

Working with Slower-Paced Math Students

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Last year (*Research Bulletin* XI, 1, Autumn 2005) I wrote about three distinct qualities of slower paced or hands-on math students. To review briefly, these math students are typically feeling-based persons. This means that their feeling lives dominate their will and thinking. Second, they are highly intuitive. They often somatically sense their surroundings and they are impacted and swayed by impressions they receive. Third, they are commonly picture-image learners who frequently need to form mental pictures or stories before they can understand a concept. As a teacher, it is helpful to be aware of the special qualities of these students who commonly are identified as dyslexic, are diagnosed with ADD or ADHD, are contending with emotional issues, or have experienced a trauma in their earlier years. Given this picture, how are we to teach these students? What is required for feeling-based, intuitive, picture-image math students to succeed?

Unfortunately, there is not one answer to these questions. Teachers may choose among various methods. Some common methods include self-paced student work groups in which the grade is dependent upon assignments completed, one-on-one teaching from student to adult, or regular classroom instruction with groups of 6 to 20 students.

This report will examine building a strong lower level math class, using regular classroom instruction, through teacher preparation. To begin, it is fundamentally important that the slower-paced math teacher focus on everything through the lens of assessment and have a willingness to change. The teacher should assess the following before each class begins: self, classroom, materials, warm-ups, and content.

Self

How am I this year, this month, this week, today, and in this moment? Am I healthy and loving? Do I enjoy what I do? Ronald Davis and Eldon Braun conclude in their book, *The Gift of Dyslexia*, that

dyslexics have special talents of perception, imagination, and intuition. They cite talented and brilliant figures from Leonardo da Vinci through Albert Einstein and Winston Churchill to Walt Disney to support their claim. In the classroom, these talents mean that these students may intuit the teacher's mood and the moods of others in the room. It is especially important, therefore, for a teacher to work at becoming open and welcoming. When open students read lack of health or disease in others, they often shut down, deeming unsafe the environment or persons in it. Self-care and self-nurture are keys to a healthful inner world. For teachers, time for self-care can be challenging to find and yet so important to a productive learning environment for our students. In this vein, a teacher's wellness is an essential part of classroom preparation. (See Mitchell, D., "Soul Hygiene and Longevity for Teachers," *Research Bulletin* XI, 1, Autumn 2005.)

Classroom

How are such elements as the room's cleanliness, light, circulation, warmth, aesthetics, spaciousness, smell, and sound? How does the environment affect the twelve senses: touch, life, self-movement, balance, smell, taste, sight, temperature, hearing, speech, concept, and ego? How are these senses affected by or nurtured in the classroom? I have experienced, for example, my students' complete unwillingness to begin a day's learning on days when our classroom has been recently sanitized. The odor in the room repels sensitive students. On some summer days, leaving the lights off may increase participation and awareness. Colored chalk has a way of keeping students' attention at the board when used in an organized manner. Teachers can also open up their own senses and be in the classroom before class in order to get a feel for what students may experience.

Materials

How will I meet the needs of my students with such materials as books, supplies, writing utensils, paper, compasses, straight edges, and colors? It is important for slower-paced math students, who tend to be disorganized and forgetful, to have a safe backup supply of what is needed to learn during a day of math. Many of these students struggle with remembering to bring their backpack and supplies to school each day. It can greatly add to the ease of the room if the students know that they can still do the work assigned using borrowed books, paper, and pencils for a day.

Warming Up

What is in my warm-up bag? Do I have warm-ups that could induce laughter, connection, breath, centering, relaxation, depth, or an increase in energy, if necessary? Am I ready to use them based on how the students show up? Sometimes, teachers will have worked diligently to prepare for class but students show up emotionally shut down or intellectually blocked. This can happen for a number of reasons, many beyond teachers' control. Students may, for example, be exhausted from the other lessons of the day, upset with a friend, hungry, or sleepy. It then becomes the task of the teacher to enliven the students and reopen their feeling life and mental capacities. Nothing works better for this than movement coupled with laughter. Five to ten minutes of movement exercises, rhythm activities, or a game can be enough. Theater and improvisational games are teenage favorites. Sensory integration activities, Extra Lesson exercises, or simply a quick jog around the track work well here, also. These warm-ups have potential to build community, trust, and openness; they can offer a bit of healing, too. *Theater Games for the Classroom: A Teacher's Handbook*, by Viola Spolin, is full of wonderful and quick games that work well as classroom warm-ups.

Content

Am I prepared for today's lesson with multiple teaching methods? Am I prepared to throw the lesson out the window if necessary? Am I prepared to go faster or slower today based on the students' availability? Teachers work hard at

keeping a class on track with the required material for a year. We worry about covering enough material to prepare students for their next educational step. We can feel burdened by the responsibility of delivering a large amount of content in a short amount of classroom time. If a student is pushed through learning too quickly the material becomes deadened. Balancing quantity with quality or content with assimilation is difficult.

An important aspect of content is teaching in large picture images and with the use of manipulatives and colors wherever possible. A strong bridge needs to be built for the slower-paced math student between the semi-abstract and the abstract. Teach, for example, using stories to explain math concepts. David Berg of Making Math Real, Berkeley, teaches an Algebra 1 course for teachers that is wonderfully heavy in stories. Work with manipulatives such as Algebra Tiles, GeoMags, or origami. Color code chalkboard work. Have students create models of current work whenever possible. Relate math to sports or money. Write clear, easy-to-follow steps on the board for any problem that requires more than three steps to solve.

The method that I find most effective is the color-coding of chalkboard work. Not only is it pleasing to look at but it is also a way to organize the board for typically disorganized students. Take, for example, the difficulties of the subtraction step in polynomial long division. The most common error for slower-paced math students with this topic is to add or subtract incorrectly. If, however, in the subtraction step, all the signs change color as well as value, it is easy for students to work correctly and spot their own errors. The same is true for subtracting algebraic fractions. When the subtraction signs are color coded first, it is easier for students to identify the trickier problems that need distribution. Solving for a variable becomes quicker and easier when the unknown is a special color throughout the equation. I often give extra credit to students who color-code their quiz sheet before they begin to work on the problems. I have noticed a direct correlation between this color work and a decrease in simple errors on these quizzes.

Remediation and Further Research

Teacher preparation is only part of what is necessary for students' success. Other elements that contribute to success are actual class time and the responsibility of the students themselves. In many cases, students arrive in class needing remediation before higher-level work can begin. Some signs of needed remediation, not intuitively obvious, that could be examined in future research,

are incorrect pencil grip and ear infections. I have noticed this past year that approximately one third of my slower-paced math students have an incorrect pencil grip and many of them suffer or suffered from frequent ear infections. Other teachers may discover other signs that add to a complete picture of a math student in need of extra help.