TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

1: Preschool Math Grows Up: Tips for Teachers

This practice guide provides five recommendations for teaching math to children in preschool, prekindergarten, and kindergarten. Each recommendation includes implementation steps and solutions for common roadblocks.

Print Children are using early math skills throughout their daily routines and activities. This is good news as these skills are important for being ready for school. Even before they start school, most children develop an understanding of addition and subtraction through everyday interactions. For example, Thomas has two cars; Joseph wants one. Other math skills are introduced through daily routines you share with your childâ€"counting steps as you go up or down, for example. Informal activities like this one give children a jumpstart on the formal math instruction that starts in school. What math knowledge will your child need later on in elementary school? Early mathematical concepts and skills that first-grade mathematics curriculum builds on include: Understanding size, shape, and patterns Ability to count verbally first forward, then backward Recognizing numerals Identifying more and less of a quantity Understanding one-to-one correspondence i. In the toddler years, you can help your child begin to develop early math skills by introducing ideas like: Number Sense This is the ability to count accuratelyâ€"first forward. Then, later in school, children will learn to count backwards. A more complex skill related to number sense is the ability to see relationships between numbersâ€"like adding and subtracting. Ben age 2 saw the cupcakes on the plate. He counted with his dad: Casey aged 3 was setting out a pretend picnic. He carefully laid out four plastic plates and four plastic cups: Aziz 28 months was giggling at the bottom of the slide. Measurement of time in minutes, for example also falls under this skill area. Gabriella 36 months asked her Abuela again and again: Fill it up once and put it in the bowl, then fill it up again. This is very difficult for young children to do. You can help them by showing them the meaning of words like more, less, bigger, smaller, more than, less than. Nolan 30 months looked at the two bagels: That bagel is bigger. That bagel is smaller. Breakfast is coming up! Patterns help children learn to make predictions, to understand what comes next, to make logical connections, and to use reasoning skills. Ava 27 months pointed to the moon: In the morning, the sun comes out and the moon goes away. At night, the sun goes to sleep and the moon comes out to play. It means using past knowledge and logical thinking skills to find an answer. Carl 15 months old looked at the shape-sorterâ€"a plastic drum with 3 holes in the top. The holes were in the shape of a triangle, a circle and a square. Carl looked at the chunky shapes on the floor. He picked up a triangle. He put it in his month, then banged it on the floor. He touched the edges with his fingers. Then he tried to stuff it in each of the holes of the new toy. It fell inside the triangle hole! Carl reached for another block, a circular one this timeâ€¦ Math: One Part of the Whole Math skills are just one part of a larger web of skills that children are developing in the early yearsâ€"including language skills, physical skills, and social skills. Each of these skill areas is dependent on and influences the others. Trina 18 months old was stacking blocks. She had put two square blocks on top of one another, then a triangle block on top of that. She discovered that no more blocks would balance on top of the triangle-shaped block. She then added two more blocks to her tower before proudly showing her creation to her dad: Her physical ability allows her to manipulate the blocks and use her thinking skills to execute her plan to make a tower. She uses her language and social skills as she asks her father for help. Her effective communication allows Dad to respond and provide the helps she needs further enhancing her social skills as she sees herself as important and a good communicator. This then further builds her thinking skills as she learns how to solve the problem of making the tower taller. What You Can Do The tips below highlight ways that you can help your child learn early math skills by building on their natural curiosity and having fun together. Most of these tips are designed for older childrenâ€"ages 2â€"3. Younger children can be exposed to stories and songs using repetition, rhymes and numbers. Talk with your child about each shapeâ€"count the sides, describe the colors. Make your own shapes by cutting large shapes out of colored construction paper. Gather together a basket of small toys, shells, pebbles or buttons. Count them with your child. Sort them based on size, color, or what they do i. With your 3-year-old, begin teaching her the address and phone number of your home. Talk with your child about how each house has a number, and how their house or apartment is one

of a series, each with its own number. What size is it? Notice the sizes of objects in the world around you: That pink pocketbook is the biggest. The blue pocketbook is the smallest. Even young children can help fill, stir, and pour. Through these activities, children learn, quite naturally, to count, measure, add, and estimate. Taking a walk gives children many opportunities to compare which stone is bigger? You can also talk about size by taking big and little steps , estimate distance is the park close to our house or far away? Use an hourglass, stopwatch, or timer to time short 1â€”3 minute activities. This helps children develop a sense of time and to understand that some things take longer than others. Point out the different shapes and colors you see during the day. Read and sing your numbers. Sing songs that rhyme, repeat, or have numbers in them. Songs reinforce patterns which is a math skill as well. They also are fun ways to practice language and foster social skills like cooperation. Use a calendar to talk about the date, the day of the week, and the weather. Calendars reinforce counting, sequences, and patterns. Build logical thinking skills by talking about cold weather and asking your child: This encourages your child to make the link between cold weather and warm clothing. Help him give one cracker to each child. This helps children understand one-to-one correspondence. When you are distributing items, emphasize the number concept: Give your child the chance to play with wooden blocks, plastic interlocking blocks, empty boxes, milk cartons, etc. Stacking and manipulating these toys help children learn about shapes and the relationships between shapes e. Nesting boxes and cups for younger children help them understand the relationship between different sized objects. Open a large cardboard box at each end to turn it into a tunnel. This helps children understand where their body is in space and in relation to other objects. The long and the short of it. Cut a few 3â€”5 pieces of ribbon, yarn or paper in different lengths. Talk about ideas like long and short. With your child, put in order of longest to shortest. Cut shapesâ€”circle, square, triangleâ€”out of sturdy cardboard. Let your child touch the shape with her eyes open and then closed. Have fun with patterns by letting children arrange dry macaroni, chunky beads, different types of dry cereal, or pieces of paper in different patterns or designs. Supervise your child carefully during this activity to prevent choking, and put away all items when you are done. Make household jobs fun. As you sort the laundry, ask your child to make a pile of shirts and a pile of socks. Ask him which pile is the bigger estimation.

TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

2: 10 Effective DAP Teaching Strategies | NAEYC

Teaching Children Mathematics (TCM) is an official journal of the National Council of Teachers of Mathematics and is intended as a resource for elementary school students, teachers, and teacher educators.

