Math Matters

Math for the Real World

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Teaching Math in Preschool is not Magic

Discovering a Wealth of Resources to Build a Solid Math Foundation

Creating Meaning in Mathematics for All Learners

Paraprofessional Press

Michael Behrmann, Ed.D.
Principal Investigator
mbehrm@gmu.edu

Lynn Wiley, Ph.D.
Director of T/TAC@GMU
Academic Review & School Improvement,
Early Childhood
hwiley@gmu.edu

Kay Klein, M.Ed.
Assistant Director of T/TAC@GMU
Effective Schoolwide Discipline
mklein1@gmu.edu

Nancy Anderson, M.Ed.
Policies and Procedures,
Family Involvement
nanders7@gmu.edu

Bonnie W. Bell, Ph.D.
Secondary Education & Mild/Moderate Disabilities, Family Involvement
bbell5@gmu.edu

Karen Berlin, M.Ed.
Autism & Intellectual Disabilities Coordinator
kberlin@gmu.edu

Sheryl Fahey, M.A.
Early Childhood Coordinator
sfahay@gmu.edu

Judith Fontana, Ph.D.
Curriculum & Instruction Projects Coordinator, ICT, SIM®
jfontan1@gmu.edu

Kris Ganley, M.Ed.
Early Childhood Coordinator, Autism
kganley@gmu.edu

Soojin Jang, M.Ed.
Assistive Technology Coordinator
sjang6@gmu.edu

Estela Landeros, M.Ed.
Assistive Technology Coordinator
elandero@gmu.edu

Diane Loomis, Ph.D.
Transition Coordinator
dloomis@gmu.edu

Nikki Miller, Ed.D.
Curriculum & Instruction Coordinator
nmiller7@gmu.edu

Seunghun Ok, M.Ed.
T/TAC Online Administrator
sok@gmu.edu

Dionne Paul-Wiggins, MTA
T/TAC Events Coordinator
dpaulwig@gmu.edu

Jackie Petersen, MLS
T/TAC Librarian
jpetersk@gmu.edu

Sandra Price
Administrative Office Support
spricc@gmu.edu

Jeff Richards
Graphic/Web Designer
Jricharc@gmu.edu

Judy Stockton, M.A.
Curriculum & Mild/Moderate Disabilities Coordinator
jstockt1@gmu.edu

Clare Talbert, M.Ed.
T/TAC Online Coordinator
c talber1@gmu.edu

Contact Information

VDOE Region IV T/TAC at George Mason University

Northwestern Consortium T/TAC
This newsletter is a collaborative effort by the Northwestern Consortium of the T/TACs, which includes James Madison University, co-directed by Cheryl Henderson and Melinda Bright, and George Mason University, directed by Lynn Wiley.
Students staying on track in math, “building concept upon concept in a steady stream progression of skills,” is a national and state priority as well as a practical necessity. We know that daily life involves math. Teachers have the daunting challenge of teaching the concepts with meaning and understanding in order for this conceptual understanding to lead to fluency and recall of facts (Steedly, Dragoo, Arafeh, & Luke, 2008). Understanding and applying these concepts will enhance meaning in the adult world of higher education, independent living, and employment. Have you ever wondered how we can directly link the learning of algebra and geometry, for instance, to everyday life?

Virginia is a participant in an initiative that was created in 1996 by the nation’s governors and corporate leaders. Achieve, Inc. is a “non-profit reform organization that helps states raise academic standards and graduation requirements, improve assessments, and strengthen accountability.” Their effort is to make college and career readiness a national priority, ensuring that the transition from high school graduation to post secondary education and employment is seamless (About Achieve, 2010).

As part of this effort, Achieve, Inc. has identified Common Core State Standards (CCSS) for math. The high school mathematics areas are organized in conceptual categories as opposed to courses. The CCSS conceptual categories for high school specify content that all students should learn in order to be college and career ready. The five content CCSS strands are Numbers, Discrete Mathematics, Algebra, Geometry, and Probability and Statistics (Secondary Mathematics Benchmarks Progressions Grades 7 – 12, 2010). These standards are reflected in the Virginia Math Standards of Learning under specific courses and the following strands: Number and Number Sense, Computation and Estimation, Measurement, Geometry, Probability and Statistics, and Patterns, Functions, and Algebra (Mathematics Standards of Learning for Virginia Public Schools, 2001). Each of these categories has implications for mathematics in everyday life.

1. Numbers: Number sense is the foundation for mathematics in everyday life. From comparison shopping, to buying a car, estimating tax on a purchase or the tip in a restaurant, using credit responsibly, or gleaning important information from the daily news that uses numerical data, students need to have an understanding of and ability to use quantified information. The use of electronic technology provides an exact and effective way to deal with this information. Being confident and flexible in the procedure for solving mathematic problems and understanding the properties that govern the numerical operations are important for practical computation. These lay theoretical foundations for the study of algebra and for reasoning in all areas of mathematics.

2. Discrete Mathematics: This, also known as finite mathematics, can be thought of as the science of counting, arrangements, and the procedure to solve problems. New approaches and applications that require the use of discrete processes are increasingly important in the world of computers, information technology, and logistics. To be well prepared for the future, students need to understand the concepts and applications of this important area of mathematics.

3. Algebra: Learning algebra is an important step in a student’s cognitive mathematical development. It opens the door to organized abstract thinking, supplies a tool for logical reasoning, and helps to model and understand the quantitative relationships so vital in today’s world.
4. **Geometry:** This ancient undertaking has been an integral part of mathematics for centuries and a common vehicle for teaching the critical skill of deductive reasoning. It assists students with understanding the structure of space and nature of spatial relations. Geometry is a requirement for a broad range of activities and leads to methods for figuring out practical problems that students may face in the world in which they live. Understanding geometry may help with carpentry projects, industrial tool design, using a ruler, sizing a recipe, or simply figuring out how to move a large piece of furniture into a room. Understanding geometric properties in nature provides an excellent medium for the development of students’ ability to reason and produce thoughtful, logical arguments.

