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ABSTRACT

The objective of preschool teachers should be to determine the mathematical ability of preschool children and improve their skills using meaningful teaching methods through pictorial demonstration and manipulative models. Children who receive number concept instruction through hands-on play models, activities, and discussion show greater understanding in math skills. Teachers should be striving to create a learning environment for their students and help them fulfill their needs through their playful activities. This paper discusses how to integrate math activities into preschool classrooms. (ASK)

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"Eyes to see and ears to hear

Teaching math in the childhood years"

Integrating math in children's learning centers

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Snack time is always enjoyable at our Happy Times Preschool Center. As we started having fun in counting the cookies on the plate, Cindy requested for half a cookie. With a plastic knife, I helped Cindy cut the cookie into two equal pieces. So, our math class began with Cindy's one-half cookie. Then I asked others if any one else wants the other half. Blair, who just turned three, raised his hand to make his claim. Emma's mother had brought a cheesecake for us and we all agreed that each of us should have a slice of it. I cut the cake in twelve pieces, and then we tried to figure out how could we all have equal pieces of the cake? We counted that there were six of us sitting for snack with twelve slices of cake. Tom, another three-year-old volunteered to answer. He said, "we all should have one each and then see if someone wants more." We all agreed on Tom's good idea. To make the children think more, I asked that if all of us want more, then how could we all have equal share? "Hmmm, that's interesting", says Kathleen. Through our discussion, the children tend to learn a lot of math skills. Another time, during our lunch, I brought a whole pizza and few slices. After asking the children to point out which is a whole pizza and which is a piece, I found that ninety percent of the children understood the meaning of a whole pizza and a piece of a pizza. When children converse with each other, I observe and record their views. I found that 80% of the children understood the concept of "whole" and "piece" but only 50% understood "one-half". When I deliberately make mistakes, 50 % of the children could identify my mistakes. Children, who needed more help, I show them different objects, and try to build their concepts. Through our discussion and from each other children learn a great deal.

Its' simply amazing how little objects or playful activities can help children learn mathematics. The approach is simple, effective, and fun filled. On the other hand, if teachers were to teach mathematics in a rigid format, it would be regimental and boring. In my preschool classroom, math was always taught through playful activities. The purpose is to develop an interest in math among the children and make them more inquisitive towards problem solving situations. When a child asks for a piece of cookie, or a piece of a cake or a slice of an apple, it is the child initiated approach, and I facilitate their learning process by allowing them to carry on the discussion. This helps create a learning environment, and that's how the children learn math in my classroom. Often, I will have a child at my table during snack time; he or she will be shy and does not want to talk much. I do not force the soft-spoken children to speak out, rather they learn even by being a silent participant. Children observe, and even if they do not speak out at that moment, their communication at a later time reflects their understanding of the concept that was discussed at the table. Hands-on learning assist them in understanding the concept better than going through the books or learning by looking at the math chart.

During the early years of life, children play with concepts of size, number, shape and quantity. They discover that objects exist, can be moved, and can be fitted together. As they acquire language, children begin to make statements indicating their knowledge of mathematical concepts. Parents and teachers must appreciate the efforts that children make.

Math activities are constructed based upon the theme that we choose. It is flexible and situation dependent. Choosing a theme helps form a story as well as getting children's attention, and there are different themes to choose from. If the theme was on milk, initially, I would show them the pictures of cows, and have the children count the number of cows who would provide the milk. Then, we constructed a math puzzle by placing three empty glasses on the table. In the first glass, I poured the milk up to the brim, the second glass got half-filled, and the third remained empty. Now, I would ask the children to identify which glass was empty, which was full and which was one-half full. All children understood the meaning of "full" and it's pictorial representation. When the concept of "empty" was focused, 80 % of the students understood and only 20% did not understand. More than 60% of the children failed to answer

correctly on "half". Through our interaction and the responses given by the children, number counting, and the mathematical fractions were learned.

Another interactive event that children enjoy is the circle time. The theme may be grocery shopping. We would talk about making a grocery list if we want to buy certain item for our next day's shopping. We talk about how many items we need to buy, and how much each of those items we should buy so that it is enough for everyone. I always allow children to take active participation, and that is how our 4 and 5 year olds at our Preschool know what to do the next day. Children get very excited if they play an active role right from the very beginning of the project.

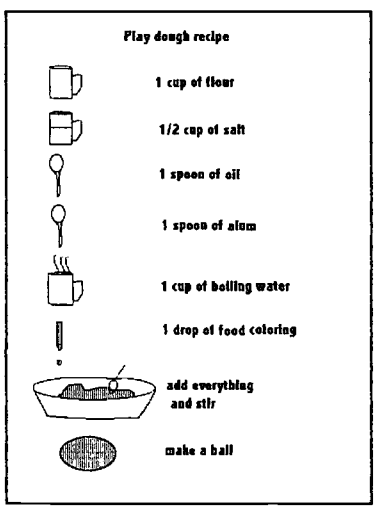
We also talk about different shapes and sizes using blocks and then we look at different objects in the room to identify the shapes and the sizes. Measuring tapes also create fun activities. The children would use them in the block area to measure blocks. Children also measure blocks with another block and compare which is longer than the other, or which one is thicker than the other etc. While working at the art area, I hear children often saying, could pass me that shape that looks like a circle..."

