BYRAM HILLS CENTRAL SCHOOL DISTRICT
ARMONK, NEW YORK

Author: Kim Karoglanian

Title: *Building Basic Math Skills for Students with Special Needs*

Year: 2011-2012

School/Grade: H. C. Crittenden Middle School/Grades 6 - 8

SUMMARY OF *INVESTIGATORS OF PRACTICE* ACTION RESEARCH PROJECT

Context:

I am a Special Education Teacher at H. C. Crittenden Middle School. The grade levels and classes that I teach depend on the needs within the school on a year to year basis. Every year I teach special class math (6:1:1) and these students continue to have me in sixth through eighth grade. Students in my math class are unable to access the regular grade level curriculum. This is a daily math class that is based on more functional math skills. Students in my math class are assessed by the state using either the New York State Alternate Assessment or the New York State Mathematics test for their corresponding grade. Since I have started at Byram Hills, I have been looking for a math program that is comprehensive and research based that will improve the skills of my students. I have reached out to other Special Education Teachers in surrounding districts to get feedback on programs that have worked for them. The SRA Connecting Math Concepts, a Direct Instruction Program, was the one that some nearby districts were using with success. SRA is a leveled curriculum which is based on direct instruction in building basic math skills. Last year, I tested my students to see what level was best for them. This year I wanted to implement this program and research its effectiveness, as well as other research based strategies, to see how to best help my students succeed.

Action Plan:

My first research question is: How effective is the math program that I am currently using in building the basic math skills for students with special needs? My second question is: How can I improve the basic math skills of my special needs students? I chose these questions as a way to guide me in finding ways to better help my students succeed in building their basic math skills. My research was based on many articles about math interventions, strategies, and programs within the professional magazine, *Teaching Exceptional Children.* I also met with a district math consultant to get her thoughts on how to better help my students build their skills. I found that the research validated many strategies and best practices that I was already using in my classroom. It is recommended that you teach math in a CRA sequence. You start at the concrete level, then move to representational, and lastly, a more abstract level. "The concrete-representational-abstract (CRA) instruction begins with the use of manipulative devices, (i.e., concrete), progresses to the use of pictures or tallies (i.e., representational), and ultimately involves solving problems using numbers only (i.e., abstract)" (Miller 40). This sequence of teaching helps students to gain a more conceptual understanding of the four basic operations. I had already been using this sequence to teach addition and subtraction skills with much

success. This year I wanted to try it with multiplication and division. I also discovered that it is important to build three types of mathematical knowledge when working on computational skills: conceptual, procedural, and declarative knowledge. "Conceptual knowledge involves a deep understanding of the meaning of mathematical operations as well as an understanding of the meaning of mathematical operations as well as an understanding of the relationships and connections among the operations" (Miller 38). "Procedural knowledge involves the ability to solve mathematics problems using a step-by-step process that ultimately results in an accurate solution" (Miller 38). I found it very hard to help students with declarative knowledge, which is "the ability to memorize information that is factual in nature"(Miller 38). I found the lack of declarative knowledge as being the biggest road block to building these foundational math skills. The district consultant supported the need to build the accuracy and fluency of basic facts for my students. I have found that some students do not have the memory skills needed to internalize the math facts, and/or do not have the processing skills to access them as quickly as needed. I had to look to assistive technology strategies to help them compensate for the lack of memory and processing skills like the calculator, number lines and a multiplication chart. My students certainly were able to transition to the use of these strategies to help them keep moving on with more complicated math skills. As a whole, the research supported that direct and sequential instruction in math was best practice for teaching students with special needs.

I started my data collection with a student survey on feelings toward math in general, skills that they found to be important in their lives, and how they felt about math class this year versus last year. I found that my students really enjoy math class, that they had realistic expectations as to what types of math skills they would need to be successful in their future, and they felt that this year their skills have been improving and that they feel better about math. All of this was encouraging news for me and of course it is encouraging that my students have positive feelings toward math class in general. I also collected data through a variety of sources, direct observation, assessments, pre-test and post test, charting data and a math log. The math log was a running log that I tried to keep daily after each math class that I taught. I would reflect on the lesson; what worked and what didn't. I also would reference any research that I had read and how it related to that skill or student. The math log seemed to help me stay more focused on how to take all these pieces of my action research and use it to reflect and tweak my daily lessons to better meet my students' needs.

Results:

I learned that I was on the right track as far as best practices in math for students with special needs. I learned that the right balance of direct instruction and sequenced teaching can help students be more successful with building basic math skills. I found that the SRA program, although it is direct instruction, was not strong enough as a stand alone program. I needed to adjust and add more strategies to this program to help my students have a well rounded understanding of skills within the program. The data showed me that my students improved their multiplication and division skills throughout the course of the year. I started with a pre-test on multiplication in the beginning of the year. The pre-test showed that the students had not memorized their facts, and some of the students did not know the meaning of multiplication. Currently, we are working on 2-digit by 1-digit multiplication independently. We are just starting the learning sequence of 2-digit by 2-digit multiplication. I found that some students have mastered many facts and some can only memorize the facts that have a rule or a trick to go along with them. The students that are unable to memorize all the facts have

moved to an alternate strategy of a multiplication chart. Yearly educational testing in the area of math reasoning and calculation showed that my students did increase slightly in both of those areas. It is encouraging that these students can increase their basic math skills and be more successful in math class. I think that the most important thing that I learned is that my students like or even love math, even though it is very difficult for them, and I hope that as long as they do have positive feelings toward math, they will continue to learn.

Implications:

I like the way the SRA Connecting Math Concept program is visually set up. It is chunked into small sections of different skill practice. It has a workbook and textbook which clearly define what is guided practice, group or partner practice and what is independent work. I find that it reviews many previously taught skills. However, I found that the SRA Connecting Math Concept program was not enough as a standalone program. The students were saying "again?" with some of the repetitive review skills. I found there were an excess of review skills but I did not feel that there were enough new skills being taught. I felt that if my students were voicing that they were doing this "again", then I needed change things up. I ended up adding supplementary materials from various other sources. I found that a balance of SRA and supplemental materials helped them to push their math skills farther and at an appropriate pace. I think that next year I would like to continue a balance of the SRA program and supplemental materials. My next questions are: Is there a different math program that encompasses a better balance of review skills and new material? Is there research on students who are unable to internalize/memorize basic math facts?

Work Cited:

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