5. **Probability and Statistics:** This mathematical concept helps make sense of the enormous mass of data that come from a variety of measurements. Retrieving statistical data is important when making business decisions and governmental policy. There are numerous jobs that require workers to be able to analyze, interpret, and describe data using visual representations such as charts, graphs, and diagrams when getting a point across in an accurate and concise manner. Our society depends on its citizens to understand information, evaluate data based on facts, detect false information or misrepresentation, and make sound decisions based on this knowledge. Statistical understanding rests on a foundation of probability. The study of probability determines whether an event may happen and includes the analysis of odds and risk and the prediction of future events (*Secondary Mathematics Benchmarks Progressions Grades 7 – 12, 2010*).

The next time a student asks, “Why do I need to learn math?” you will be able to provide the reason. All of this knowledge will increase the chances of success in higher education, employment, and solving everyday real life problems.

To learn more about how the Virginia Department of Education compares Virginia’s 2009 Mathematics Standards of Learning with the Common Core State Standards refer to the first draft copy of the preliminary analysis that was completed on September 23, 2010. [http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/sol_ccss_comparison_mathematics.pdf](http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/sol_ccss_comparison_mathematics.pdf)

**References**


Walk into any classroom and you will find students with differing educational needs and learning preferences. Regardless if the student has autism or another disability, as educational professionals we have to consider the student’s educational needs and learning preferences. When planning a math lesson for students with autism consider which skills are most essential for each student to know, and how you will teach those skills. Some students with autism may have the ability to complete complex, multi-step mathematics but it is essential that they learn “survival math” skills for daily life math-related task. Consider what math skills you will focus on with the student then decide how you will teach skills and the strategies you will use. Students with autism are often very concrete thinkers so you will want to focus on making their learning relevant to the real world while also making use of visuals, using hands-on learning, finding ways to maintain their attention, using technology, and being intentional about the environmental arrangement.

• **The Real World Connection**

   Walk through your typical day and think of how you use math. Your clock, balancing your checkbook, making purchases, paying your bills, following a recipe, dialing a phone number, and possibly determining how long before the end of your work day. Now think of how you can get your students to be able to walk through their typical day. You can begin with simple number recognition for dialing a number and reading a clock. These are skills that will be used daily. Find daily activities that can motivate a student to learn and use those as teachable moments. For instance, if you have a student who enjoys soft drinks, incorporate a vending machine or store purchase into a lesson plan. Teach the skills of money identification, money differentiation, and counting the money. These skills can generalize to other real world situations and help your students become more independent. As you are teaching math skills remember to ask yourself how the math skills that I am emphasizing will take this student one step closer to independence.

• **Incorporating Visuals**

   The effective use of visual strategies can make or break a lesson. Visual strategies are objects or pictorial representations to relay your message. Complex auditory directions can be difficult for students with autism to process. With the use of visual strategies, students are able to see what you are trying to teach them, process it, connect it to what you are teaching, and become less dependent on auditory directions. Visuals could be pictures of a process. For example, if you are teaching how to add five plus seven, show them five plus seven. You can use five pictures of apples and seven pictures of apples. Put them together and show that now there are 12 apples. Aim for an understanding of the concepts but be careful not to over stimulate a student by offering too many visuals.

• **Hands-on Activities**

   The use of visuals goes hand in hand with hands-on activities. Make your visuals come to life by allowing students to manipulate objects. Use objects to make those abstract math concepts concrete. For example, if the lesson is time telling, allow the students to manipulate the clock to the
different times being taught. You can also set the time and have them identify what time is on the clock, or use other creative ways to incorporate the clock into the lesson of time telling. Objects should be used for their designated purpose. Do not expect your students to imagine that an object is something that it is not.

**Incorporate Student Interest**

Incorporating students’ interest into instruction is important for maintaining attention; learn what interests your students and use it. If they love dogs, use dog pictures to teach them counting. Teach them measurements by measuring the amount of water or dog food that they would need to feed a dog. Get creative! Each student’s interest will be different. It will take you extra time to develop your lesson plans, but you will have an increased chance of gaining and maintaining their attention to support comprehension of the lessons.

**Adding Technology**

Now that you have their attention through your creative lesson plans, incorporate the use of technology to further develop and define their skills. Although devices such as the computer, calculator, iTouch, and iPad may not be designed to teach skills, they can immediately capture students’ attention and further develop and define those skills taught through your classroom lessons. Technology captures students’ attention, gives immediate feedback, and can often be used in the real world for situations where math is needed. It is essential that for the technology to be an aid to the learning, students understand how to use it. Initial time invested in technology training will benefit the students for future lessons.

**The Environment**

While attending to all of your students’ needs and incorporating various strategies to enhance your lessons, don’t forget the importance of the learning environment. Students with autism are often easily distracted or stimulated by their environment. Before beginning a math lesson be sure to evaluate your environment. Is it clearly set up to learn math? Are there excessive unnecessary visual distractions? Is it clear that at this time, in this space, math is to be learned? Is there a light flickering that is going to be more stimulating than your math objects? The environment should be simple and conducive for your students’ educational needs and their learning preference.

With math or any academic lesson, think of your student’s learning preferences and educational needs first. You may have to make adaptations to your materials and lesson plans, but you will give your students a better opportunity to learn math and retain those skills to become more independent in life.

**References:**


**Resources for teaching mathematics to students with autism:**


Two Teachers... One Classroom... Priceless!

Do you co-teach in an inclusive classroom? If so, is that classroom a 70,000, 80,000 or 90,000 dollar classroom? Does the learning reflect the fact that there are two certified teachers in the room? Are students excited to come to math? Are they actively engaged in the math instruction? If not, here are some tips to get more “bang for your buck.”