We now turn our attention to what it takes to develop proficiency in teaching mathematics. Proficiency in teaching is related to effectiveness: Proficiency also entails versatility: Teaching in the ways portrayed in chapter 9 is a complex practice that draws on a broad range of resources. Despite the common myth that teaching is little more than common sense or that some people are just born teachers, effective teaching practice can be learned. In this chapter, we consider what teachers need to learn and how they can learn it. First, what does it take to be proficient at mathematics teaching? If their students are to develop mathematical proficiency, teachers must have a clear vision of the goals of instruction and what proficiency means for the specific mathematical content they are teaching. They need to know the mathematics they teach as well as the horizons of that mathematicsâ€”where it can lead and where their students are headed with it. They need to be able to use their knowledge flexibly in practice to appraise and adapt instructional materials, to represent the content in honest and accessible ways, to plan and conduct instruction, and to assess what students are learning. Helping Children Learn Mathematics. The National Academies Press. If you can interweave the two things together nicely, you will succeedâ€¦. Believe me, it seems to be simple when I talk about it, but when you really do it, it is very complicated, subtle, and takes a lot of time. It is easy to be an elementary school teacher, but it is difficult to be a good elementary school teacher. Used by permission from Lawrence Erlbaum Associates. Teaching requires the ability to see the mathematical possibilities in a task, sizing it up and adapting it for a specific group of students. In short, teachers need to muster and deploy a wide range of resources to support the acquisition of mathematical proficiency. In the next two sections, we first discuss the knowledge base needed for teaching mathematics and then offer a framework for looking at proficient teaching of mathematics. In the last two sections, we discuss four programs for developing proficient teaching and then consider how teachers might develop communities of practice. The Knowledge Base for Teaching Mathematics Three kinds of knowledge are crucial for teaching school mathematics: Page Share Cite Suggested Citation: In our use of the term, knowledge of mathematics includes consideration of the goals of mathematics instruction and provides a basis for discriminating and prioritizing those goals. Knowing mathematics for teaching also entails more than knowing mathematics for oneself. Teachers certainly need to be able to understand concepts correctly and perform procedures accurately, but they also must be able to understand the conceptual foundations of that knowledge. In the course of their work as teachers, they must understand mathematics in ways that allow them to explain and unpack ideas in ways not needed in ordinary adult life. Knowledge of students and how they learn mathematics includes general knowledge of how various mathematical ideas develop in children over time as well as specific knowledge of how to determine where in a developmental trajectory a child might be. Knowledge of instructional practice includes knowledge of curriculum, knowledge of tasks and tools for teaching important mathematical ideas, knowledge of how to design and manage classroom discourse, and knowledge of classroom norms that support the development of mathematical proficiency. Teaching entails more than knowledge, however. Teachers need to do as well as to know. For example, knowledge of what makes a good instructional task is one thing; being able to use a task effectively in class with a group of sixth graders is another. Understanding norms that support productive classroom activity is different from being able to develop and use such norms with a diverse class. Knowledge of Mathematics Because knowledge of the content to be taught is the cornerstone of teaching for proficiency, we begin with it. Many recent studies have revealed that U. The mathematical education they received, both as K students and in teacher preparation, has not provided them with appropriate or sufficient opportunities to learn mathematics. As a result of that education, teachers may know the facts and procedures that they teach but often have a relatively weak understanding of the conceptual basis for that knowledge. Many have difficulty clarifying mathematical ideas or solving problems that involve more than routine calculations. Many have little appreciation of the ways in which mathematical knowledge is generated or justified. Preservice

teachers, for example, have repeatedly been shown to be quite willing to accept a series of instances as proving a mathematical generalization. Although teachers may understand the mathematics they teach in only a superficial way, simply taking more of the standard college mathematics courses does not appear to help matters. The evidence on this score has been consistent, although the reasons have not been adequately explored. For example, a study of prospective secondary mathematics teachers at three major institutions showed that, although they had completed the upper-division college mathematics courses required for the mathematics major, they had only a cursory understanding of the concepts underlying elementary mathematics. For the most part, the results have been disappointing: Most studies have failed to find a strong relationship between the two. Many studies, however, have relied on crude measures of these variables. The measure of teacher knowledge, for example, has often been the number of mathematics courses taken or other easily documented data from college Page Share Cite Suggested Citation: Such measures do not provide an accurate index of the specific mathematics that teachers know or of how they hold that knowledge. Teachers may have completed their courses successfully without achieving mathematical proficiency. Or they may have learned the mathematics but not know how to use it in their teaching to help students learn. They may have learned mathematics that is not well connected to what they teach or may not know how to connect it. The empirical literature suggests that this belief needs drastic modification and in fact suggests that once a teacher reaches a certain level of understanding of the subject matter, then further understanding contributes nothing to student achievement. Fourth graders taught by teachers who majored in mathematics education or in education tended to outperform those whose teachers majored in a field other than education. That crude measures of teacher knowledge, such as the number of mathematics courses taken, do not correlate positively with student performance data, supports the need to study more closely the nature of the mathematical knowledge needed to teach and to measure it more sensitively. The research, however, does suggest that proposals to improve mathematics instruction by simply increasing the number of mathematics courses required of teachers are not likely to be successful. As we discuss in the sections that follow, courses that reflect a serious examination of the nature of the mathematics that teachers use in the practice of teaching do have some promise of improving student performance. Teachers need to know mathematics in ways that enable them to help students learn. The specialized knowledge of mathematics that they need is different from the mathematical content contained in most college mathematics courses, which are principally designed for those whose professional uses of mathematics will be in mathematics, science, and other technical fields. Why does this difference matter in considering the mathematical education of teachers? First, the topics taught in upper-level mathematics courses are often remote from the core content of the K curriculum. Although the abstract mathematical ideas are connected, of course, basic algebraic concepts or elementary geometry are not what prospective teachers study in a course in advanced calculus or linear algebra. Second, college mathematics courses do not provide students with opportunities to learn either multiple representations of mathematical ideas or the ways in which different representations relate to one another. Advanced courses do not emphasize the conceptual underpinnings of ideas needed by teachers whose uses of mathematics are to help others learn mathematics. While this approach is important for the education of mathematicians and scientists, it is at odds with the kind of mathematical study needed by teachers. Consider the proficiency teachers need with algorithms. The power of computational algorithms is that they allow learners to calculate without having to think deeply about the steps in the calculation or why the calculations work. Over time, people tend to forget the reasons a procedure works or what is entailed in understanding or justifying a particular algorithm. Because the algorithm has become so automatic, it is difficult to step back and consider what is needed to explain it to someone who does not understand. Most advanced mathematics classes engage students in taking ideas they have already learned and using them to construct increasingly powerful and abstract concepts and methods. Once theorems have been proved, they can be used to prove other theorems. It is not necessary to go back to foundational concepts to learn more advanced ideas. Teaching, however, entails reversing the direction followed in learning advanced mathematics. In helping students learn, teachers must take abstract ideas and unpack them in ways that make the basic underlying concepts visible. For adults, division is an operation on numbers. She wants to put 6 cookies on each plate. How many plates will she

