

Mathematics Teaching-Research Journal On-Line

A peer-reviewed scholarly journal

Editors: Bronislaw Czarnocha (Hostos Community College)

Vrunda Prabhu (Bronx Community College)

Anne Rothstein (Lehman College)

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Selected Middle Grade Intervention Strategies Jacqueline Wright

According to the New York State Content Learning Standard for Mathematics, basic operations are introduced in grade 3 and further developed in grades, 4 and 5. Therefore, expectation is that middle grades students will be familiar and fluent with addition, subtraction multiplication and division of whole numbers. This level of proficiency is foundational for teaching more complex topics, i.e., representation of repeated multiplication in exponential form, representation of exponential form as repeated multiplication, identification of the multiplicative inverse (reciprocal) of a number.

Middle school teachers do not expect to introduce multiplication and division operations as if they are completely unfamiliar to students. However, at the beginning of the current school year, several teachers reported that student performance on informal and formal assessments highlighted significant gaps in student readiness for upper elementary mathematics instruction. Specifically, students demonstrated major gaps in understanding basic whole number operations (especially with multiplication and division). Discussions within the mathematics department (with teachers, lead teachers, mathematics coach and administration) resulted in two main suggestions for dealing with this issue: (1) re-teach basic operations before teaching grade specific topics and (2) identify and implement prompt intervention strategies. For the most part, several teachers re-taught basic operations before moving on to grade specific topics. As the school's mathematics coach, I did my own teacher research about intervention strategies for older students. When I heard about this online teacher research journal, I decided to share my findings. What follows are selected intervention strategies; I do not claim that this effort was comprehensive. There is so much more to read and reflect on. I do plan to share this paper with colleagues at our regularly scheduled common planning sessions. My hope is we will dialogue about their practicality.

Prompt Intervention

Sigrid Wagner identifies prompt intervention as intervention that occurs before a student fails¹. Wagner writes that this intervention is necessary when students' progress toward mathematical proficiency is in danger.

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The Cyclopedic Education Dictionary defines intervention instruction as educational assistance given to students. Assistance (which includes but is not limited to extra help, additional time, a modified teaching approach, remedial aid, etc.) preempts the need for referral for special needs evaluation.

In *Elementary and Middle School Mathematics, Teaching Developmentally*, Van de Walle states that children who have not mastered basic algorithms by sixth or seventh grade have seen and practiced basic operations countless times throughout their years in school. Thus, they will more probably *not* benefit from more drill instruction. Clearly, struggling students need something better. Van de Walle makes the following suggestion to help middle school students.

1. Recognize that more algorithmic may be ineffective. It is unwise to subject struggling students to fact drills unless they are comfortable with drill and have experienced success with them.
2. Find out what students do when they encounter math activities that they do not know how to approach. Do they count on their fingers? Add up the numbers in the margins?
3. Provide hope. Children who have experienced difficulty with fact drills often believe that they cannot learn facts without counting on their fingers. Let these children know that you will help them and that you will provide some new ideas that will help them as well.
4. Build in success. Begin with easy strategies, and introduce only a few new concepts or skills at a time.

Additionally, Janzen² outlines these additional intervention strategies.

5. Use quick warm-up activities in class. Warm-up activities are good for reviewing prerequisites and gauging student mastery of concepts. Begin lessons by having students complete several problems that cover prerequisites. While students are working on warm-up activities, teachers may conference with selected students.
6. Student writing in math provides insights about their misunderstandings and identifies gaps in understanding. Writing provides students with opportunities to think about key

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prerequisites. Prompt students to use math journals to record steps they used to solve problems. Student explanations can also be used as a form of error analysis to help identify gaps in understanding.

7. Utilize multiple techniques to assess depth of student understanding. For example, application problems are a good mechanism through which students demonstrate mastery of specific skills or concepts and readiness to move on to new concepts. Application problems also help identify students who have not thoroughly mastered specific concepts and who may require intervention to avoid moving on to a new concept or skill too quickly.

8. Small group instruction is also a beneficial intervention strategy. Working in a small group or with a partner may be less intimidating and encourage struggling students to ask questions and admit confusion.

Invariably, students benefit from explanations from their peers. In fact, student to student explanations often make more sense than those offered by teachers. When students work independently or with others, teachers have opportunities to assess student learning informally.

9. Differentiating or varying instructional approaches is another way to help struggling students. When students do not understand a concept that is presented concretely, illustrate it by using symbols, pictures, graphs, models, manipulative or technology. Varied instructional strategies included in lessons enhance student chances of grasping concepts.

10. Use as many representations of the concept as possible: try manipulatives, models, real life examples, technology and symbolic representations. Middle school students often need more interventions because they have difficulty grasping abstract concepts of higher level mathematics. The use of multiple representations can help address their needs.

11. Help students see the value and application of the mathematics they are studying by presenting as many practical applications as possible. By relating a math topic to something relevant to student's life increases student interest and makes the math more

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meaningful. This may be especially beneficial for struggling students who do not see how the math they are studying relates to them.

12. In addition to the intervention strategies mentioned above, provide students and parents with tutoring options that include the United Federation of Teacher's Dial- A-Teacher Program, Supplemental Education Services (SES), Saturday school programs, online help, alternative homework assignments and local after school program options.

Finally, it is important that all stakeholders in the education process (students, parents, teachers, administrators and the other members of the school community) know that students can and must be taught how to learn. This includes teachers planning lessons that encourage and motivate students to put forth effort. All students can learn, and teachers must be willing to provide different ways for them to do so. Professional development for teachers who are providing prompt intervention is central to the implementation of intervention strategy. In the final analysis, the success of intervention strategies requires the commitment of all members of the learning community.

Citations

1. Wagner, S., PRIME, Prompt Intervention in Mathematics Education. 2005. Ohio Resource Center for Mathematics, Science and Reading and Ohio Department of Education.
2. Janzen, H. Intervention Strategies for Mathematics Teachers. 2000. Glencoe/McGraw Hill, New York.

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