Plan effectively and with purpose: To make co-teaching successful, teachers must plan together. Finding a time to plan is the most difficult obstacle in co-teaching; however, it’s the one activity that makes the most difference in classroom instruction and student learning. Without planning, it is very difficult to implement anything other than a classroom with one teacher and one highly paid assistant. To achieve a classroom that reflects the cost of having two certified teachers working with students, you must plan each day with purpose. You will want to decide the best ways to meet students’ needs, plan activities where both teachers deliver instruction, and assign roles and responsibilities for each teacher. By using both teachers in classroom math instruction, you can focus on presenting concepts in ways that involve students in active learning and guide them through math concepts using concrete, representational, and abstract models of instruction.

Reinforce the positive and ensure a safe environment: In math class, as well as any class, classroom management must be in place to ensure a positive and safe environment for all students. It is very important that as co-teachers you discuss classroom management and decide on a consistent routine that both of you will follow. Both co-teachers must be “on the same page” with discipline procedures, classroom rules, noise level issues, etc. If you neglect discussing behavior management, you can easily fall into a “good cop/ bad cop” role in the classroom. This is confusing for students and very difficult for the co-teaching pair.

In addition to establishing a well-managed classroom, you must also make sure that it is a safe place to learn. A safe classroom is a classroom that is not only physically safe, but also emotionally safe for everyone. It is a place where exploration is possible, where different approaches to the same problem are accepted, and where the “wrong answer” can also be a good answer because it means that students are involved and engaged in the learning process. An emotionally safe environment in a co-taught classroom, as well as any classroom, means that all students are accepted, and all students are expected to treat each other with respect. Being positive with students by reinforcing appropriate behaviors, positive attitudes and good work ethics is also a critical way to nurture a safe environment.

Include the models of co-teaching to enhance engagement: The models of co-teaching, as referred to by Marilyn Friend (2008), include several ways to effectively use two teachers in the classroom. The first model to consider is Station Teaching; this is when the class is divided into two or three groups that rotate through each activity. Typically each teacher takes a station, and then there is an independent station. Different activities are going on in each station. Be aware that noise level needs to be controlled, and the timing has to be discussed so that each group ends at approximately the same time. Positive aspects of this model are engagement, engagement, engagement…small group interaction, and ongoing formative assessment.

Another model to consider is Parallel Teaching. In this model, the students are divided into two groups and the same instruction is being delivered to both groups. The instructional methods may differ, but the expected outcomes are the same. Cautions associated will this model include noise level and making sure that the time frame stays the same for both groups. This is also a great way to enhance engagement, reduce behavior issues, and continue to formatively assess the learning of each student. Additional models are outlined by Marilyn Friend (2008). One model is Alternative Teaching which involves one teacher pulling a small heterogeneous group to the side to reinforce or enrich content while the other teacher is responsible for the large group. One Teach, One Assist is just that; one teacher is delivering instruction to the whole group, while the other teacher is assisting the students in the classroom. This is a model commonly used in classrooms, but one that should be limited because using it too often designates one person as the teacher and the other as an assistant. One Teach, One Observe.
is a model of co-teaching that is used to collect specific classroom or student data. While one teacher is instructing the whole class, the other can be documenting data. Last, but not least is Teaming; in this model of co-teaching, both teachers are delivering the same instruction at the same time. This is considered one of the most complex, but satisfying, models of co-teaching and is the one that is most dependent on teachers’ styles. Points to consider when team teaching are that consistent planning needs to be in place and that some instructional intensity is lost if this is the only model used.

Having two teachers in the math classroom, delivering instruction to all students can be a dynamic process. By combining the content skills of the general education teacher and the strategy skills of the special education teacher, the learning of all students is enhanced.

**Build relationships with students:**
Building a rapport with students is an important part of student success and should be a priority to every teacher. Teachers should communicate interest in their students by engaging in practices that resonate with them. First of all, smile and make eye contact with students. Smiling is an easy way to put students at ease and to communicate caring; eye contact conveys sincerity. Next, ask students to tell you a little about their families and with whom they live. Also give them chances to share about pets they have or have had. Periodically inquire about these special people and pets; this shows a personal interest in their everyday lives. Another way to build relationships with students is to use humor in the classroom. Students love to see co-teachers use humor. It creates a positive and productive learning environment and may be the best adult relationship a student sees in a day. Finally, try to attend events that your students are involved in; it’s not possible to do this for all students, but it will impact those whom you can.

Math can be intimidating and difficult for many students, so by co-teaching in the math classroom you can offer an experience for every child that is enriching and engaging. By combining your skills as the content specialist with those of the learning strategy specialist, you can have that 70,000, 80,000 or 90,000 dollar classroom – the classroom that truly reflects the hard work and dedication of two certified teachers working together for the good of all students. **Coming together is a beginning, keeping together is progress, working together is success.**

- Henry Ford

**References:**

During my tenure with T/TAC I have visited many math classrooms and met with numerous math teachers. As I listen to these teachers I often hear how hindered they feel trying to help diverse groups of students be more successful in math. To give teachers an opportunity for professional growth in areas pertaining to effective teaching mathematics, Region 5 T/TAC will be hosting a one day regional math conference at James Madison University on March 30, 2011. The focus of this conference will center around three very influential factors for a successful math classroom: teaching for understanding, student engagement, and formative assessment. Participants will have the opportunity to hear from professionals who have worked with Pre-K - 12 general education and special education students, as well as hearing updates regarding revisions and implementation of 2009 math SOLs from the Virginia Department of Education (VDOE).

Session topics for the Making Math Meaningful for All Students conference include:

- Making math vocabulary interactive
- Proportional reasoning in math
- Number sense and fractions
- Teaching multiplying and dividing fractions for conceptual understanding
- Math and technology
- Early childhood numeracy
- Co-teaching in the math classroom, differentiating for students with disabilities
- Algebra across the grades K-8
- Intellectual disabilities, Equals Math
- Make it – take it, Early Childhood

As you think about these topics, also reflect on how these sessions will contribute to your meaningful instruction for ALL students’ understanding, student engagement, and the on-going formative assessment of your students.

