



Those Mysterious Montessori Materials

Addition With The Golden Beads and Stamp Game

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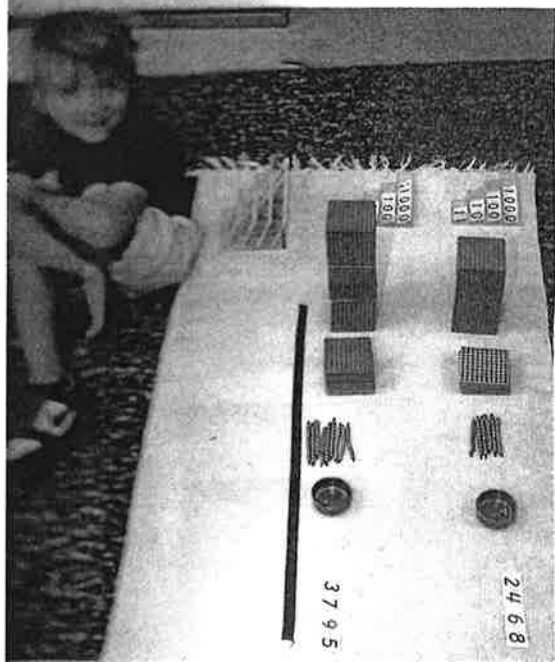
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ontessori children work with hands-on learning materials that make abstract concepts clear and concrete. The materials allow young students to develop a clear inner image of concepts in mathematics, such as value and the ability to conceptualize how big a thousand is, what we mean when we refer to the ‘hundreds’ column, and what is actually happening when we divide one number by another. This approach makes sense to children. Developed by Dr. Montessori over one hundred years ago, today’s research consistently shows that this ‘innovative’ approach, which is beginning to work its way into more traditional schools, works exceptionally well with most children.

As an example, let us consider the decimal system, which forms the basis of mathematics: units, tens, hundreds, and thousands. Normally, young children find it difficult to understand or operate with quantities larger than twenty. They cannot grasp the value of a hundred, thousand, or million ... much less the idea that one thousand is equal to ten hundreds or one hundred tens.

Montessori overcame this obstacle by developing concrete, tangible materials that not only represent the values, but are equal in scale, representing each value of the decimal system. Units are represented by single 1-centimeter beads; a unit of 10 is made up of a bar of 10 unit beads strung together; hundreds are squares made up of 10 ten-bars; and thousands are cubes made up of 10 hundred-squares. Each one of these corresponding materials is presented to the child in a manner that shows how ten of each is equal to one of the values of the next place value: 10 units are equal to 1 ten; 10 tens are equal to 1 hundred; etc. Furthermore, because the corresponding values are constructed from smaller values, they are to scale in weight and size.

Together, they form a visually and intellectually impressive tool for learning. Great numbers can be formed by very young children. Able to identify each value and its corresponding bead material, the pre-school age child can actually build numbers by playing the *Bring Me Game*. “Please bring me 3 thousands, 5 hundreds, 6 tens, and 1 unit.”



Working with his teacher, this young man (pictured above) has chosen to construct and add two quantities of Golden Beads. The first is made up of 2 'thousand' cubes, 4 'hundred' squares, 6 'ten bars,' and 8 'unit' beads, equalling 2,468. The second is made up of 3 'thousand' cubes, 7 'hundred' squares, 9 'ten' bars, and 5 'unit' beads, totalling 3,795.

The two addends are placed on a rug with their corresponding numeral cards. Both number and material are named and created with the thousands (or highest place value) on the left. Right from the start of their education, Montessori children learn the concept of the units (ones), tens, hundreds, and thousands columns, and the way to read such large numbers.

From this foundation, all of the operations in mathematics, such as the addition of quantities into the thousands, become clear and concrete, allowing the child to internalize a clear picture of how the process works.

