
UNIT 5 LEARNING TO COUNT

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5.1 INTRODUCTION

Most of us, when planning the first mathematical experience for three-year-olds, think in terms of helping them memorise numbers from 1 to 20. We also teach them to indicate numbers upto 10 by using their fingers. The next step that we wish the children to master, and master very soon, is being able to write and recognise numerals. (We do not really bother about whether it should be writing first and recognising later, or vice versa, or both together !)

Once the child has memorised 'one to twenty', we like to show off to relatives and friends how well she can count. We sit back and listen proudly as she 'performs' in front of this audience. But did you notice the terrified glance she stole at you when, in the middle of her 'performance', she could not immediately remember what comes after 'six'? And the relief on her face when she tentatively whispered 'seven', and you nodded your head vigorously in approval? For you it was another successful performance, for the child another ordeal over.

Having 'taught counting' in this repetitive, monotonous and drill-like manner, we continue in the same fashion with addition, subtraction, multiplication, division, and later, fractions and decimals. Having successfully separated joy from the process of learning, is it any wonder that children fear mathematics, feel it is tough and wait longingly for their maths class to end? Perhaps children's thoughts, when experiencing mathematics in this joyless and dull way, far removed from everyday life, are something like this :

"There goes Mummy again! Just when I was having fun playing in the sand, she wants me to make these drawings in the copybook. She calls them 'numbers'..... I don't mind drawing, but she asks me to repeat the same one again and again on the whole page, and gets angry if I change it a little..... I hope Aunty won't come today. It is boring when Mummy asks me to "tell her 1 to 20". Why can't I say 'seven' before 'five', or 'two' before 'one'?..... Playing in the sand is more fun. But Mummy says that is wasting time..... There she calls me again. I must run, otherwise she will ask me to write two pages instead of one!"

If you have ever wondered why children have such difficulty with learning how to count, and how you can help them with it, then reading through this unit may help you.

Objectives

After studying this unit, you should be able to :

- explain the processes involved in counting;
- explain why the ability to recite number names is no indicator of the child's ability to count;
- plan and carry out activities to strengthen children's abilities of classifying, seriating and setting up one-to-one correspondences;
- plan and carry out activities to help children learn how to count.



Fig.1: Can Mini count ?

5.2 WHAT IT MEANS TO COUNT

What do we understand by "being able to count"? Think about the following situation before you answer.

Example 1: Three-year-old Mini could recite numbers from 1 to 20 in the correct sequence. Once, her grandmother asked her to get twelve buttons from the heap of buttons lying in the drawer. Mini 'counted' till 12 as she picked up the buttons and handed them over. Her grandmother counted the buttons. There were seven in all. She asked Mini to check whether she had really given her 12 buttons. Mini 'counted' again and said, "No, they are fifteen."

- ? Do you think Mini knows how to count? (Remember, she can recite number names in correct sequence from 1 to 20.)
- ? Why do you think Mini could not pick up twelve buttons correctly?

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Having reflected on these questions, try out the following activity with a four-year-old child in your family or neighbourhood.

- E1) Place ten pebbles (or any other such objects) in front of a child who can recite number names upto ten in the correct sequence. Ask him/her to count them aloud while touching the pebbles with his/her finger. You may need to show the child what you mean. But once he/she begins counting, do not interrupt. Watch carefully as the child counts, and record your observations according to the following questions.
- a) Did the child count one or more pebbles more than once?
 - b) Did the child leave out any pebble ?
 - c) Did the child say a number name without touching a pebble ?
 - d) Did the child go on saying number names even after he/she had touched all the pebbles ?

On the basis of your observations, what conclusions can you draw about the child's ability to count ?

If the answers to all the questions in E1 are 'No', then it is most likely that the

Being able to recite number names is not the same as being able to count.

child can count upto ten. If the answer to **any** question is 'yes', then it means that the child does not know how to count. What the exercise above brings out is that the ability to recite number names only shows that the child has a good memory. On the other hand, being able to count shows that the child is moving towards building a concept of number.