**Teaching for Understanding**

When it comes to teaching mathematics, have you thought about the difference between conceptual knowledge and procedural knowledge? Conceptual knowledge consists of rich relationships, a web of ideas, and the ability to make connections. Procedural knowledge of mathematics is the routine rules and procedures necessary to carry out a routine task.

Yes, procedural knowledge does play a very important role in learning and doing mathematics. However, teaching procedures without a conceptual base are rules without reasons and lead to errors and dislike of mathematics. For example, doing endless procedures of “invert and multiply” with fractions will not help a child understand division of fractions.

As Van de Walle (2007) aptly expressed, “it is generally accepted that procedural rules should never be taught in the absence of concepts, although, unfortunately, that happens far too often.” As part of the Making Math Meaningful for All Students conference, there will be multiple illustrations of the importance of the connection and integration of both concepts and procedures for effective teaching of mathematics.

**Student Engagement**

As teachers we all know this is an important component of effective teaching. If an outsider entered your classroom what would student engagement look like? Are students sharing reflective thinking, are they mentally engaged? Is there appropriate interaction with the teacher and other students? Is there the use of math “tools for learning” (manipulatives, computers, drawings, representations, oral communication, and inquiry)?
Since we can’t just pour mathematics into our students’ heads we need to stop and think about the factors that impact what and how students learn. It is all about classroom instruction, something you, the teacher, control and design. Come on March 30th, 2011 and pick up some new ideas for the challenge of keeping students engaged and actively learning.

**Formative Assessment**

So you spend 20 minutes teaching a new concept in math, it’s the end of class, and the homework assignment is given. How do you as a teacher know what your students know as they walk out the door? Did they “get it”? Do they have the groundwork for understanding the concept? Will they reinforce errors doing their homework incorrectly? How can you find out what they know without creating more papers to grade? As students start to make connections and develop their understanding of a math concept, it is important to realize that their processing may not be the same as yours, the teacher, or that of other classmates.

As conveyed in *The National Mathematics Advisory Panel Report* (2008), information about students is crucial to a teacher’s ability to calibrate tasks and lessons to students’ current understanding. In addition to tasks that reveal what students know and can do, the quality of instruction depends on how teachers interpret and use that information. Teachers’ understanding of the students’ work and the progress they are making relies on their ability to use that understanding to make sense of what the students are doing. When you attend the Region 5 T/TAC math conference you will be given multiple opportunities to observe strategies that incorporate the process of ongoing monitoring of student learning to inform instruction, a key component of effective instruction.

**References**


Having the opportunity to teach concepts in mathematics to a classroom of four-year-olds is one of the most exciting experiences for a preschool teacher. Watching a child pour water into a container that fills to the brim and seeing the child's face expressing both relief and satisfaction when it all “fits” is witnessing learning in action. When a child finds the answer to a question or discovers results from an experiment, the child’s success translates to personal and professional satisfaction for the teacher. We can take a deep breath and say, “He did it!” but we know it is not magic. Yes, preschool children naturally discover and learn from teachers and from each other with hands-on experiences but rarely does it happen coincidentally. Nobody can pull a rabbit from a hat unless someone puts the rabbit there in the first place.

According to Jennifer Grisham-Brown, co-author of Blended Practices for Teaching Young Children in Inclusive Settings (2005), universal strategies must be in place to implement a curriculum framework regardless of the subject. When Dr. Grisham-Brown presented at the Content Teaching Academy at James Madison University in June 2010 she included the following strategies in her list:

- Universal Design
- Developmentally Appropriate Environments
- Embedding
- Multiple Opportunities
- Non-directive Teaching Strategies
- High Quality Lesson Planning

Each of these components are deliberately planned and intentionally provided in the preschool classroom where math is not taught with worksheets or in teacher-directed lessons during a specific period during the day. Teachers are often taken back when principals ask, “When do you do math in this class?” The answer is teachers in preschool do math all day long…during transitions, center time, mealtime, outdoor time, etc. This requires embedding, planning, taking advantage of multiple opportunities, and setting the stage (the classroom environment) for a not-so-magic math show. Again, there is nothing that appears effortlessly or with the wave of a wand.

When we take a look at “Learning Paths and Teaching Strategies in Early Mathematics,” a position statement from the National Association for the Education of Young Children and the National Council of Teachers of Mathematics (2003), the developmental process in children from three to six years varies considerably so the recommended strategies for math instruction take variations into consideration. Regardless of the level in development, the key words are the same: show, encourage, involve, and invite the children to experience math on the continuum in an environment that is well equipped with materials. Personnel from the Frank Porter Graham Child Development Institute at the University of North Carolina, Chapel Hill writes, “Math materials, unlike materials used for block play, art, or housekeeping usually are not placed within a particular interest center. Instead, math materials appear in many interest centers throughout the room” (Cryer, Harms, & Riley, 2003). When the materials are conveniently accessible for all children and the teaching staff models and shows the children how to “play” with measuring, grouping, counting, and comparing then the results are embedded, intentional instruction that is developmentally appropriate.

As teachers engage with children in natural, comfortable conversation it is imperative that teachers use math vocabulary and show children what the words mean so that they can relate them to their experiences. The
children need to hear the words that connect math concepts to their world and it needs to be fun! Encouraging children, through active exchange, to repeat “math language” in words or in demonstration reinforces and extends learning. Using the vocabulary from the math standards section of the Virginia Foundation Blocks for Early Learning (VDOE, 2007) in lesson plans and in notes to co-teachers is an effective way to ensure that children are exposed to math vocabulary. When we write the words we usually say what we have written, so it is a good habit to write, for example, “pattern” so that we say the word for children to hear and repeat. Adding visuals to show what a word means is important in preschool and allowing time for children to show you what they understand is key to accessing and planning for math instruction. Encouraging children to express themselves, mathematically, is beneficial and entertaining. We are regularly “amazed” in preschool when a four-year-old tells us how old he or she thinks we are.

