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SAINT MICHAEL

Messenger

SAINT MICHAEL SCHOOL
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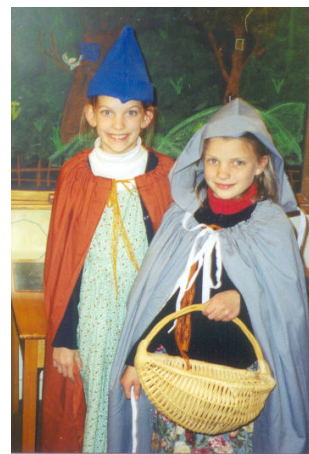
Teaching Math

Engaging the Heart, Mind, and Will of the Young Student

In our efforts to develop a curriculum which strengthens and nourishes all the powers of the soul—mind, heart, and will—we have realized that lessons designed to engage all three powers are the most effective. These are the lessons from which the children learn the most and that they enjoy the most. This has been especially true in teaching mathematics, a subject that is too often taught in rather abstract terms.

In designing the math curriculum, we have taken seriously the fact that young children think in a very literal and concrete way. Their powers of abstraction have not yet developed because of their age and limited life experience. They are, however, very eager to *do* something (the will) and to open their hearts to new experiences. We also had to take a fresh look at the nature of mathematics.

Mathematics is not just about adding or subtracting numbers. Mathematics is a non-verbal language which attempts to describe our experience of space, pattern,



Juliana Woolums and Xenia Hoffman dressed up to enact math story problems.

rhythm, weight, sequence, and motion just as our verbal language attempts to describe our thoughts, feelings, ideas, etc. Mathematics is a study of relationships, as well as the rules and computations necessary to accurately express those relationships.

From Concrete to Abstract: Learning Math Fundamentals through Stories and Use of Manipulatives

Most people now acknowledge the importance of telling and reading stories to their children as one of the ways in which children gain a foundation for the more formal instruction of reading and writing. Through stories, children actually gain experiences. Through these early experiences, children absorb an understanding that those funny marks on the page mean something; that there is a pattern to them. They form pictures of the real things or people in their minds when words are spoken. A similar process happens with mathematics. Children need opportunities to experience what the language of math attempts to describe. Acknowledging the importance of experience, especially with young ones, we strive to follow a principle we call “*From the concrete to the abstract.*”

In real life we are not faced with numbers unrelated to an actual situation. Life presents us with real situations to address. Therefore,



Theodore Killinger and Juliana Woolums create a chalkboard drawing of a math story problem with a woodland theme.



“From the concrete to the abstract.” These colorful, wooden blocks represent thousands, hundreds, tens, and ones, and are used to solve math problems that afterward can be converted into written mathematical equations.

math should be taught through story problems, which are simulations of actual experiences. The situation (concrete) comes before the mechanics of arithmetic (abstract). If the math story is simple enough, children take part in it just as they place themselves into any story. Children also need objects which they can handle as they are being taught the basic arithmetical processes. Arithmetic textbooks often have pictures to help children understand, but pictures are only a little less abstract than raw numbers. Objects that children can hold in their hands and move around as they solve a math problem engage their will and thus help deepen their understanding. If children are simply taught the mechanics of the four basic processes without multiple opportunities to experience these processes with concrete objects, their “knowledge” often remains very superficial. Children need to understand the reasons, not just memorize the rules of mathematics.



A really big math problem worked out on the floor using manipulatives.

There is nothing wrong with a page of math problems to provide practice in the mechanics of arithmetic, but it is not these pages that give a child an understanding of arithmetic. This is because the numbers on a page of problems have no reality of themselves. They are symbols (abstractions) of real things (concrete). Mechanical knowledge alone can create a stumbling block to real understanding. A child may think that he knows what he is doing, but not know why he is doing it. A child may know the mechanics of borrowing in subtraction, but not know why he is “reducing the number in the tens place by one and adding ten to the units place.” We have known children who can readily perform the mechanics of addition or subtraction if given a problem on the blackboard, but are lost if asked to solve a story problem. Children who know only the mechanics often have trouble in math later on when real understanding is demanded.

Engaging the Heart in Teaching Math Fundamentals

If manipulatives can be used to engage the will in the teaching of math, what can be used to engage the feeling? How can we generate



Mr. Minus Mouse and Paddy Plus the Beaver with their acorns and twigs.



The wise owl, Daniel Division, with King Equal.

a response from the heart? We decided to draw upon the power of imagination and the natural love that children have for animals.*

The Stories of Paddy Plus the Beaver and Her Woodland Friends in the Land of Numbers

In order to present the four basic operations of mathematics (addition, subtraction, multiplication and division), we have developed four animal characters, each representing one of these processes. Through puppets and stories the children learn about their individual personalities. Paddy Plus the Beaver, who is slow, methodical and very accurate, represents addition; Mr. Minus Mouse, who represents subtraction, is generous and loves to give things away. He is one of the children's favorite because he is also absent-minded and tends to lose

*St. John of Kronstadt writes in *My Life in Christ*, "images are a necessity of our nature." St. Theophan the Recluse, in his book, *The Path to Salvation*, calls the imagination and memory the transition points between the body and the soul and notes that our first impressions remain deeply imbedded in the memory. He goes on to say that "the first food for the formation of the soul is from the senses through the imagination."

things. Peter T. Times, a rabbit, thinks Paddy is much too slow and would rather multiply than add. Daniel Division, the wise owl, teaches the young animals how to share and thus represents division. Chatty, the Squirrel, who has various size storehouses, helps us learn about place value. The children have told us that Daniel is the wisest because, as a bird, his kind was created on the Fifth Day of Creation, a day earlier than the others.