Mini, in Example 1, cannot count even though she knows the number names in the correct sequence. While counting, she is making one or more of the following mistakes — counting a button more than once, leaving out a button while counting, saying a number name without touching a button, or continuing saying number names even after all the buttons have been touched. To understand why she is making such mistakes, let us consider the processes that we go through when we count. And, to do so, nothing could be better than counting for yourself the number of beads in a handful of them ! Yes, why not actually do so, and reflect upon what you did ?

How does your answer to this question compare with mine, which follows ?

- i) To begin with, I laid the beads out in a row for counting, so that I wouldn't leave any out or count any of them twice. In other words, I placed them in an **order**.
- ii) Next, to count them I began reciting number names in the conventional counting **sequence**. I could do this because I know enough of them in that order, at least as many as the number of beads I was asked to count. While counting them, I touched each bead once (actually or mentally) as I said each number name, and left no bead untouched. This means that I **paired** one bead with one number name. In other words, I set up a **one-to-one correspondence**.
- iii) At each stage of counting, I **classified** the beads into two groups — those that had been counted, and those that were still to be counted.
- iv) As I touched the tenth bead (I had 10 beads altogether), I said 'ten'. Seconds later I said that I have ten beads. This means that the label 'ten', which I associated with the touching of the last bead, has changed its role and is now used to describe **all** the beads.

So, I carried out **four different processes** to be able to count the number of beads — ordering, classifying, setting up a one-to-one correspondence and using a number name in two different ways.

But where do most of us begin when we introduce counting to children? We don't even bother to find out whether the child has the ability to sort and to order objects. And, regarding one-to-one correspondence, we just indicate once or twice to the child that each object should be touched only once in counting. We don't give her enough time to understand or practise what this actually means. So we should not be surprised if a child, on being reprimanded for counting incorrectly, responds as Rani did :

"But what's wrong ? You asked me to say 'one, two, three....' and touch these things at the same time. So what if I can say till 20 as I touch them, and you can say only till 15 !"

The fourth step listed above is the most confusing of them all to a child. The following situation often arises in this context.

Example 2: A parent shows his child four pencils. He places them in a row in front of her and says "one" as he points to the first pencil, "two" as he points to the second one, "three" as he points to the third one, and "four" as he points to the fourth. He repeats this for the child. Then, with an encouraging smile he asks, "Now give me two pencils !" The child picks up the second pencil in the row and gives it to him. She is quite baffled when the parent says, "No child ! I said two pencils. Here (*adding another pencil*), now they are two." "Are they?", wonders the child. "But didn't he just say that that pencil was 'two' ?"

? Why do you think the child in the example above was confused ?

— X —

Think about what happens when we set number names and objects in one-to-one correspondence. We use the number names as temporary labels for the objects. In the example above, the pencil has nothing in common with the number "two"; it is just the second object in the ordered row of objects. But when we say "Give me two pencils", we expect the child to mentally separate the label "two" from the second pencil, and then associate it with any two pencils. This way of using number names in two ways is quite confusing to a child who is just beginning to deal with numbers. How can we sort out this confusion? We shall answer this in Sec.5.4.

Why don't you try an exercise now ?

E2) Which of the following statements are true ? Suitably alter the false statements to make them true.

- i) If a child can't count, she certainly can't recite a sequence of number names
- ii) If a child can't count, it is possible that she has not understood how to pair number names with a given set of objects.
- iii) Once a child can correctly pair upto five objects with number names, she is able to use the word 'five' in both senses.
- iv) A child needs to have some sense of classification, ordering and one-to-one correspondence, before she can learn to count.

The reason we have discussed the processes involved in counting is that, unfortunately, many preschools only emphasise memorisation of number names. Most of them believe that if a child can recite number names in the counting sequence, then she can count. By now you probably agree that this is a wrong notion, and that children gradually develop an understanding of number. They need to be able to classify, order and set up one-to-one correspondences to some extent **before** they can count. This is also why these abilities are called **pre-number concepts**, that is, concepts that children need to develop **before** they can understand what number means. Let us briefly see how we can help children develop these concepts.