According to the Teaching Pyramid model from The Center on the Social and Emotional Foundations for Early Learning (2010), “Good relationships are key to effective teaching and guidance in social, emotional and behavioral development.” With this foundation in place to ensure that a “good time will be had by all,” then preschool teachers provide materials and plan to incorporate the standards for math instruction as provided in Virginia’s Foundation Blocks for Early Learning and not the Kindergarten Standards of Learning for Mathematics. Again, there are children who vary in their levels of skill and knowledge, especially in inclusive classrooms. Some children are not capable of saying number words while there are others who recognize written numerals. Teachers in preschool are as capable of individualizing for children’s instruction as teachers in fourth grade and understanding and accepting individuality is the first step to making a child feel good about learning in preschool. Preschool teachers have the perfect opportunity to tackle problem solving, one skill area that is especially important in math instruction. Challenges abound for preschool children and every day presents an opportunity to show a four year old how to respond like “Tucker Turtle” (Challengingbehavior.org). When Tucker is faced with a problem that requires skill and patience to solve, he stops to breathe and then considers possible solutions. There is nothing magic there, except that in preschool a frown can be turned upside down, perhaps magically, when love and acceptance are at the heart of instruction.

References:


Grisham-Brown, J. (2010). Designing and implementing a curriculum framework for all children—part II [PowerPoint slides]. Presentation at the 2010 Content Teaching Academy, James Madison University, Harrisonburg, VA.


Students with weak basic math skills often struggle in school. It is common for students to need numerous practice opportunities to fully understand math concepts. Active instructional strategies help students learn content in core academic subjects. Discover resources grounded in the Concrete-Representational-Abstract (CRA) strategy, a research validated instructional sequence model known to lay a solid math foundation for all students.

In general education classrooms, many students with disabilities struggle to meet the math standards. The National Council of Teachers of Mathematics (NCTM) emphasizes the importance of having all students learn and value mathematics. To help students become better problem solvers and reason mathematically, the NCTM promotes the Concrete-Representational-Abstract (CRA) instructional sequence.

- **CONCRETE**: Student uses hands-on, physical (concrete) models or manipulatives to represent numbers and unknowns.
- **REPRESENTATIONAL** or semi-concrete: Student draws or uses pictorial representations of the models.
- **ABSTRACT**: Student uses numbers as abstract symbols of pictorial displays.

**Resources and Web sites Recommended by the Virginia Department of Education (VDOE) to Support Virginia Math Teachers:**

**Elementary School Mathematics Instructional Resources**


**Middle School Mathematics Instructional Resources**


**High School Mathematics Instructional Resources**


**Additional Teacher Resources and Web sites:**

**Math Word Walls**

http://www.broward.k12.fl.us/STUDENTSupport/ese/PDF/MathWordWall.pdf

**Secondary Graphic Organizers**

http://www.sw-georgia.resa.k12.ga.us/Math.html#High%20School%20Graphic%20Organizers

**See example graphic on next page.**

**Discovering a Wealth of Resources to Build a Solid Math Foundation**

Tina Spencer, M.S., Specialist, VDOE T/TAC at The College of William and Mary

James Madison University

K-12 math resources

http://guest.portaportal.com/k12math

Developed to promote NCTM math standards and principles

http://illuminations.nctm.org

Harvey Almarode, internationally known math professional developer

http://harveyshomepage.com/Harveys_Homepage/Welcome.html

Interactive math lessons

http://www.aamath.com

National Library of Virtual Manipulatives

http://nlvm.usu.edu/en/nav/vlibrary.html

Discovery Education free lesson plans for K-12

http://school.discoveryeducation.com/lessonplans/math.html

**Student-Friendly Math Web sites:**

A network of math lessons, practice activities, games, and a math dictionary

http://www.coolmath.com/

Developed to help students improve their math skills interactively

http://www.aplusmath.com/
Ask Dr. Math is a question-and-answer service for math students and their teachers. A searchable archive is available by level and topic.
http://mathforum.org/dr.math/

BrainBashers is a collection of brain teasers, puzzles, riddles, games, and optical illusions.
http://www.brainbashers.com/

The National Council of Teachers of Mathematics, in cooperation with the National Action Council for Minorities in Engineering, Widmeyer Communications, and the Learning First Alliance, launched Figure This! to meet the rigors and demands of increasingly higher-level concepts and approaches to problem solving in today’s math classes.
http://www.figurethis.org/index.html

Funbrain® (2002 Pearson Education, Inc.) offers free games, parent and teacher resources, and a math quiz lab.
http://www.funbrain.com

The goal of this math Web site is to help elementary school (Grades 1 through 6) children boost their math problem-solving and critical-thinking skills. MathStories.com has over 15,000 online and printable NCTM compliant math word problems.
http://www.mathstories.com

The Math Forum is a research and educational enterprise of the Goodwin College of Professional Studies which includes K-12 math problems, puzzles, tips and tricks.
http://mathforum.org/k12/mathtips

A portal of free math sites for elementary students compiled by a teacher to be both fun and educational.

Example of CRA: Tilt or Balance the Equation

• Concrete: Provide students with a physical balance scale
• Representational: Have students draw circles representing the numbers in the math equation
• Abstract: Write the numbers in the math equation

Example for 3-5

Tilt or Balance the Equation!