need? He wants to put all the cookies on 6 plates. If he puts the same number of cookies on each plate, how many cookies will he put on each plate? These two problems correspond to the measurement and sharing models of division, respectively, that were discussed in chapter 3. Young children using counters solve the first problem by putting 24 counters in piles of 6 counters each. They solve the second by partitioning the 24 counters into 6 groups. In the first case the answer is the number of groups; in the second, it is the number in each group. Until the children are much older, they are not aware that, abstractly, the two solutions are equivalent. Teachers need to see that equivalence so that they can understand and anticipate the difficulties children may have with division. To understand the sense that children are making of arithmetic problems, teachers must understand the distinctions children are making among those problems and how the distinctions might be reflected in how the children think about the problems. The different semantic contexts for each of the operations of arithmetic is not a common topic in college mathematics courses, yet it is essential for teachers to know those contexts and be able to use their knowledge in instruction. The division example illustrates a different way of thinking about the content of courses for teachersâ€”a way that can make those courses more relevant to the teaching of school mathematics. Teachers are unlikely to be able to provide an adequate explanation of concepts they do not understand, and they can hardly engage their students in productive conversations about multiple ways to solve a problem if they themselves can only solve it in a single way. Most of the investigations have been case studies, almost all involving fewer than 10 teachers, and most only one to three teachers. Not surprisingly, these teachers gave the students little assistance in developing an understanding of what they were doing. The teacher also needs to be sensitive to the unique ways of learning, thinking about, and doing mathematics that the student has developed. Each student can be seen as located on a path through school mathematics, equipped with strengths and weaknesses, having developed his or her own approaches to mathematical tasks, and capable of contributing to and profiting from each lesson in a distinctive way. Teachers also need a general knowledge of how students thinkâ€”the approaches that are typical for students of a given age and background, their common conceptions and misconceptions, and the likely sources of those ideas. We have described some of those progressions in chapters 6 through 8. From the many examples of misconceptions to which teachers need to be sensitive, we have chosen one: Children can develop this impression because that is how the notation is often described in the elementary school curriculum and most of their practice exercises fit that pattern. Knowledge of Classroom Practice Knowing classroom practice means knowing what is to be taught and how to plan, conduct, and assess effective lessons on that mathematical content. We have discussed these matters in chapter 9. In the sections that follow, we consider how to develop an integrated corpus of knowledge of the types discussed in this section. First, however, we need to clarify our stance on the relation between knowledge and practice.

TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

3: Help Your Child Develop Early Math Skills â€¢ ZERO TO THREE

Promote children's understanding of measurement by teaching them to make direct comparisons and to use both informal or nonstandard (e.g., the child's hand or foot) and formal or standard (e.g., a ruler) units and tools.

This work is available here free, so that those who cannot afford it can still have access to it, and so that no one has to pay before they read something that might not be what they really are seeking. But if you find it meaningful and helpful and would like to contribute whatever easily affordable amount you feel it is worth, please do do. I will appreciate it. The button to the right will take you to PayPal where you can make any size donation of 25 cents or more you wish, using either your PayPal account or a credit card without a PayPal account. Teaching Math to Young Children by Rick Garlikov This is one of a series of webpages to help students understand math, and to help parents teach their children math -- especially to help children have a good foundation. These are not pages to teach the mere recipes or algorithms for solving problems. My philosophy is that if you understand math as you go along, you will be able to do your homework well yourself and you should be able to do well on exams. And although understanding takes some work, it is usually actually easier than trying to memorize rules and recall them later, especially in situations that are slightly new and different, and especially under pressure of tests. Practice is important to help you do math more automatically and therefore to recognize possible solutions more quickly, but you should still understand the things you memorize or know automatically. It is not all that difficult if you develop a good foundation, which requires both understanding and sufficient practice to keep your understanding sharp. This essay presents ways for parents or teachers to help children develop such a foundation. The following are some other essays in this series. My training is in philosophy and I use a conceptual and analytic approach to teach math. I believe it is lack of conceptual understanding that causes students to have the most difficulty, along with lack of practice manipulating quantities and numbers in certain ways to the point of being comfortable and familiar with them. Imagine if I said from now on we will change all the numeral names that is to the ten letters of the alphabet below, which you already know in order, so this should make the tasks following them even easier: You would need lots of practice; and the idea would be to make the practice be enjoyable and interesting to you. Obviously this will be more difficult for young children to verbalize, but they should have the opportunity and the coaxing to try to communicate in some way how they are thinking and seeing a concept or idea. It is important for parents and teachers to try to help children explain their own ideas and reasoning as much as possible. If you are the parents of young children, you can practice some of these things with your children while you are in the car with them; I found that to be a good time to work with them: As young children get older, they can add more numbers to the list. Notice, naming numbers in order is different from counting, though counting sometimes involves naming numbers in order. But you can name numbers in order without counting and you can count without naming numbers in order. But before kids can count objects by naming the numbers one at a time in order as they point to objects, they need to learn the number names in order. So you can start with "one, two" and then add numbers as kids are able to absorb them. You can name numbers while pointing to fingers, or just reciting the numbers, or by using nursery rhymes such as "One, two, buckle my shoe See 5 and 6 below for typical particular problems about learning number names in order. As your children learn number names, give them practice counting things, helping them when necessary and praising them as they get it right. Counting things one by one helps them count and it reinforces the order of number names while they are young. If you have games like Chutes and Ladders or Monopoly, etc. Once they understand WHAT it is you are teaching them, you can give them practice by the next step, 4. Make sure you get them to see how much faster it is to count out large quantities by groups, rather than one at a time. So it took additional practice working with that in particular. So we did extra practice naming numbers starting at the 7 in each "decade"; i. It is not a sign of any significant difficulty, but you need to watch for it so they learn not to do it. This is not too difficult with single digit numbers, but it is somewhat difficult with multi-digit numbers, since the number ten, for example, written out looks like one, zero. Kids can just learn it is If you feel they might think it interesting, you might explain that the "teen" in each of the -teen number names is like