5.3 DEVELOPING PRE-NUMBER CONCEPTS

In Block I you have read how children acquire concepts. You know that, for children to grasp a concept, they must be given several opportunities to explore and experience it. **While exploring, they must be encouraged to talk about what they are doing.** And, all this requires us to be patient. Some of us start by encouraging children to look for the answer themselves. But when they take time, our impatience makes us give them the answer or do the task quickly ourselves. This prevents the children from reasoning for themselves and finding out. In fact, we should help them define the problem, and then look for possible solutions, giving them enough time to do so. That is how they will develop their understanding of mathematical concepts and their ability to think mathematically.

Let us now talk specifically of ways of nurturing the child's abilities of classifying, ordering and pairing. The discovery approach, through activities

Give the child enough time to understand a problem, and to try and solve it.

that children enjoy, seems to be the most effective teaching method. We shall consider several activities here. Please note that **the activities that we describe here are meant as examples only**. Please adapt them to your specific situation, using the materials that are easily available. We also hope that they will help you to generate other activities relevant to your situation.

Let us first consider activities that can help a child to learn how to classify.

5.3.1 Classification

As you know, **classification** (also called grouping) **involves putting together things that have some characteristic in common**. We can say that a child is able to classify only if she is able to decide upon the criterion for classification, and maintain it throughout the activity. **This ability forms a basis for the development of logical and mathematical concepts.**

Children often classify while doing everyday activities. When a child is asked to put a doll's clothes in one bag and the doll's ornaments in another, or to put the unclean plates in one tub and the clean ones in another, or to separate squares and triangles from paper cutouts, she is classifying. But we need to give children more opportunities for classification, to develop this ability in them. This can be done very easily through play.

Before discussing some activities, let us look at some points that are important to keep in mind while devising them.

- i) While organising a task for a child, we must keep in mind what she is **familiar** with, and her **capabilities**. If we don't do this, then the child may not be able to do the activity. Therefore, we must build the activities around objects and situations that she is familiar with.
- ii) It is important to observe a child in different situations before coming to any conclusions about her abilities. Recent research shows that **preschoolers can classify in some situations that are meaningful to them** and in which they clearly understand what has to be done.
- iii) We must **encourage children to talk about what they are doing in an activity**. This helps us to know how far the children have understood the concept of classification. It will also help them to develop concepts of 'same', 'different' and 'belongs to', which are basic to classification. Questions like "Why have you made the groups like this?" and "What is common between these things you have placed together?", help them to clarify their thoughts and improve their understanding.
- iv) In the **initial activities** the basis for classification should be **one property only**. Gradually, as children learn to classify at this level, you can increase the complexity of the task. Then you can ask them to classify on the basis of two properties such as colour and size, or shape and colour, and so on. Many preschoolers would find such classification activities difficult because there is more than one way of classification.

An activity must be relevant and meaningful to the child.

Let us now look at some activities that can be organised with preschoolers to develop their ability to classify.

- You could start by giving children different materials to play with. While playing, they spontaneously think of ways of 'arranging' them. Of course, their 'classification' may seem quite arbitrary to you, but that doesn't matter. What is important is that they are getting an opportunity to handle a variety of materials, and 'organise' them in some manner. At this stage the children may not be ready to classify on the basis of even one criterion.
- At the next stage you could ask them to classify **objects that are familiar to them** on the basis of one physical characteristic like colour, or shape,



Fig.2 : A classification activity.

or texture. You could explain what has to be done — “Put together all the objects which are red in colour”, “Put together all the sticks like this one”, etc. Initially you may have to form the groups to show the children how to do the activity.

- You could make available a variety of leaves/stones/pulses/balls, and ask children to sort them into groups. Let children evolve their own criteria for classification and group them in any way they like. Once they complete the activity, talk to them about the criteria they have evolved by asking them questions like “Why are these together?”, “Why not put this here?”, etc.
- While children are having a meal, you could ask them which foods taste sweet, and which are salty.
- A more complex game would be to divide up some objects yourself, based on some criterion. Then you could give the children a few chances to guess what your criterion is.

E3) List two more activities to help children improve their ability to classify.

Let us now consider activities related to ordering and seriation.

5.3.2 Seriation

You have read about a preschooler’s ability to order. **Ordering a set of objects means to arrange them in a sequence according to some rule.** This arrangement could be on the basis of size, shape, colour or any other attribute. For example, you could order a set of red and green leaves on the basis of colour — one red, one green, one red,....