Source:
http://www.k8accesscenter.org/index.php/category/teaching-learning/instructional-strategies/
<table>
<thead>
<tr>
<th>Concrete</th>
<th>Representational</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>The “Concrete” level is the most basic and crucial. Using concrete objects students can have a sensory experience of mathematical concepts. They can see, touch, and feel math! Teachers can facilitate learning at this level by getting students to think about and verbalize how the objects reflect the mathematics.</td>
<td>When students are able to “see” concepts and are proficient with the concrete, the concept can be modeled at the “Representational” level using drawings that represent the concrete items. When students begin to draw, their understanding of the concept can become apparent. Teachers can facilitate learning by explicitly relating the drawings to the concrete materials that were used earlier. Replicating the movements used while using the concrete items can assist struggling learners.</td>
<td>When students are proficient at drawing representations of math solutions, they are ready for the &quot;Abstract&quot; level. By connecting what students did at the earlier &quot;representational&quot; and &quot;concrete&quot; levels of learning, teachers can promote conceptual understanding and allow students to internalize their learning. Linking the abstract symbols to the concrete items and drawings, as students progress through earlier stages, can assist in this process.</td>
</tr>
<tr>
<td>Use chips, straws, interlocking cubes, base-10 blocks, beans and bean sticks, pattern blocks, geometric prisms, paper plates, fraction bars.</td>
<td>Use tallies, dots, circles, stamps, number lines, graphs, pictograms, etc.</td>
<td>Use number sentences and algorithms.</td>
</tr>
<tr>
<td>Mastery to move to Representational Level: Performs skill correctly 3/3 times, 3 consecutive days.</td>
<td>Mastery to move to Abstract Level: Performs skill correctly 5/5 times, 3 consecutive days.</td>
<td>Mastery of Skill at Abstract Level: Performs skill correctly 10/10 times, 3 consecutive days.</td>
</tr>
</tbody>
</table>

Through careful planning and open communication, paraprofessionals can take an active role in the classroom within the local district’s guidelines. This role may be to provide instructional support to students, collect data, offer practice and review opportunities, implement behavior management plans, and/or produce materials. Generally when working in the classroom, paraprofessionals provide services in one of two settings: full or small groups.

As paraprofessionals offering support in a full group setting, it is important to circulate among students providing directions, giving visual and/or oral prompts, and reinforcing responsible student behavior. While circulating, the use of proximity management can help prevent misbehavior in a full group setting. If misbehavior continues, it is important for the assistant to speak as privately as possible to the student regarding the observable outcome he/she would like to see. For instance, instead of the adult saying, “Stop talking,” a reminder to the student to “Pay attention to the teacher” would state the desired outcome. If the misbehavior continues, it is important for the paraprofessional to think before reacting, possibly turning the situation into a teachable moment.

Another role of the paraprofessional involves providing instructional support in a small group setting. In preparing to work with a group, it is important for both the teacher and assistant to be clear regarding the time schedule and the students’ work expectations. As the instructor for the small group, the instructional assistant should create a physical layout that gives a direct line of sight to all students. In order to maintain students’ interest, it is important for the adult to be enthusiastic regarding the information presented, to use humor, and to allow student interaction to process the information. Additionally, when working with a small group, the paraprofessional should incorporate all the components of a well-structured lesson: review previously taught skills, allow time for processing and practice, provide instruction as needed, and assess student understanding. It is important for the assistant to be aware of the responsibility in giving academic and behavior feedback to the teacher.

The role of the paraprofessional in the classroom varies from location to location; however, the focus remains the same: providing support to provide what is best for the students.

Resource:

The Virginia Guide to Supervision and Collaboration with Paraprofessionals: A Partnership (July 2005)
Virginia Department of Education
The Division of Special Education and Student Services
P. O. Box 2120
Richmond, VA 23218-2120
804.786.8671
Engaging students in learning and keeping them engaged is 99% of the challenge in today’s classrooms. So how do we do it? How do we get our students to the edge of their seats and provide effective instruction on the skills they need to build a strong math foundation that enables them to meet the Virginia Standards of Learning requirements and prepares them for whatever future opportunities lay ahead?

The VDOE T/TACs at George Mason University and Old Dominion University invite you to begin to answer these questions at a day-long training in Fredericksburg. If you are an elementary or middle school teacher, join us for a workshop that will link the most recent research on student engagement with learning in the math classroom.

Activate, Captivate, Invigorate: Engaging the Mathematical Brain

will be held on

Thursday, April 14, 2011

at the Fredericksburg Hospitality House and Conference Center in Fredericksburg, Virginia

Keynote Speaker: John Almarode

John Almarode, a dynamic speaker, has been an educator and staff developer for many years. He has worked with all age groups in education from kindergarteners to graduate students. He began his career in Augusta County, Virginia, teaching mathematics, Physics, and Chemistry in inclusive settings. He then taught PreCalculus, Physics, and Modern Physics at the Shenandoah Valley Governor’s School for three years. As a mathematics and science teacher, John created an innovative and unique experience for each of his students, matching instruction with how the brain learns. John is known for his extremely active and engaging learning environments where thinking is fun and learning is easy!

As a staff developer, John has presented locally, regionally, nationally and internationally on the role of brain research in education. Allowing audiences to experience brain-based learning, his action-packed workshops offer participants ready-to-use strategies and information on the brain rules that make them work.

In addition to our keynote speaker, there will also be breakout sessions on best practices in math presented by the T/TAC staff developers. Topics will include: Good questions – an engaging, manageable way to differentiate math instruction; Making math vocabulary engaging and interactive; Math & technology; Fractions; Algebra across the grades; and Differentiating instruction using a concrete-representational-abstract approach.

Plan to join us for this amazing day devoted to learning about math and motivation. You will walk away with ideas and strategies that will have every student captivated, activated and invigorated!

To register, go to:

http://ttaconline.org/staff/s_events/s_event_detail.asp?cid=1807
What’s in YOUR library at VDOE's T/TAC at GMU?

February/March 2011

Featuring some of our Most Wanted resources...