Often, two children will work together to construct and solve a mathematical problem. Using sets of numeral cards, each will collect a quantity for addition by deciding how many units, tens, hundreds, and thousands will be in his or her addend.

The corresponding cards themselves follow a color code in which

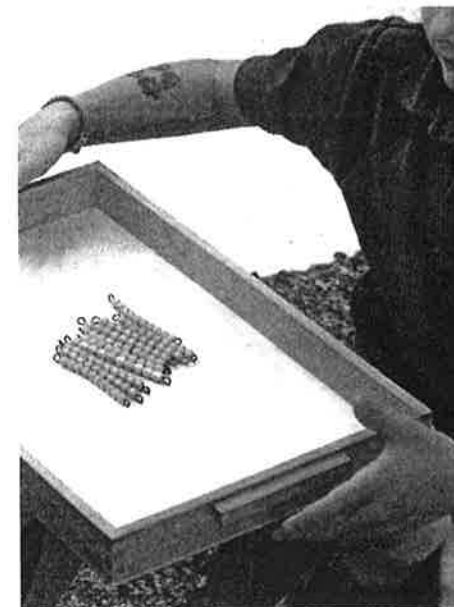
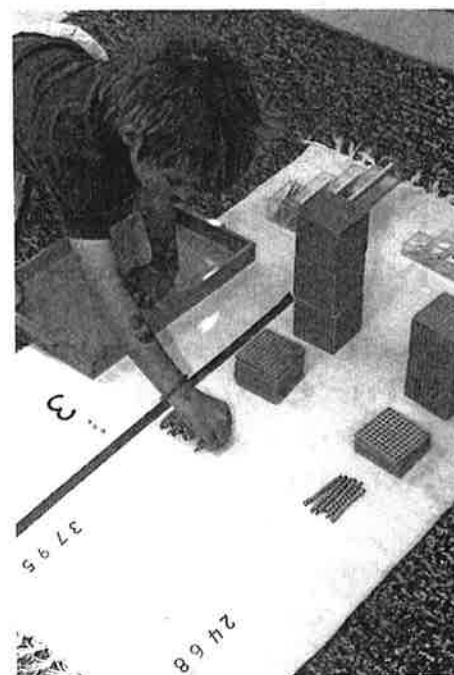
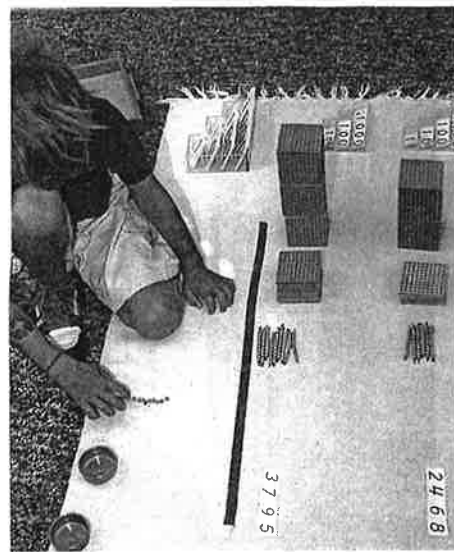
the cards, showing the units 1 to 9 are printed in green; the cards showing the numbers from 10 to 90 are printed in blue; the hundreds from 100 to 900 are printed with red ink; and the cards showing the numbers 1,000 to 9,000 are printed in green again because they represent units of thousands. As the child progresses in arithmetic, this color scheme continues into the millions, each hierarchy (or family) is represented by the green of units, blue of tens, and red of hundreds.