Seriation is a particular type of ordering in which the objects are arranged according to an increase (or decrease) in some attribute like length, shape, weight, and so on. For example, you could seriate a set of stones according to their weight — the heaviest one coming first, and then the next heavy one, and so on, ending with the lightest one.

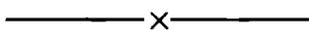
While designing seriation tasks for children, we must keep their abilities in mind. For instance, seriating more than three objects may be difficult for preschoolers as the following example illustrates.

Example 3 : 4-year-old Bachi was given five sticks of different lengths, and asked to order them according to length. To do so she placed the first stick next to herself. Then she picked up another and placed it with reference to the first one. This was alright so far. While placing the third stick, she referred to the previous two sticks, and placed it correctly. Now, while placing the fourth stick, she referred only to the third stick, instead of looking at the total arrangement. So, finally her arrangement looked like the one in Fig. 3.

Bachi could seriate three objects. But, when it came to the fourth, she couldn’t relate it to all the previous sticks. She couldn’t see that it is longer than the second, but shorter than the third, and therefore, must come in between them. After the third stick, she perceived each subsequent one only in relation to the previous stick that had been put in the sequence.



Fig. 3 : Beyond three sticks, this child sees each additional one only in relation to the previous stick in the sequence.



Example 3 also brings out the need to be clear about the logical processes involved in any task given to a child. In particular, before we expect a child to perform seriation tasks, we should see if she is able to

- i) **order in two directions** (e.g., apply the relations 'bigger than' and 'smaller than' at the same time),
- ii) understand the logic of **transitivity** (i.e., if A is more than B and B is more than C, then A is more than C).

Let us now take a brief look at some ordering and seriation activities for children. We have listed them in terms of levels of increasing difficulty.

- The simplest ordering activity is asking children to copy a pattern. For example, make a row of alternating chalk and pencils, and ask children to make a similar row using chalk and pencils from a heap.
- At a higher level of difficulty, you could ask children to continue a pattern. For example, place a twig and two beads, repeat this unit a few times, and then ask children to continue it.



The question to be answered in ordering activities is "what comes next?"

- At the next level of difficulty is asking children to seriate a collection of objects on the basis of some attribute. You could begin by giving children three objects to seriate and then gradually increase the number. Initially you may need to prompt them by asking questions such as "Which is the smallest?", "Which is the longest?", and explain how to do the task. If children put objects in a series incorrectly, ask them questions like "Is A (pointing to the object) thinner than C (pointing to the object)?" or "This one looks bigger, shouldn't it come here?". This will help them to analyse the arrangement and develop the concepts involved.

When carrying out seriation activities, using words like 'last', 'first' and 'before' helps children develop these concepts. Such activities will also **help them to see that attributes are relative**. A button which may be the largest in one set, may be the smallest in another. Thus, there are no absolute dimensions.

Now why don't you try and think of some seriation activities?

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- E4) List one play activity each where children seriate on the basis of size, texture and weight. What concepts do they acquire as they do these tasks?
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So far we have considered activities to strengthen children's abilities to classify and seriate. Let us now discuss activities to help them grasp the concept of one-to-one correspondence.

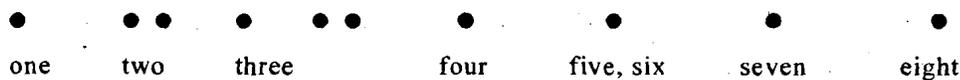
5.3.3 One-to-one Correspondence

Suppose you are given a certain number of cups and saucers, and are asked to find out whether there are enough saucers for all the cups. How would you do this? By counting the number of cups and saucers, of course! But what if you do not know how to count? Can you still answer the question? Yes, by **matching** (or **pairing**) each cup with a saucer. This means that you set up the cups and saucers in **one-to-one correspondence** with each other. Thus, pairing is simpler than counting, and is basic to it.

You may have come across a situation similar to the following one, when interacting with preschoolers who are learning how to count.