Basic Picture Math: Visual Activities for Basic Math Concepts
Cynthia Hernandez, Bonnye W. Cavazos, & Karen Lundell; Call number: 510 BAS 2008

This series was developed to help beginning and struggling readers improve their basic math skills. Each level contains reproducible activity sheets designed to be as simple and visual as possible to ensure students’ success. Practice for real-world situations is also included.

Literacy Strategies for Improving Mathematics Instruction
Joan M. Kenney, Euthemia Hancewicz, Loretta Heuer, Diana Metsisto & Cynthia L. Tuttle; Call number: 510.71 KEN 2005

What makes mathematics so confusing to students? To succeed in the study of arithmetic, geometry, or algebra, students must learn what is effectively a second language of mathematical terms and symbols. In this book, the authors describe common ways in which students misinterpret the language of mathematics, and show teachers what they can do to ensure that their students become fluent in that language.

Equals: Mathematics Curriculum for Students of Differing Abilities
ABLENET, 2009; Call number: 510 EQU 2009

Equals is a Pre K-12 curriculum for educators who work with students in special education or in alternative education programs. It encompasses...

Jackie Petersen, MLS, VDOE T/TAC at George Mason University
pre-readiness math skills (attending, cause and effect, etc.), fundamental math skills (numbers and operations, measurement, and estimation), and higher order math skills (data analysis, probability, spatial sense, geometry, algebra, and problem solving). Each lesson provides three levels of instruction for students with mild, moderate, and severe disabilities.

**More Good Questions: Great Ways to Differentiate Secondary Mathematics Instruction**

Marian Small & Amy Lin; Call Number: 510.712 SMA 2010

A great resource for teachers Grade 6 and higher, More Good Questions, presents two powerful and universal strategies that teachers can use to differentiate instruction across all math content: Open Questions and Parallel Tasks. Showing teachers how to get started and become expert with these strategies, this book also demonstrates how to use more inclusive learning conversations to promote broader student participation. Strategies and examples are organized around Big Ideas within the National Council of Teachers of Mathematics (NCTM) content strands. With particular emphasis on Algebra, chapters also address Number and Operations, Geometry, Measurement, and Data Analysis and Probability, with examples included for Pre-Calculus.

**Also by Marian Small – Good Questions: Great Ways to Differentiate Mathematics Instruction;**

Call Number: 372.7 SMA 2009

**Teaching Math to People with Down Syndrome and Other Hands-on Learners**

DeAnna Horstmeier; Call Number: 510.71 HOR 2004

This book teaches practical math skills to kids and adults with Down Syndrome or other learning delays, using hands-on activities that appeal to their learning style.

**Teaching Student-Centered Mathematics**

John A. Van de Walle & Louann H. Lovin; Call Number: 372.7 VAN 2006

This series of 3 volumes provides practical guidance along with proven strategies for math teachers of kindergarten through grade 8.

**Touchmath: Time, Upper Grades**

Innovative Learning Concepts; Call Number: 372.7044 TOU 2006

This kit includes methods and activities to help students develop basic and advanced concepts in time. The materials are designed for students in third and fourth grades and for remedial use with students from fifth grade through adult education classes.

**Word Problems for Nonreaders: Multiplication Division**

Janie Haugen-McLane; Call Number: 510 HAU 2009 vol. 3

This series was developed to help students with limited or no reading skills solve basic addition, subtraction, multiplication and division word problems. The word problems are based on everyday situations that students may encounter in their day-to-day lives. A CD with a full color PDF of the entire binder is included to support the use of projection devices, including digital whiteboards. This series can be used with large or small groups or in one-on-one settings.

If you like these, search our catalog for more @ http://kihd.gmu.edu/library

No time to come to the library?
No problem!
Most items can be mailed to your school or home address.

To request one of the items above or any other materials available for checkout, please contact Region 4 T/TAC Librarian Jackie Petersen, jpetersk@gmu.edu or 703.993.3672
MARCH

This lively workshop will delve into the necessity for collaborative teaming to conquer the complexities of educating learners with Autism Spectrum Disorders. The keynote speaker is Cathy Scutta, OTD, OTR/L, BCBA-D. The location is Hilton Richmond Hotel & Spa/Short Pump, 12042 West Broad St, Richmond, VA 23233. Pre-Registration is required.
Visit: http://www.ttaonline.org/staff/s_events/s_event_detail.asp?cid=1803

March 11&12, 2011: VCTM Annual Conference and Meeting: Making Math Monumental
Virginia Council of Teachers of Mathematics (VCTM) 32nd Annual Conference will feature 105 talented speakers. Mathematics topics will cover all grade levels, math specialists, and Virginia SOLs. Location: Sheraton West – Richmond, Virginia
Visit: http://www.ttaonline.org/staff/s_events/s_event_detail.asp?cid=1804

March 12, 2011: Eating problems in autism spectrum disorders: What they are and what to do
Description: Keith Williams, Ph.D., B.C.B.A-D will provide information detailing the range of feeding and eating problems found among children with autism spectrum disorders and will discuss a variety of empirically-proven treatments for these problems. Location: Enterprise Hall- Room 80 @ George Mason University- Fairfax Campus
Visit: http://www.ttaonline.org/staff/s_events/s_event_detail.asp?cid=1801

March 14-16, 2011: Virginia Transition Forum 2011: Taking Steps to Person-Centered Thinking
Norfolk Waterside Marriott, Norfolk, VA
Drawing close to 1,000 participants annually, The Virginia Transition Forum brings together students, parents, educators, rehabilitation professionals, and others to guide youth with disabilities to achieve successful employment and life outcomes. We will host the 2011 Transition Forum at the Norfolk Waterside Marriott and the overflow hotel is the Sheraton Norfolk Waterside.
Visit: http://www.ttaonline.org/staff/s_events/s_event_detail.asp?cid=1746
March 18, 2011: Book Study Topic: The Universally Designed Classroom (Part 1)  
(Presented by the AT Coordinators from GMU T/TAC)

This is Part 1 in a 2 session series. The book title is “Accessible Curriculum and Digital Technologies” (2007). It is edited by David H. Rose, Anne Meyer, and Chuck Hitchcock. During this workshop, participants will review the UDL framework and apply its principles to developing materials, instruction and evaluation tools. Homework will be assigned to discuss during Part 2. This workshop will be presented by the AT Coordinators from the GMU T/TAC and will be held at the Kellar Annex 1 near the GMU Fairfax Campus. It will be limited to 30 people on a first come, first serve basis. Light lunch will be provided at this location. This event can be repeated on different dates at your request if you provide a site in your geographical area.