"ten" and that the teens are like three-teen, four-teen, five-teen, and that twelve is like two-teen and so the numbers look like a ten except for the numeral that replaces the "0" in the ten. Once you get to twenty, this is easier, and you may even want to start with it -- twenty one is written like twenty but with a one at the end; twenty two is like twenty with a two at the end, etc. I will get to place-value later. Or you might give them "half a glass of milk" and identify it as such. Let them know the bottom tells how many "pieces" you divide something up into, and the top part tells you how many of those pieces "you have" or "you are talking about". So if you divide a cookie into halves, and you get one piece, you have one half a cookie. If you have four people in your family and two of them are women, then two fourths of your family are females. You can ask them what fraction of their family they are, what fraction the children are, what fraction of the legs of a dog are front legs, or left legs, or left front legs. I find kids get a real kick out of telling you all kinds of bizarre fractions like these once they catch on to seeing how to name fractional parts of things. At some point you can also show them that fractions can be more than one whole thing, say, by breaking two cookies into halves and giving them three of the halves and asking them how many halves they have. And helping them see that three halves then is the same as one-and-a-half cookies, just as you probably already have shown them that two halves are the same as a whole cookie except for some of the crumbs that fall when you break the cookie in half. They can play with two or more dice, for example. Or they can play "double war" in cards, a game where each player turns over two cards, and the player with the highest SUM wins all the cards turned over. Each player keeps doing this until one player has all the cards. Or when they are old enough to start to understand the game, they can play blackjack just for fun without betting anything. They will like just trying to win each hand. As your children get better at adding and subtracting, you can show them neat "magic" tricks with numbers, such as how to add up the numbers that are on the BOTTOMS of the dice they have rolled, without having to pick up the dice to see those numbers. The opposite sides of dice add up to 7, so if the three is rolled, a four is on the bottom; if a six is rolled, the one is on the bottom. So if you roll two dice and get a five and a three, you know that there is a two and a four on the bottom, and can sum them up to six. Also, the opposite sides of TWO dice will add up to 14, so you could add the five and the three you see and subtract that from 14 to still get 6. Especially if using three or four dice. If you were to get 19, you would not have had to regroup in the first place, because you could have subtracted any digit from the 9 that you began with, without having to "borrow" to do it; e. If you are not opposed to letting them play cards, "blackjack" or 21 is an easy and excellent game for practice in developing this particular skill. And many learn it only by rote they never learn the "why" , which causes problems later in a number of places. I think there is an easy and great way to teach place-value, and to teach about regrouping, borrowing, etc. Stacks of poker chips can also teach about fractional relationships; e. So I recommend that you buy a pack or two of poker chips be sure they have stacks of at least three colors -- commonly red ones, white ones, and blue ones , which you can get for a few dollars a pack at some of the discount stores or at some drugstores. And I also recommend your buying two decks of cards, since you can give kids practice in counting and adding and subtracting with them. They can count cards or count the objects on the faces, or add and subtract the face values, in a number of different games they might play, or in a number of different tasks you might ask them to do, that they often will find fun. And once they have learned these things, percentages will be easy as well. As the child gets older or more sophisticated in arithmetic, you can make the question more sophisticated: Sometimes they do so by trial and error or by lucky guesses; but all of them give them more and more practice with numbers and with relationships between numbers. And they often seem to love doing these things, at least in small doses. Or you can make two different progressions in the same problem: There are two progressions here: Try to devise games or puzzles using insights from those areas that your children might find fun to play with and think about. There are various inexpensive math puzzle, riddle, logic, or "magic" books, and free Internet sites, available that teach many different aspects of math in different fun ways. Simple objects can be used to teach math elements also. Nobel physicist Richard Feynman told, for example, about how when he was still in his high chair, his father would bring home color tiles and would line them up in various ways for and with him so that there would be patterns, such as blue-white-blue-white-blue-white, or color patterns alternating by thirds or some other way. It was something of just a fun game for the baby, but a game that had a deeper meaning and point to his father.

As long as it stays interesting or fun for the child, I do not see any harm in it, and it might have much educational developmental value for later.

TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

4: How to Teach a Young Child Beginning Math Skills: 15 Steps

Children learn mathematics most effectively in contexts that are meaningful to them. Realizing the potential of these contexts for fostering young children's mathematical learning while nurturing and challenging them, requires knowledge of mathematics as well as of child development.

Preschool Math Grows Up: From the outside, it might seem like your job is all about fun and games, but parents of young children know and appreciate how you influence and model positive behaviors, shape instruction, cultivate optimism and positive attitudes about school and learning, boost self-esteem, and provide the foundation for their future in school and in the community. Early reading has been a major focus of education research and instruction for many years; and thankfully, the spotlight has now expanded to include math. At the same time, the No Child Left Behind Act has led to more rigorous reading and math programs in early elementary school. Consequently, many preschools are now revising their math programs to prepare students for the increasing demands of early elementary school math. What do you need to know and do to help preschoolers learn about math? And, you can learn about new research findings that will enhance your knowledge about teaching preschool math. Building an effective preschool math program As your school reviews and retools its math program to meet current requirements, you and your director may want to ensure your program is aligned with current best practices. Teaching the many aspects of math: Teaching math across the curriculum rather than as an isolated subject. Blend math concepts into language arts, music, art, and science projects. Find out if the math program and materials you use are based on peer-reviewed research that has proven to be effective. Staying on top of best practices in math instruction Keeping up with best practices in preschool math requirements can be a challenge for preschool teachers. The right support can improve your comfort level, confidence â€” and the quality of your teaching. You can also keep up with best practices by: Talking to other teachers and finding out what works for them; swapping ideas and lesson plans with each other; Reviewing the curriculum, then creating and expanding activities to teach and practice key concepts and skills; Checking with the National Council of Teachers of Mathematics for advice on about effective preschool math materials and teaching methods. Do you lack confidence in your own math ability? If this sounds like you, take heart: For example, can the child: Complete a geometric pattern or math pattern? Identify colors and shapes, numbers, and quantity? Place numbers in the correct order, such as smallest to largest? Compare objects based on size, shape, length, etc.? Because math is a multi-faceted subject, a child may be strong in some areas but have difficulty with others. In that respect, learning math is much like learning to read. Once you know where a child stands, play to his or her strengths while addressing the areas in which he or she struggles. While this can make screening for math disabilities and delays tricky, you may want to seek help and support if a child: Has difficulty with simple counting. Dislikes and avoids activities and games that involve numbers and counting. Research has revealed cultural differences in when â€” and how â€” children are exposed to early math concepts at home. Children who live in poverty are often at risk for poor math achievement and for low academic achievement in general. Look for ways to provide rich math experiences for children and to engage their parents as partners by sharing with them the math concepts your child is learning at school and encouraging them to reinforce that learning at home. Activities to help preschoolers gain math literacy What do we know about preschool students and math? You already know that preschoolers love to learn by doing â€” engaging their minds, connecting with their senses, and tapping into their enthusiasm. Research reinforces the value of letting them learn about math through hands-on games and activities they enjoy. One surprising research finding is that, while young children appear to learn to read best by mastering skills in an orderly, linear fashion e. In fact, some children seem to be able to understand and engage in certain math activities without first having mastered other, simpler counting and math-related tasks. Learn more about these research discoveries and insights. Below are some suggested activities to help young children learn and practice each of the core aspects of early math.