Example 4 : An educator placed 10 pebbles in a row and asked four-year-old

Jaswant to count how many there were. She asked him to touch the pebbles while counting them. Jaswant counted the pebbles thrice and came up with a different answer each time. What was happening was that he either left out a pebble while counting, or counted a pebble twice. His counting was something like the following.



? Why do you think Jaswant counted in this way ?



Children like Jaswant have not grasped the idea that each object has to be touched only once during counting, that no object can be left untouched and that only one number name has to be recited upon touching each pebble. In other words, they have yet to understand the concept of one-to-one correspondence. To help them grasp this concept, you need to give them several experiences in setting up objects in one-to-one correspondence. This should be done **before** you expect them to learn counting, and **while** teaching them how to count.

As part of understanding one-to-one correspondence, children need to understand the meaning of 'many and few', 'more than', 'less than' and 'as many as'. Many everyday experiences help children understand these concepts — when they check whether there are as many plates as the number of people to be fed, when they divide up sweets equally among their friends, and so on. We need to extend these experiences. Let us look at some activities for this purpose.

- Lay out a row of pebbles and ask the child to make another row of as many sticks as the first one.
- Ask the child to lay out as many leaves (or beads) as the number of children in the group.
- You can draw a set of rabbits and one of carrots (see Fig. 4). Then you could ask the child to connect each carrot with a rabbit by a line.

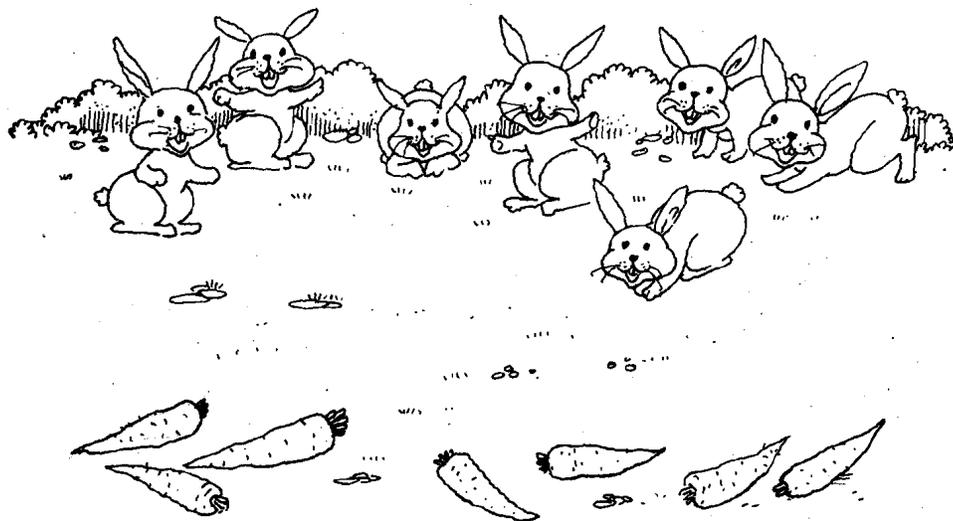


Fig.4

Such activities will help the child to visually understand what is involved in one-to-one correspondence.

Whatever the activity, we must **encourage the children to talk about what they are doing**. Ask children questions like "Are there as many leaves as the number of children?" or "Which are more—the leaves or the beads?" during the activities. This helps to strengthen their understanding.

Why don't you think of and try out some activities now ?

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- E5) Devise one activity each to help the child understand 'as many as' and 'one-to-one correspondence'. Try them out on a child/children in your neighbourhood, and record your observations.
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So far we have considered some examples of activities that you can devise to introduce and strengthen the concepts of classification, ordering and one-to-one correspondence. Here we would like to mention a **point of caution!** While organising such activities, it is important to be careful when setting them up. This is because we may inadvertently mislead the child as in the following example :

When talking about 'as long as', Dolly's teacher always used a rod for comparing with. Because of this, Dolly thought that the rod and 'as long as' are somehow related, and that 'as long as' can only be applied to that kind of rod.

Thus, **while introducing a concept, we should devise as many different activities as possible with a variety of materials, so that children can correctly glean the concept and generalise it.** For example, let children encounter the term 'as long as' with reference to sticks, pencils, ribbons, spoons, blocks, ropes, in a variety of situations. Then, from these various experiences they will be able to draw out the meaning of 'as long as'.