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1769

March 23, 2011: Keeping it Real: Data Collection and Analysis for the Special Education Classroom (2 days)
In this two-part training, participants will learn data collection strategies that can be implemented in the classroom/school setting, and how to use data collection results and analysis to create appropriate behavior interventions. Participants must attend both sessions. - Location: St. Clare Walker Middle School, Locust Hill, VA

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1794

March 27, 2011: Thinking Ahead: Special Needs Plans and Options--A Workshop for Parents and Professionals
This workshop is open to ALL who work with or are impacted by Learning Disabilities, ADD/ADHD, Asperger's Syndrome, Autism and Developmental Delay. Break-out sessions will address issues (transition, sensory needs, advocacy, employment skills, financial and insurance options, video modeling) impacting all ages. Registration: $10 Location: Jewish Community Center of Northern Virginia

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1808

March 30, 2011: Making Math Meaningful for ALL Students Conference, Location: Festival Conference and Student Center, JMU, Harrisonburg. To register, contact Susan Bowman, Region 5 T/TAC, 540.568.8843.

March 31, 2011: Assessment, Communication, and Routines: Building Blocks for Calendar Systems for Children
The Virginia Project for Children and Young Adults with Deaf-Blindness is very excited to announce that we will be offering a two-day workshop with Robbie Blaha. This workshop is offered free of charge (first come, first serve) to professionals, paraprofessionals, and families in Virginia. Location: Sheraton Roanoke Hotel & Conference Center in Roanoke, Virginia.

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1796
**APRIL**

April 6, 2011: Make It, Take It (Literacy and Math), Location: American Frontier Culture Museum, Staunton. To register, contact Susan Bowman, Region 5 T/TAC, 540-568-8843.

April 8, 2011: Make It, Take It (Literacy and Math), Location: The Nelson Center, Lovingston. To register, contact Susan Bowman, Region 5 T/TAC, 540-568-8843.

April 14, 2011: CAPTIVATE, ACTIVATE, INVIGORATE: ENGAGING THE MATHEMATICAL BRAIN
Plan to attend this amazing workshop (Featured presenter: John Almarode) which will link the most recent research on student engagement with learning in the math classroom. Participants will walk away with ideas and strategies that will have every student captivated, activated and invigorated! Cost: $25 (includes continental breakfast, lunch and workshop materials) - Location: Fredericksburg Hospitality House and Conference Center, Fredericksburg, VA.

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1807

April 18, 2011: Precision Teaching- Rick Kubina, Ph.D., B.C.B.A-D
Day 1- This workshop presentation will discuss some of the research showing why gaining behavioral fluency is important for students with and without disabilities. More importantly, this presentation will show participants how to achieve behavioral fluency. Day 2- This workshop presentation will show all participants how to use the Standard Celeration Chart to display student behavior and how to interpret the data. All participants will receive a packet of charts along with a number of important resources to help with continued charting. Location: Verizon Auditorium- Occoquan Building @ George Mason University-Prince William Campus

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1800


The CEC 2011 Convention & Expo is the largest professional gathering of the special education community. This event offers you an unparalleled experience with more than 800 sessions to help you learn the latest in evidence-based practices; explore innovative technologies, products, and services; and network with other professionals working with children with exceptionalities and their families.

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1788

April 29, 2011: Book Study Topic: The Universally Designed Classroom (Part 2)
(Presented by the AT Coordinators from GMU T/TAC)
This session is Part 2 in a 2 session series. The book title is “Accessible Curriculum and Digital Technologies” (2007). It is edited by David H. Rose, Anne Meyer, and Chuck Hitchcock. Continuing from Part 1, participants will discuss UDL implementation and review examples using best practices and curriculum enhancements. This workshop will be presented by the AT Coordinators from the GMU T/TAC and will be held at the Kellar Annex 1 near the GMU Fairfax Campus. It will be limited to 30 people on a first come, first serve basis. Light lunch will be provided at this location. This event can be repeated on different dates at your request if you provide a site in your geographical area.

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1770
MAY

May 26, 2011: SAVE THE DATE: Differentiation Workshop sponsored by GMU T/TAC. Visit T/TAC Online (Events) for details and registration information.

JUNE

June 28&29, 2011: OPENING DOORS – UNLOCKING POTENTIAL 2011: Language, Literacy, and Learning! Description: 5th Annual Conference for educational professionals who work with students who are deaf or hard of hearing. Location: Holiday Inn University Area & Conference Center, Charlottesville. Registration will be available soon at: www.vcu.edu/partnership under Professionals & Providers.

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1805

JULY


Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1806

July 18, 2011: Youth Leadership Forum (Virginia Board for People with Disabilities) Twenty-five Virginia high school students with disabilities will be selected to receive full scholarships to participate in VBPD’s youth leadership forum (YLF). Scholarships cover the entire cost for delegates to attend this 5-day leadership development program, including room & board, instructional materials, activities, interpreters, personal care assistants, and individual medical care as required. YLF educates students with disabilities about the principles of leadership, builds their self-confidence and advocacy skills, and prepares them for future career choices. To be considered, students’ applications must be received no later than March 31, 2011. Location: Virginia Commonwealth University

Visit: http://www.ttaconline.org/staff/s_events/s_event_detail.asp?cid=1799

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