5: Early Math Matters: Preparing Preschoolers to Succeed

Teaching Math to Young Children The Institute of Education Sciences (IES) publishes practice guides in education to bring the best available evidence and expertise to bear on current challenges in education.

He marched into the center for scientific research in education and declared, "Children are visually illiterate! Although the Agam Program is long and involved, versions of the activities can be adapted for your work with young children. What follows are several types of activities that can be repeated with different shapes. Building Knowledge of Shapes Begin by helping children build a basic knowledge of shapes. Point out all the circles around you, such as plates or the tops of cans. Naming the shapes children see in their environment is important. Extend these experiences by running your finger around the objects while you say "circle," and talk about how it keeps curving. Ask children to do the same. When you are talking about triangles, talk about the straight sides and the sharp corners. Analyzing Shapes Next, involve children in analyzing objects and pictures in their environment by identifying their basic shapes. For example, they might: Find circles in picture books Go on a "shape hunt" and find all the rectangles in the classroom Look for shapes such as triangles or squares that you have hidden all around a room When you are teaching about shapes that are not as numerous in most environments, such as triangles or rhombuses diamonds , you can make copies out of cardboard or construction paper. Keep these available for later activities. Make sure you make different shapes and sizes. Children learn limited ideas about shapes unless we show them a variety of examples. For example, show a child a very simple picture, such as a line drawing, for only two or three seconds. Then cover it and ask the child to describe it. Continue to play this "flash" game with variations. For example, show a child one of three drawings that are very simple for two seconds. Then mix all three up and let the child find the one that you showed. Later, when you have worked with several shapes, and combinations of shapes, this can be fun and challenging: Combining Shapes As soon as you have worked with several shapes, combine these shapes in your activities. For example, after you have studied horizontal and vertical lines, examine pictures with children, such as city scenes, and invite them to find all the horizontal and vertical lines they can. Talk about the vertical and horizontal lines in your classroom, and how they combine to make different shapes and objects. For example, show a child a square you made with blocks or pipe cleaners. Then, challenge the child to copy the shape. Creating with Shapes Children should use the shapes you are working with to make their own designs and pictures. Soon after reproducing shapes, encourage children to invent their own ways of using the shape to make designs with pipe cleaners, buildings with blocks, and pictures with crayons. Supply children with a combination of different materials, such as small blocks, pipe cleaners, and paint. Remind children of the shapes you have explored. Then, give them the opportunity to use the materials to create the shapes in their own ways. Different materials encourage children to think about the shape in different ways. To make a square, you have to choose the correct number of blocks four equal lengths. Using pipe cleaners, you have to bend them "just right" to make the square corners. Why are we so confident that children will benefit from these activities in so many ways? Along with the Agam developers, we conducted extensive research on the program. Children showed gains in geometric and spatial skills. They showed pronounced benefits in math and writing readiness. They even increased their IQ scores. Children are better prepared for school-and life-when they can think about and use the tools of basic geometric ideas.

TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

6: Teaching Young Children | NAEYC

Teaching math to your children is as easy as 1+1=2. Go beyond pencil and paper to make math a learning experience that's fun for you and your kids. These quick and easy strategies help you teach your kids math and will turn them into mini mathematicians.

Preparing Preschoolers to Succeed By Kristin Stanberry For preschoolers in the United States, the pressure is on to learn math early and learn it well. The No Child Left Behind Act NCLB has put pressure on schools to make sure that all students are meeting state standards for achievement, and this has resulted in more rigorous math curricula and testing, starting in early elementary school. We can start by learning from some of the research studies on early math acquisition. And we must understand and respect how preschool students naturally explore and experiment with math concepts; with this insight, we can identify effective math programs and tailor experiences and instruction that will propel them towards success. Finally, math is best taught at both home and at school. The many dimensions of math Even for young children, math is more than just a numbers game. Math has many dimensions, including: Preschoolers learn math by exploring their world Much attention and research has been focused on early reading over the past few decades and researchers are now catching up to learn more about early math learning and instruction. For example, researchers have found that young children are, by nature, curious about math. They have good evidence that math becomes real to young children as they use it by talking, reasoning, playing, and doing. One somewhat surprising research finding is that preschoolers appear to learn math concepts and operations in a much less predictable sequence than they do when learning to read. Most young children acquire reading awareness and skills in a fairly linear fashion. Think of it this way: Imagine a tower of blocks, with necessary skills â€" like print awareness â€" providing a foundation on which to build other skills â€" like phonemic awareness. Early math learning, on the other hand, is more like assembling a jigsaw puzzle, with children mastering math concepts in no set sequence but still managing to assemble the complete picture over time. Learn more about these early math benchmarks. Keep in mind that a child may be strong in some aspects of math but have difficulty with others. Learn more about teaching preschool math. The power of a good preschool math program As states revamp their preschool math program requirements and schools look to strengthen math instruction for students across the grades, parents and educators can play an important role in ensuring that practices that have proven to be effective in promoting math learning are in place: Know what concepts and skills a child has already learned so that an effective program of instruction and support can be designed and implemented early in the preschool year. Children will need different types of instruction and support. Be sure to reinforce and practice math learning throughout the day, in school, at home, and in the community. Learn math by living math. Focus less on passive learning such as listening to someone explain and demonstrate , and provide lots of hands-on activities. Young children and older ones too! Use parent-teacher conferences to discuss strategies that have been successful in the classroom and talk about how these can be reinforced in everyday games and activities at home. Show me the research! Ask why the school uses a particular approach or set of activities to teach math, and ask whether it is based on the best available research. Math across the curriculum and throughout life Math is often treated as a one-dimensional subject that is separate from other subjects taught in school. Unfortunately, this is a common sometimes unconscious perspective among adults, including preschool teachers and parents. As a result, many preschoolers come to view math as something that has no connection to other school activities or to their daily lives. Another obstacle to teaching math to preschoolers is that many parents and teachers lack confidence in math, and some even suffer from math anxiety. Read it a new way: Ask the child questions about what they think will happen next and encourage them to tell you what they see in the illustrations.