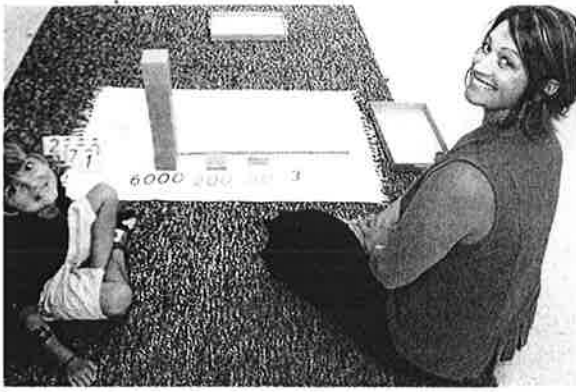
As the children construct their number, they will decide how many units they want in their number, find the corresponding cards that represent that quantity, placing the created number at the upper right-hand corner of their work space. Next, they go to the 'bank,' or central collection of Golden Bead material and gather that number of unit beads that corresponds with the numeral cards selected. This process is repeated with the tens, hundreds, and thousands. By doing this, they are not only becoming familiar with place value and developing the skills of naming numerals, but they are developing the deeper understanding of the value of thousand, hundreds, tens, and units.

Next, the two addends are combined, which we call the operation of addition. Beginning with the units, the children count the combined quantities to determine the result of adding the two together. If the result is nine or lower, they simply find the large numeral card that represents the answer.

As the children count, if the quantity in the column is ten or greater, they stop at the count of ten and exchange them for the next highest quantity. For example, in this case, when the units from both addends were combined, we had 13 units. The child gathers 10 units and carries them back to the bank to exchange them for a ten-bead bar: 10 unit beads is equal to 1 unit of ten. He has also used the large number cards to show the remaining number of units, which is 3.

This process is repeated with the ten's column. Here, for example, we



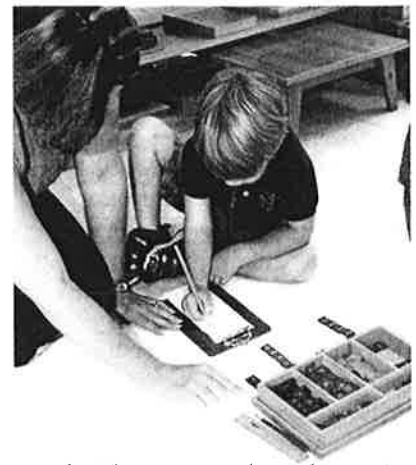
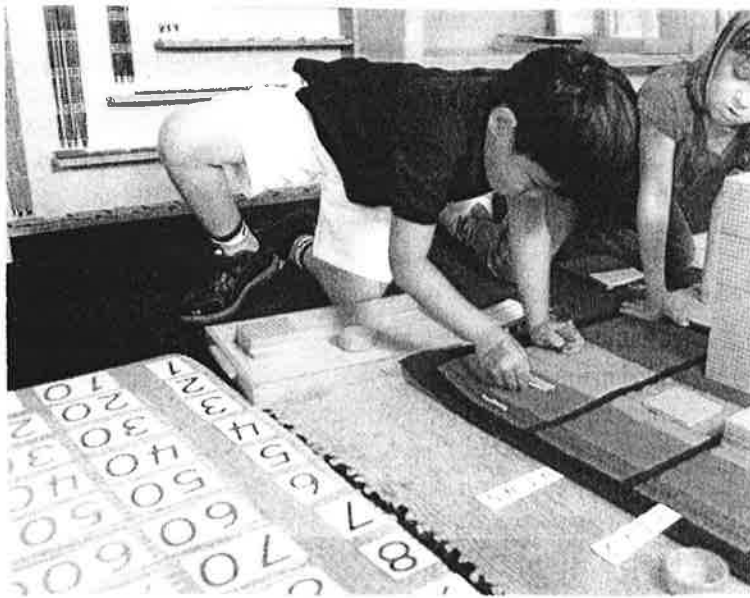


added 6 tens and 9 tens, plus the additional 10 that we carried forward. This gives us 16 tens. Our young friend gathers 10 ten-bead bars and takes them to the bank to exchange for another hundred square, which he places in the hundreds column. Finally, the child selects the correct numeral card to represent the total of the remaining ten bars, which is 6 tens.