We also have a math area where different types of activities with manipulative are done. One of the activities involves 3 transparent plastic cups. I keep one cup empty, the second is half filled with dried beans, the third cup is full of beans. Then I asked the children to show me the cup that has more beans than the half-full. Most of the children do not have any difficulty in understanding either "full" or "empty" and the children understands the concept of "little" but they are not at all comfortable indicating what's "less" or "more" or "one-half". However, with a little help it is possible to give them a direction so that the children could understand on their own. So, I would fill the empty cup, took all but a few out of the half- filled cup and made the full cup one-half full. Then I ask the children to point out the cup that had "little". Lastly I would ask any of the children to make a cup "full" of beans, make a cup "empty" and also to make a cup have "lesser" beans than the "full" cup. This helps children create their own one full cup of beans, an empty cup and on-half cup of beans. Thereby the concept is learned by doing instead of just watching some one doing it.

Most of the time, I would set up the area with picture direction with few words that children

could perform the activities on their own. They would also play the domino game that gives them the opportunity to learn math through play. Sometimes, the math books would fascinate them. One of their favorites is the "The very hungry caterpillar" by Eric Carl. They count the apples or the pears that the caterpillar ate before it had the upset stomach. Children need some fun themes in their learning activities. Our play center also has computers. These classroom computers have some software programs that facilitate math learning. Examples of the software that we have in our classroom are "Math Rock', "Math Bluster" etc. Children play on the computers individually or with partners. I make sure that one of the teachers is around to help the children if they have any questions.

Our cooking activities or making play dough also involves math. I usually make a picture recipe, which I laminate for further use.



Since it is in pictorial format, it is easy for children to follow. They measure the number of spoons and the number of cups as identical to the picture recipe. A teacher supervises the activity and helps the children as needed. Once the play dough is made, the children makes smaller ball from the dough, count them and again create even smaller bean like balls. Sometimes they would create shapes and relate them to various objects.

The dramatic play area also sets up a stage for creating various math activities. Children get very excited and get busy in the dramatic play area. When children play "restaurant game", I see children in chef's cap, counting how many items they need to make in the kitchen. They would go on a shopping trip to buy the list of items they need to make the food in the kitchen. They also take orders from their customers, give them their bills (usually scribble in a piece of paper), take fake money from the customers, pretend to calculate the price and give back the change (sometimes all the money). When calculating the price, children will often have confusion and argue among themselves as no one seems to agree on the pricing. I take the opportunity of this moment and

teach them simple addition and subtraction. Children would also use calculator from time to time. Sometimes, I observe at a distance and sometimes I participate in their play.

Children love to play using the water table or the sand table. Most of the times, children use the water table to bathe the animals. I place some measuring cups in the water table and encourage them to use those. They would count the number of animals that will be getting the bath for the day. The other day I found Jennifer hiding an animal in the sand and asking Charles to re-count the number of animals. Charles counted four animals, which was one less than what he previously counted. He found that the green turtle was missing. So, Charles asked Jennifer, if she would know where the turtle went. Jennifer gave a clue, saying; " Charles, touch the sand to see if you see the turtle". When Charles could not find the turtle that Jennifer hid, Jennifer came and checked with me if it was all right to hide an animal in the heap of sand. Then, she helped Charles to dig out the turtle from the sand. This interactive moments create fun and help children understand math in a playful way. When children are playing at the sand table, sometimes I would show children the four pictures that I laminated on a poster board. The first picture was of a girl with a bucket of sand, the second picture depicted a truck full of sand, and the third picture showed a child playing with a heap of sand enclosed in a squared area and the fourth picture was of a man with a cart full of sand. The children were asked to show the person having "little" sand. Most of the children understood the concept of "little" quantity. Similarly I showed the children different pictures where they had to compare quantity. However, when the children were asked on the degree of comparative analysis (for example, identifying the picture where dog had "lesser" food than the cat, or a child having "more" cake than the other), over 60% of the children failed to answer correctly. The children who had difficulty, I showed them two containers, one having more sand than the other, and most of the time looking at real objects helps.

Sometimes, I would ask children playing at the sand table to categorize different types of objects. The children would classify household animals, the animals living in the forest, and the animals that live in the water. Once it happened that Maria, a four-year girl, found a water animal in the sand table and wanted to put it back in the water table. I agreed to her request and we had a discussion in the circle time,

about Maria's concern. I always choose the toys before displaying them in the respective areas.

Often children would fly kites outside the classroom. Once, Angelo, looked up and said, "Look, look, Charles' kite is flying higher than mine". It is quite amazing to see that my preschoolers could notice and then relate which kite is flying higher than the other. It is the activity that propels their mind to analyze and make statements of such kind.

Through my experience, I noticed that children who received number concept instruction through hands-on play models, activities and discussion, showed greater understanding in math skills. I believe that children learning the concept of numbers through a meaningful way would gain a broader understanding of math skill than the children learning the number concept in an abstract mode of understanding. The activities we construct for the children at the child center, are not merely focussed on having fun at the center, but to create a learning environment and how the children spend their time in nurturing their inquisitive minds.

The objective should be to determine the mathematical ability of pre-school children and improve their skills using meaningful teaching methods through pictorial demonstration and manipulative models. It was quite interesting to note that when the children were shown pictorials or when manipulative methods were used, they were more interactive in their approach and demonstrated their ability in learning the concept easily. Children are the focus of these learning centers, and their minds are like cobwebs, very fragile but always working towards some conclusión. Like Angelo, who pointed out that his kite was flying higher than Charles's, there are little Angelos, cheerful Marias, or ever-inquisitive Emmas around the world whose imagination soar higher than the kites in search of the answer they want. As teachers we should be always there to create a learning environment for them and help them fulfill their needs through their playful activities.

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