7: Teaching Math to Young Children | FPG Child Development Institute

From Building Blocks (National Science Foundation), ideas for finding the mathematics in and developing mathematics from children's activities. 3. National Council of Teachers of Mathematics (NCTM) offers math standards, Principles and Standards for School Mathematics, and many activities, web-based software environments, and videos.

How Young Children Approach Math Mathematical experiences for very young children should build largely upon their play and the natural relationships between learning and life in their daily activities, interests, and questions. Passing by, her teacher inquires, "Where are the others? Exploring the Math in Play Children become intensely engaged in play. Pursuing their own purposes, they tend to tackle problems that are challenging enough to be engrossing yet not totally beyond their capacities. Sticking with a problem â€" puzzling over it and approaching it in various ways â€" can lead to powerful learning, in addition, when several children grapple with the same problem, they often come up with different approaches, discuss various strategies, and learn from one another. These aspects of play can promote thinking and learning in mathematics as well as in other areas. Young children explore patterns and shapes, compare sizes, and count things. But how often do they do that? When children were studied during free play, six categories of mathematics content emerged. One girl, Anna, took out all the plastic bugs from the container and sorted them by type of bug and then by color. Exploring magnitude describing and comparing the size of objects. Enumerating saying number words, counting, instantly recognizing a number of objects, or reading or writing numbers. Three girls drew pictures of their families and discussed how many brothers and sisters they had and how old their siblings were. Investigating dynamics putting things together, taking them apart, or exploring motions such as flipping. Several girls flattened a ball of clay into a disk, cut it, and made "pizza. Studying pattern and shape identifying or creating patterns or shapes, or exploring geometric properties. Jennie made a bead necklace, creating a yellow-red color pattern. Exploring spatial relations describing or drawing a location or direction. When Teresa put a dollhouse couch beside a window, Katie moved it to the center of the living room, saying, "The couch should be in front of the TV. We can see that free play offers a rich foundation on which to build interesting mathematics. These everyday experiences form the foundation for later mathematics. Later, children elaborate on these ideas. We call this process "mathematization. Play does not guarantee mathematical development, but it offers rich possibilities. Significant benefits are more likely when teachers follow up by engaging children in reflecting on and representing the mathematical ideas that have emerged in their play. Towers of Learning The benefits of block building are deep and broad. Children increase their math, science, and general reasoning abilities when building with blocks. Consider how block building develops. Infants show little interest in stacking. Stacking begins at 1 year, when infants show their understanding of the spatial relationship "on. At 2 years, children place each successive block on or next to the one previously placed. They appear to recognize that blocks do not fall when placed this way. Children begin to reflect and anticipate. At 3 to 4 years of age, children regularly build vertical and horizontal components within a building. When asked to build a tall tower, they use long blocks vertically, because, in addition to aiming to make a stable tower, their goal is to make a stable tall tower, first using only one block in this fashion, then several. At 4 years, they can use multiple spatial relations, extending their buildings in multiple directions and with multiple points of contact among the blocks, showing flexibility in how they build and integrate parts of the structure. Preschoolers employ, at least at the intuitive level, more sophisticated geometric concepts than most children experience throughout elementary school through block play. For example, one preschooler, Jose, puts a double unit block on the rug, two unit blocks on the double unit block, and a triangle unit on the middle, building a symmetrical structure. Consider a preschooler who is making the bottom floor of a block building. He lays two long blocks down, going in the same direction. Then he tries to bridge across the two ends with a short block. However, before he tries the short block again, he carefully adjusts the other end of the long block. He tries the short block. He quickly places many short blocks, creating the floor of his building. We learn a lot from this episode and others like it. Just as this little boy did, many children intuitively use the concepts of parallel and perpendicular. The boy even seems to understand-in his

