

MTIP Nugget

Learning to Balance Instruction and Purposeful Play in a Multi-grade Classroom

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How do you teach four grades at once? How do teachers provide quality, differentiated instruction to one grade while keeping three other grades engaged, as well as challenging all learners? For mathematics in particular, how do teachers also develop learners who can execute efficient mental math strategies and are confident problem solvers?

I started out my quest this year with these questions and an uncertain view of how I would achieve these goals. However, there was one area of my work for which I felt certainty – knowing my students. In my current position, I have been teaching the same students for the past few years. I am familiar with their strengths and challenges as learners. I *know* my kids. I am a unique type of teacher in that I teach at one of the 17 Hutterite Colony schools in Prairie Rose School Division. My class is quite small, with only 9 students in grades 5-8, and the culture values traditional instruction methods that don't involve a lot of technology.

I knew my students needed to improve their problem solving and mental math skills and abilities. Initially, my students would make random guesses or use inefficient strategies. When problem solving, my students struggled and believed that they could not be successful – they sincerely and genuinely lacked confidence. Because of my own interest and love of math, I knew that some things had to change.

Even before beginning this quest, I have found that that math centers are essential for balancing my instruction time fairly among the various grades/groups in my classroom. In my typical math class, students rotate through four 15 minute centers: math with teacher, group math, math alone, and math games. Good math games are an integral component of my math program because they intrinsically motivate participation and practice of math skills and strategies. I try to have several different games for each skill covered in the math curriculum. Students can spend a few days playing one game and then switch before the game's motivational appeal wanes. Watching students actively play a game that reinforces skills and allows them to answer many questions in a short amount of time has proven to me the power of purposeful play. I can see my students gaining a deeper understanding of math concepts and strategies because they are competitive and want to win. I have attended many PD's to learn about different math games and simply adjusted games to suit the needs of my own learners. As a class we will also modify games to change the skills or come up with new rules that make the activity more enjoyable or relevant to our lessons. Sometimes, the kids are the best game creators in the building!

Mental Math Strategies

I decided to break my quest up into smaller goals that were more manageable. First, I wanted to motivate my students to get their basic multiplication and division facts memorized for easy recall in later more advanced problems. Each day my students took time to practice math facts in a variety of ways, using flashcards, dice, partner, group, or individual activities. The idea was to accommodate multiple intelligences and help students acquire facts as quickly as possible. After lunch each day we had a pencil paper test of 60 questions that they had to complete in 3 minutes. Each test focused on a level of questions going up to 12×12 multiplication and division facts. Students moved to the next level of test when they achieved two errors or less on the current test. Upon completion of all the levels, students would receive a \$5 prize. This was very motivating for some students, but unfortunately, not all of the class was successful. I implemented this testing approach until Christmas Break, as well as working on mental math strategies at other times during the school day. Most students came close, but about 30% did not achieve the \$5 prize. I think that for many students, the traditional pencil paper tests were stressful in a way that didn't allow them to properly show their learning. However for a small group of intrinsically motivated students, they were eager and excited to write the tests each day. This is just more evidence that as teachers we need to diversify our assessment strategies as part of differentiating instruction.

As the school year progressed, I kept introducing and reviewing mental math strategies. I reinforced and assessed the strategies using mostly games and reduced the amount of pencil paper assessments. Observing my students answer questions became a key element of my formative and summative assessment practices. Constant encouragement was also given for students to use mental math strategies efficiently during their math lessons and daily life. I started to see students making connections between the strategies they use to win games and the strategies they use to solve conventional math questions, such as those found in a textbook. Games have proven to be a very valuable tool for me in my classroom management and delivery of instruction. In my classroom, I have found games to be a more beneficial instructional method than traditional textbook practice and paper-pencil tests. The proof of this claim is in the results – all of my students learned more efficient mental problem strategies when I shifted to this approach.

Problem Solving Confidence

In November I began working on problem solving. We tackled problems as a class and took time to work through different steps. The problems were slow but manageable for everyone in grade 5-8. Once they had mastered some basic steps to problem solving and their confidence had grown because of their success, I started providing more difficult and open ended problems. At this point, we started to work on problems involving reasonable estimations. The notion of estimating encouraged the students to take a risk because there wasn't one right answer. The children would try different calculations, diagrams, or models without the fear of being wrong. As a class, we had started to develop confidence as problem solvers.

After Christmas, I took another risk and invited Dr. Betts to visit my classroom and lead an open-ended problem solving activity. Because there has been new building construction in the colony recently, Dr. Betts had the students explore how much materials are needed to build a house. Although everyone worked on the same problem, the openness of the problem allowed students to work on the problem and make progress at their own level of ability. The openness of the problem differentiated for the range of ages and abilities in my classroom, and allowed each child to feel at least some success.

I started to look for real examples of problems around the community where my students live. One spring day we calculated how long it would take a pump to empty a clogged ditch – much like a Dan Meyer 3-act problem. Another day we estimated the volume of the new machine shop being built. The students were curious about these topics so they were motivated to learn the math. After each problem solving activity, I made sure to leave time for math talks. I wanted students to share their ideas, learn different approaches to the problem, and hear the thinking of children of different ability levels. Most importantly, I wanted my students to notice all the different ways we can tackle problems and still find success.

Conclusion

It is safe to say that none of the realizations and reflections described above would have occurred without the MTIP program. From the very first meeting, the collaboration with our numeracy leader and other teachers has been instrumental in my success with this research project. It has truly been an eye-opening experience for me. I have learned about how to use games and purposeful play to cause students to develop efficient problem solving strategies, and how to use real-life and open-ended problems to foster confidence in my students as problem solvers. I feel that having time to reflect on my instruction and my goals as a teacher has led my students to greater success. As their confidence as learners grows, so does mine.