As the children are introduced to each of the characters, they create large crayon drawings of each, make up many, many math stories concerning their life in the forest, and work out each story with manipulatives. At first, we use natural materials such as filberts, apricot pits, or short (2 in.) sticks for manipulatives. These have worked well because they are just the items you might expect the animals to have.

By presenting the four basic mathematical operations in this way, what we teach them becomes heart-felt understanding, not just superficial head knowledge. The children's enthusiasm, joy and openness to the characters actually prepares them to receive the mathematical instruction the characters symbolize.

It is significant that this correlation between our emotions and learning can also be seen physiologically. The part of our brain that is concerned with emotional responses is immediately adjacent to parts crucial to memory.

As the children progress, we use specially dyed wooden blocks as manipulatives which allow us to demonstrate carrying, borrowing and two-place multiplication. We will write about this next step in a future *St. Michael Messenger*. †

We have produced two booklets that include the stories and crayon drawings of the characters, and much more detail than we can give in this newsletter. These will be available in the near future.



Mr. Minus Mouse

*Timid Mr. Minus Mouse
Bringing goodies to his house
Dropping, losing all the way.
“Oh, dear me,” is all he’ll say.*



Student Reports

My Trip to Taiwan

By Theodore Juu-en Killinger

My family and I went to Taiwan, and we visited a lot of different places that we liked very much. We visited our relatives and our friend's shrimp farm. Our friends took us up to the mountains where we spent the night. We also visited an Orthodox priest in Taipei and attended Divine Liturgy. I really enjoyed the trip and learned a lot from it.



Theodore and his sister, Eugenia, show a map of Taiwan and places they have visited.



Theodore demonstrates a spinning toy from Taiwan that whirrs when set in motion.



Eugenia plays a Chinese stringed instrument.

Student Reports



Our Voyage on the Hawaiian Chieftain

By Eugenia Killinger



Our voyage began on May 29 at 1:00 after a lunch in Sausalito. It was by God's providence that the day our school arranged to sail was the feast of St. Brendan the Navigator. After receiving some rules and safety instructions and a little history about the Chieftain, we boarded the ship.

The Chieftain is a square rigger ketch. It has two masts, the foremast being the larger. A schooner, however, has the larger mast aft. The Hawaiian Chieftain was built in Hawaii in 1988. She was made for trading purposes but was not fit for the job. Now she belongs to people in San Francisco. Made of metal with wood trimming, she's about 103 feet long.

The Chieftain has a motor, which we used to get us out of the harbor. Once we were out of the harbor it would be up to us and the wind to drive the ship forward. We learned different commands for raising and lowering sails. We learned how they could calculate how many knots they were going in the olden days. We even were allowed below deck in the captain's quarters, where we learned a bit of history. We sailed to the Golden Gate Bridge and back. Each of us was able to take the helm, responding to the captain's command.

It was a great experience! We sang sea shanties and used our senses to take in the atmosphere. We felt the sea air on our faces and the rocking of the ship. We smelled the salt sea air and heard the creaking of the rigging. St. Brendan really blessed us with a safe and wonderful voyage.



Favorite Poems

Poetry recitation is a part of each day's beginning. Here is one of our winter favorites.



Wet-Weather Talk

By James Whitcomb Riley

It hain't no use to grumble and complane;
It's jest as cheap and easy to rejoice. –
When God sorts out the weather and sends rain,
W'y, rain's my choice.

Men ginerly, to all intents –
Although they're apt to grumble some –
Puts most theyr trust in Providence,
And takes things as thy come –
That is, the commanality
Of men that's lived as long as me
Has watched the world enough to learn
They're not the boss of this concern.

With *some*, of course, it's different –
I've saw *young* men that knowed it all,
And didn't like the way things went
On this terrestchul ball; –
But all the same, the rain, some way,
Rained jest as hard on picnic day;
Er, when they raily *wanted* it,
It mayby wouldn't rain a bit!



In this existunce, dry and wet
Will overtake the best of men –
Some little skift o’ clouds’ll shet
The sun off now and then. –

And mayby, whilse you’re wundern who
You’ve fool-like lent your umbrell’ to,
And *want* it – out’ll pop the sun,
And you’ll be glad you hain’t got none!

It aggervates the farmers, too –
They’s too much wet, er too much sun,
Er work, er waitin’ round to do
Before the plowin’ ‘s done:
And mayby, like as not, the wheat,
Just as it’s lookin’ hard to beat,
Will ketch the storm – and jest about
The time the corn’s a-jintin’ out.

These-here *cy-clones* a foolin’ round –
And back’ard crops! – and wind and rain! –
And yit the corn that’s wallerd down
May elbow up again! –
They hain’t no sense, as I can see,
Fer mortuls, sich as us, to be
A-faultin’ Natchur’s wise intents,
And lockin’ horns with Providence!

It hain’t no use to grumble and complane;
It’s jest as cheap and easy to rejoice. –
When God sorts out the weather and sends rain,
W’y, rain’s my choice.



The fruit of their labors. The Third Grade made delicious cinnamon rolls from wheat they sowed, reaped, and ground into flour.



The olives harvested last fall are finally cured, bottled and ready to eat.

ST. MICHAEL SCHOOL is a ministry of the Holy Dormition Orthodox Church, Santa Rosa, CA, under the Bulgarian Eastern Orthodox Church, and His Very Most Reverend Metropolitan Joseph of the Diocese of U.S.A., Canada, and Australia. Fr. Dcn. James Hughes, Headmaster, Tel. (707) 545-0861, e-mail: jkhughes@infostations.com.