actions-that parallel lines are always the same distance apart! We have observed other children adjusting two cylinders so that the distance between them just equals the length of a long block. They estimate how many more blocks they need to finish a surface. They estimate that eight blocks were needed if each of four sizes of a square are covered with two blocks. We know many math teachers who would be thrilled if their students showed similar insight into geometry, measurement, and number! Rhythm and Patterns Preschoolers also engage in rhythmic and musical patterns. They can add more complicated, deliberate patterns, such as "clap, clap, slap; clap, clap slap" to their repertoires. They can talk about these patterns, representing the pattern with words. Kindergartners enjoy making up new motions to fit the same pattern, so clap, clap slap is transformed into jump, jump, fall down; jump, jump, fall down, and soon, is symbolized as an AABAAB pattern. Kindergartners can also describe such patterns with numbers "two of something, then one of something else". These are actually the first clear links among patterns, number, and algebra. Children who have had these rhythmical experiences will intentionally recreate and discuss patterns in their own artwork. One 4-year-old loved knowing the rainbow colors ROY G BFV, for red, orange, yellow, green, blue, indigo, violet and painted rainbows, flowers, and designs that repeated this sequence several times. A researcher tells of visiting two classrooms in the same day, observing water play in both. Children were pouring in each room, but in one they were also excitedly filling different containers with the same cup, counting how many cupfuls they could "fit" in each container. The only difference between the two classes was that in the latter the teacher had passed by and casually asked, "I wonder which of these holds the most cupfuls of water? Materials such as sand and play dough offer many rich opportunities for mathematical thinking and reasoning. Teachers can provide suggestive materials cookie cutters , engage in parallel play with children, and raise comments or questions regarding shapes and numbers of things. For example, they might make multiple copies of the same shape in play dough with the cookie cutters, or transform sand or play dough into different objects. One teacher told two boys she was going to "hide" the ball of play dough, covering it with a flat piece and pressing down. The boys said the ball was still there, but when she lifted the piece, the ball was "gone. Children at first are unable to combine shapes. They gradually learn to see both individual pieces and a "whole," and learn that parts can make a whole and still be parts. By about 4 years old, most can solve puzzles by trial and error and make pictures with shapes placed next to one another. With experience, they gradually learn to combine shapes to make larger shapes. They become increasingly intentional, building mental images of the shapes and their attributes, such as side length and angles. Building Concepts With Computers Picture making with shapes can be done with building blocks as well as computer shapes. Computer versions have the advantage of offering immediate feedback. For example, shapes can be transparent so children can see the puzzle beneath them. In addition, children often talk more and explain more of what they are doing on computers than when using other materials. At higher levels, computers allow children to break apart and put together shapes in ways not possible with physical blocks. Computers can help facilitate play in other ways, too. The addition of a computer center does not disrupt ongoing play but eases positive social interaction and cooperation. Research shows that computer activity is more effective in stimulating vocalization than play with toys, and also stimulates higher levels of social play. Also, cooperative play at the computer is similar to the amount of cooperative play in the block center. Cooperation in a computer center can provide a context for initiating and sustaining interaction that can be transferred to play in other areas as well, particularly for boys. Dramatic Mathematics Dramatic play can be naturally mathematical with the right setting. In one classroom, Gabi was the shopkeeper. Tamika handed her a five card 5 dots and the numeral "5" as her order. Gabi counted out five toy dinosaurs. Teacher just entering the area: How many did you buy? How do you know? The play allowed her to develop her knowledge. She handed Gabi a 2 and a 5 card. You could give Janelle 2 of one kind and 5 of another. As Gabi counted out the two separate piles and put them in a basket, Janelle counted out dollars. Studies also show that if children play with objects before they are asked to solve problems with them, they are more successful and more creative. For example, one study with three groups of 3- to 5-year-olds asked them to retrieve an object with short sticks and connectors. One group was allowed to play with the sticks and connecting devices, one group was taught how the sticks could be connected, and one group was asked to tackle the task without prior play or learning. The first two groups performed similarly and achieved better

results than the third group. Often, the group that simply played with the sticks and connectors first solved the problem more quickly than the group that was taught how to use them. Mathematical Play This brings us to the final fascinating and usually overlooked type of play:

TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

8: Teaching Math to Young Children

How to Teach a Young Child Beginning Math Skills. Parents and older siblings can count somewhat as "The Count" does on Sesame Street. For example, you can help a child to count coins in order to spend them for a small treat, as part of.

He says to his teacher: Should she leave him to continue his observations unaided? Should she try to teach him about evaporation and molecules, simplifying the concepts as far as possible? Or should she do something else? How best to teach young childrenâ€”pupils in preschool, kindergarten, and the early gradesâ€”has long been a subject of lively debate. What do experts mean by this unwieldy phrase? We know, for example, that children aged 4â€”6 learn better through direct, interactive experiences than through traditional teaching, where the learner is passive and receptive. Further, the younger children are, the more what they learn needs to be meaningful on the day they learn it, not just in the context of some future learning. First, it is age-appropriate: Second, it is appropriate to the individual child: Teachers need to consider both dimensions, she says. She offers an analogy to choosing a toy for a 3-year-old. Given the diversity seen in any group of young children, attention to individual appropriateness is crucialâ€”yet too often neglected, Bredekamp says. This neglect occurs because the curriculum imposes a norm, and because teachers find it easier to plan to some predicted norm. Teachers must also consider all aspects of the child, experts advise. Instead, teachers must exercise their professional judgment, based on training and reflection. Over the past few decades, observers say, preschool classes and kindergartens have begun to look more like traditional 1st grade classes: Concurrently, teachers have been expecting their pupils to know more and more when they first enter their classrooms. Experts cite many reasons for this trend. Today, the urge to compete with Japan yields the same result, experts say. Another cause of the pushed-down curriculum is the widespreadâ€”yet incorrectâ€”notion that one can teach children anything, at any age, if the content is presented in the right way, says David Elkind, a professor of child study at Tufts University. In addition, more children today attend preschool, and preschools market themselves as academic, says Marilyn Hughes, an education consultant and veteran elementary teacher from Aspen, Colo. Some parents, too, favor the pushed-down curriculum in their zeal to give their children a head start in life. And, in general, Americans believe that faster is better. For one thing, giving children material far beyond what they can do is simply inefficient, says Elkind. Similarly, 4th graders typically need months to learn decimal fractions, whereas 6th graders can master them with far less effort. When young children are introduced to formal instruction too early, in a form that is too abstract, they may learn the knowledge and skills presented, but at the expense of the disposition to use them, Katz says. Further, when young children are repeatedly coerced into behaving as though they understand somethingâ€”such as the calendar or arithmeticâ€”when they really do not, their confidence in their own abilities is undermined, Katz says. And over time, children bring their behavior into line with this belief. Active Learning If traditional, lecture-driven teaching is not appropriate for young children, then how should they be taught? Therefore, the younger the learners, the more opportunities they need to interact with real objects and real environments. In a developmentally appropriate classroom, Bredekamp says, the teacher provides lots of organized activity. Children are actively involved in learning: Young children need hands-on experiences and social interaction around content, she says. In math, for example, students grasp concepts better when they grapple with real-life problems and work with manipulatives. Teachers must respect how young children learn best: Research shows that children learn to solve problems better when they work in groups, she says. So while some whole-group instruction may be useful, teacher lecture should not be the rule of the day. For the most part, teachers should avoid whole-group instruction, Katz agrees. So two-thirds of the children are wasting their time. Because children learn idiosyncratically, teachers need to provide a range of learning opportunities, says Judy Zimmerman, principal of Indian Fields Elementary School in Dayton, N. Therefore, the teacher must continue to provide opportunities for pupils to learn the concept. For young children, investigation is a natural way of learning; they make hypotheses all the time. To capitalize on this inclination, educators should consider how to provide contexts for worthwhile investigations. How, for example, could the teacher in the anecdote at the

