

**Master of Science in Teaching Specialization in
Middle School Mathematics Education**

**Assessment #5:
Assessment of Middle School Student
Mathematical Learning**

**MATH 509: Methods of Instruction in the Middle
School Mathematics Curriculum (Grades 5-8)
OR/ MATH 612: The Learning and Teaching of
Mathematics, Grades 6-9**

**Research Report on a Middle School Student's
Mathematical Thinking**

and

Program Standards and Performance Indicators

Assessment #5 and #7
Assessment of Middle School Student Mathematical Learning and Written Reflection

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Assignment Guidelines on:
The Research Report on a Middle School Student's Mathematical Thinking

The purpose of this assignment is to prepare a research report on middle school students' thinking and understanding of a specific mathematical concept taught in the middle school or on effective teaching methods to enhance middle school students' learning of mathematics. The multiple parts of the assignment are described on the syllabus/course outline: (a) select an article from the textbook or CD that accompanies the CD; (b) select one good problem-solving activity from the article to use in an interview setting with one middle school student; (c) review related research articles on the selected topic; (d) interview one middle school student using the selected problem-solving activity; (e) analyze the student's reasoning gathered from the interview; (f) reflect on your research findings with respect to the research you reviewed; (g) describe the implications of your research findings as well as what you learned from this assignment; and (h) discuss the research questions you may want to explore in the future. The report is to be 12-15 pages (typed, double-spaced, following APA style), in addition to reference pages and appendices that include your interview protocol and student work. The report will be evaluated on its merits as a professional means of communicating in writing with other mathematics teachers and mathematics educators.

Suggested Interview Process

Prepare a student-friendly handout for the problem-solving activity that you selected (i.e., from the selected chapter or unit of your CD) so that the student can write his/her solution on the same page as the task. This interview is expected to last about 30 minutes. It is expected that the student uses manipulatives in solving the problem. However, the student should then sketch a representation of the work on paper. This is important because you will use the student work in your analysis of the interview.

First, solve the problem yourself ahead of time before you give it to your student. Try to anticipate multiple ways the student might solve the problem. Try to identify problem-solving aspects that you anticipate may be challenging for the student. Prepare a set of questions that you will use to help the student if he/she is having difficulty. The questions should provide a way for the student to think about the big idea(s) without telling him/her how to proceed.

The interview is to be interactive. Encourage the student to articulate his/her thinking. The goal is for the student to show you what he/she can do and how she/he is thinking during the non-routine problem-solving process.

Ask questions that will further your understanding of the student's work. For example, you might ask: "Would you tell me what you were thinking as you decided how to solve the problem?" "Would you tell me about the diagram you drew?" "How did you figure that out?" "Why is that important?" "How did you reach that conclusion?" "How would you explain your solution to the rest of the students in your class?"

If the student says something like "I just guessed," or "I just knew it," ask, "Why does that answer make sense to you?" and follow up with, "I'm very interested in the ways you think about the problems." Experiment with cultivating an open and neutral tone of voice that makes you sound interested, not challenging. Provide counter-suggestions if needed to check for consistency of responses. Take notes

about the student's actions or your impressions of what the student is doing during all phases of the problem-solving session. Include anything that might provide clues for your interpretation of the student's solution strategy.

After the interview, analyze student work. You may find it helpful to consider the ISAT Mathematics Scoring Rubrics for the Extended Response Items with attention given to mathematical knowledge, strategic knowledge, and student explanations. Reflect on and connect your research findings with the related research literature that you reviewed and with your experience as a classroom teacher. Suggest some teaching implications that may be implied based on your findings.

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Program Standards and Performance Indicators

Dispositions

- Use of stimulating curricula
- Commitment to learning with understanding
- Use of various assessments
- Use of various teaching tools including technology

Knowledge of Mathematics Pedagogy

- Selects, uses, and determines suitability of the wide variety of available mathematics curricula and teaching materials for all students including those with special needs such as the gifted, challenged and speakers of other languages
- Selects and uses appropriate concrete materials for learning mathematics
- Uses multiple strategies, including listening to and understanding the ways students think about mathematics, to assess students' mathematical knowledge
- Demonstrates knowledge of research results in the teaching and learning of mathematics