The process is continued with the hundreds and thousands. Helping the children to understand that 10 tens is the equivalent of a hundred leads Montessori students to more easily grasp complex concepts in the addition of large quantities, subtraction, multiplication, and division. When everything is done, the children have their answer: $2,468 + 3,795 = 6,263$.

Notice how the cards increase in length as we grow from units to tens, then hundreds, and thousands. When the cards are laid down with the thousands on the bottom, each of the columns is shown in the answer: 6 thousands, 2 hundreds, 6 tens, and 3 units.



sands. This same color scheme is used with Montessori materials that the children will use later to find square roots and in the study algebraic concepts.

The students will perform the same operation as they did with the Golden Beads; however, because the stamps are the same size, this requires more abstract comprehension of the material. They can use the Stamp Game on a smaller work space, creating both addends and then adding them, exchanging when the number of each place value is greater than nine.

Like the Golden Beads, the children create the first addend with the stamps, starting with the units and proceeding with the tens, hundreds, and thousands. After they have created their first addend, they build a second addend, leaving a space to clearly separate the two addends. Once the two numbers are created in two columns for each place value of each addend, they are pushed together to make one value, representing the sum of the two addends.

Starting with the units, the student counts the stamps, recording the number. In the example shown, there were 10 units of tens, which need to be exchanged for 1 unit of a hundred. This yields a total of 9 hundred tiles in the hundreds column.

By this stage, in addition to constructing the answer with the number cards, most children will also record their work on large square graph paper. The final sum of $2,468 + 3,795 = 6,263$.

School Success Starts Early

Getting Kids to Relate to Their Teacher Is the Best Strategy

In my work with kids and teachers over the years, I've witnessed the many benefits of healthy student-teacher relationships. Establishing a connection between your child and his or her teachers is key to success in school and throughout life.

Regardless of a child's scholastic abilities, parents can show him or her how to get along with teachers. Before your kids start school, give them a powerful advantage over other children by teaching them the following practical, easy-to-learn skills:

Tip 1: Smile and say "hello" to your teacher everyday.

Kids who greet their teachers with a smile and a warm "hello" every morning usually have fewer problems with their teachers throughout the day. It is important, however, for parents to help their kids understand it is necessary to not overdo it. Try practicing with your child.

Tip 2: Pay attention to your teacher. While your teacher is talking, look him or her in the eyes, smile, and nod.

Love and Logic parents know that helping their child relate to teachers will increase the child's interest in what is being taught. One parent I know had a daughter who experienced difficulty paying attention in class.

After the parent suggested looking at the teacher, smiling, and nodding, she became more engaged in her learning and was better prepared to ask questions about the lessons.

Teachers enjoy working with children who are interested in learning. Students who are attentive and "encourage" their teachers during the lesson have an advantage

over those who do not. In addition, these children will be more comfortable approaching a teacher with any concerns they may have.

Tip 3: Raise your hand periodically to ask a question about the lesson.

A child who asks questions shows the teacher he or she is paying attention to the lesson being taught.

Tip 4: Say "please" and "thank you."

It is important for parents to model good manners. At the Love and Logic Institute, we've found that children learn much more from our actions than from our words. What we say in front of our kids is more important than what we say to them. For example, when your child is nearby, you might say to your spouse, "I sure do appreciate all of your help today around the house. Thank you so much."

Kids who use these skills in school will have an advantage over kids who do not. These skills also will carry over to the workforce, which will give children an advantage over others throughout their professional lives.

One student I know suffered from significant learning problems. Many people thought he would not be successful in his professional life. Much to their surprise, however, he went on to have a wonderful career and did better than kids who were much "brighter," because his parents taught and reinforced good relationship skills over and over again.

Don't wait! Start using these Love and Logic techniques and join the thousands of parents who are raising successful, responsible kids.

*People who are really successful implementing this skill purchased *Raising The Odds for Responsible Behavior**



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