working memory, resulting in reduced engagement, persistence, and self-confidence so that Riley is becoming more resistant to instruction. Further, his difficulty connecting what he must master in math to a real-world application may result in less intrinsic motivation to put forth the required extra effort.

Intervention Strategies:
Riley needs direct, explicit, and systematic instruction to remediate skill deficits and missing concepts in math. The data derived from the Key Math™-3 Diagnostic Assessment can be linked to the KeyMath-3 Essential Resources intervention materials to provide targeted remediation of missing prerequisite skills. Current interventions specifically, re-teaching of 4th grade math skills will have limited effectiveness without first developing the necessary foundation.

Riley is going to have 15 minutes, two to three times daily and should be reinforced with guided practice rather than independent homework.

Riley would benefit from instructional strategies designed to enhance his mental arithmetic. Use games such as dominoes, cards, and dice to encourage mental calculation and teach him mnemonics for math algorithms (e.g., sequential steps). Learning his multiplication facts with automaticity is critical. First, instructional targets should be based on which facts he does not know automatically.

Intentional construction of a visual image of a math problem can enhance his understanding of the problem. Riley needs assistance in developing his visual imagery through several tactics:
1) the use of number lines showing both whole numbers and fractions,
2) the provision of models that illustrate how verbal information can be re-coded visually by color-coding start points, direction, and operation cues in calculation, and
3) by teaching him ways to visually organize complex information (charts, graphs, diagrams).

Riley's teachers can provide more focused instruction by listening to his solutions to a problem and asking questions to guide him through the problem solution process.

He may benefit from the temporary use of recipe cards that list the sequential steps necessary for calculation as well as explicit instruction in how and when to use various problem-solving strategies. Other instructional approaches designed for students with math difficulties can be found in Teaching Mathematics to Students with Learning Disabilities 3rd Edition (Bley & Thornton, 1989).

Encourage Riley to use a calculator to check for accuracy rather than perform calculations at this point in time. Calculator use is recommended when the focus of the lesson is on effective selection and use of problem-solving strategies rather than calculation.