beginning of this article best help her pupil investigate whether the fish in the aquarium were actually drinking the water? Appropriate Curriculum and Assessment for Young Children the source of this example , the teacher should enable the child to test his hypothesis. One excellent way to encourage student investigations is through the project approach, Katz says. Children should study real phenomena in their environment through in-depth projects that combine all the disciplines, she advises. Children in a small Vermont town, for example, investigated the question: The project lasted for weeks, and parents and businesses were involved. The children collected measurement devices and created an exhibit. Projects help children develop this ability, she says. Using Themes The traditional curriculum is fragmented, many experts complain. Teachers can avoid this pitfall by using a thematic approach, Rosegrant says. For example, a 1st grade class could study the five senses in language arts, science, math, and art. A thematic approach makes learning more coherent, Rosegrant says; it also makes the curriculum accessible to parents, who can reinforce learning at home. Her pupils take a field trip to a pumpkin farm; then they observe pumpkins in science, weigh and measure pumpkins in math, read about how pumpkins grow, and learn to cook pumpkin pie. Without a thematic approach, the curriculum may ask teachers to do some illogical things, Rosegrant says. As a kindergarten teacher, she was expected to teach about the moon, although teaching about the sun was reserved for 1st grade! The district has since moved to a thematic approach, she says. Learning Centers Many teachers of young children use learning centers to individualize instruction and to allow pupils some choice and control over their learning, experts say. In his rural Virginia classroom, Burchfield provides many learning centers, including areas devoted to art, math and science, a library, a computer, blocks, and a stage. Allowing his students some choice yields several benefits. His pupils also strive for quality, feel a sense of ownership, and have a tremendous sense of pride. Her own classroom featured 20 hands-on learning centers, which were run on student contracts. Some of the centers were set up for independent work; others, for pairs or small groups. Students could respond to the centers in a variety of ways: Hughes taught her pupils how to move independently through the centers, giving them a chance to pace themselves. It encourages curiosity, not rote learning, and it creates a sounder base of knowledge that is more retainable. The belief that developmentally appropriate practice lacks rigor is a misunderstanding, says Bredekamp. Skills are infused and taught in contextâ€”through project work, for example. Others, however, would prefer more emphasis on the direct teaching of skills. Donna Siegel, an associate professor of education at the University of Science and Arts of Oklahoma, is a stout supporter of teaching basic skills to young children, especially the disadvantaged. Children from middle-class backgrounds fare better with less direct teaching because their parents teach them basics such as the alphabet, she says. Siegel is concerned that an emphasis on allowing children to explore and discover may leave them unprepared academically. Further, adults can teach academics to young children without harming their disposition to learn, she believes. The teacher should explain in a step-by-step fashion, help pupils along, and keep them trying. She too is concerned about disadvantaged children, but she diagnoses their needs differently. In particular, they should be read to constantly. Too often, children who have not been exposed to literacy at home get only the alphabet and phonics at school, Bredekamp says. Children who are exposed to literacy in many ways outside of school can better weather a decontextualized skills approach, she says. Teachers must be experimenters, willing to try different means to reach a child, sensitive to the fact that children respond differently to materials and strategies. Making this shift is difficult for some veteran teachers who are used to being the focal point. Elkind, however, cautions that we must allow a wide range of teaching styles, because some teachers are more at home with direct instruction. Often, this preference is a matter of temperament, he believesâ€”not a reflection of training and habit. Some younger teachers prefer teaching in the traditional way, he notes. And some children need more structure. Child development needs to be seen as an integral part of education courses, says Shirle Moone Childs, director of curriculum and instruction for the Windham Public Schools in Willimantic, Conn. Better Assessment Like curriculum and instruction, assessment practices should be developmentally appropriate, experts agree. Children are not very good with symbols; they tend not to understandâ€”or followâ€”instructions well; and their mood can greatly affect their performance. Fortunately, there are many observational ways to assess children, Elkind says. Their use of language is very revealing, for example. Similarly, if they play games with rules, they have grasped syllogistic reasoning.

Teachers need to be close observers of young children, experts agree. Kindergarten teacher Michelotti says she devotes much of her time to observing and evaluating her pupils. Instead, she believes, the influence ought to flow in the opposite direction: Teachers do not collect exactly the same information on every child more is collected on children who appear to be having difficulties , but what is the same is standardized through a six-point scale. Instead, teachers must allow children to demonstrate their learning in a variety of modes. For example, after a science exploration on weather, children could show what they learned through writing, creating charts, or building a model.

9: Math Play: How Young Children Approach Math | Scholastic

Teaching through representation or pictures will allow children to make connections between the real world and the math skills that are vital for academic success. Without making a connection between life and math, children can become confused about the information provided in a classroom.

TEACHING MATHEMATICS TO YOUNG CHILDREN pdf

Corporate social responsibility in the Peruvian mining industry Sonia Meza-Cuadra 10. Daily examination of conscience 229 One God, Three Faiths Clouded titles mayday edition Childrens Liturgies Made Easy College algebra formula sheet Silas, the team player Facsimile title pages to accompany cataloguing monographs Core concepts in clinical molecular biology Determining your investing strategy Chava book file Introduction to data science with r garrett grolemund Life; The First Seventy Years 3 Pt. 3. Subject file (42 reels) Aint going to study war no more high voice Intervention in venous and arterial grafts Advertising and the Artist Ashley Havinden Lecture 25 uc davis physics group The theory of collective efficacy Monarchy and Religious Institution in Israel under Jeroboam I A crucible of souls An introduction to optimization fourth edition The Second Mrs. Giaconda Life and music of Pierre Rode, containing an account of Rode, French violinist Something big is happening to me, by W. Eastlake. Mary Todd Lincoln, presidents wife Staff attendance management system Tim berry lean business planning Dehydrating foods, fruits, vegetables, fish and meats Literature and the web Mind reach first edition The Taung Child : Rejection Wind turbine installation project report Introduction : the choice is yours Speaking the truth about economics Operative surgery Miss Clisbys romance. History of boy scout of the philippines Ies question papers with solution 2017 Forgotten Voices of the Falklands, Part 3 CD (Forgotten Voices/Falklands)