Another point that we must keep in mind is that a child may not be able to perform a task simply because of **language incompetence, and not cognitive incompetence**. You can think of an example to illustrate this while doing the following exercises.

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- E6) Give an example to illustrate how language incompetence can interfere with a child's ability to perform a task.
- E7) While setting up a classification activity, a teacher gave the children several round and square buttons. The round buttons were all purple coloured, while the square ones were all black. Then the teacher held up a round button and asked the children to select all the round buttons from the pile of buttons.
- Do you think there is anything wrong with the activity? If so, what is wrong?
 - Can the teacher be sure that the children who have done the activity correctly have understood the concept of roundness ?
 - How would you alter the activity ?
-

As far as possible, use simple language and expressions that children are familiar with.

Let us now look at some strategies that may help children in learning how to count.

5.4 INTRODUCING COUNTING

From what you studied in Sec. 5.2, you know what it means to count. You would also agree that rote learning of number names does not always mean that

the child has developed a concept of number, or can count. Even the ability to write numerals does not mean that the child can count, as you can see from the following situation.

Example 5 : Four-year-old Mariamma was reciting number names — some of them in order, and others randomly. The child's aunt, sitting nearby, asked her, "Can you write 'two'?" She said she could, and wrote the following:

2 0 0

When her aunt asked what she had drawn alongside, the child replied, "Ducks." On asking her why she had drawn them, she replied, "This is the way two is written in the book." Then her aunt wrote '2 * *', and asked if this was two. Mariamma replied that it wasn't.

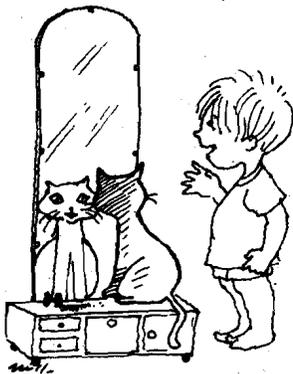


Fig.5 : "Now, I have two cats."

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It is quite clear that Mariamma had no idea that 'two' refers to **any** collection of two objects. Can we then say that she had a concept of number, even though she could write the numerals from 1 to 10?

What **does** help a child to develop the ability to count is to **introduce counting using real objects**. Let the child try and understand the meaning of 'two', say, by showing her two leaves, two pencils, two books, clapping twice, and so on. Each time stress the word 'two'. From these experiences the child will gradually understand that what all the groups of two objects have in common is the quality 'two'

In this way we can help them understand numbers upto five, **not necessarily in the usual order**. For example, they could learn them in the order — 'one', 'two', 'five', 'three', 'four'. They can learn the conventional order later, which will help them conceptualise bigger and bigger numbers. At each stage we can ask them questions like — how many marbles do I have? How many times did I hop? Which four of you are going to come to the board? And so on.

But, a **word of caution!** When counting objects for the child, we usually move from one object to the next, saying "one, two, three", and so on, as we touch each object. The child sees the adult touching these items, and saying a different word for each one. She may conclude that 'one', 'two', and 'three' are names of these objects, as happened in Example 2, described earlier. We do not explain to the child that we called the second object 'two' because we assumed that we are now referring to a collection of two objects — the object that we touched earlier and the one we are touching now. Just because we understand this, we expect the child to understand this too. In fact, we do not even realise that the child may be getting confused.

This confusion can be avoided if counting is introduced by **counting a variety of objects or actions on various occasions and in different orders**. One could also touch the first object and say, "This is one leaf", and move it to another side. Then take the second one and move it towards the first one and say, "This is one more. So now there are two leaves." Continue in this way. This kind of exercise should be done with sticks, balls, stones, and so on. It can also be done with actions. For example, you can clap once and say, "Now, I have clapped my hands one time." Then you can clap twice and say, "Now I have clapped two times", and so on. In this way it becomes clear that the number name refers not to a particular object or action, but to the size of the group of objects (or actions) that we have set to one side. This also helps the child to know that there is a sequencing of numbers in which the subsequent number is one more than the previous one.

There is another aspect that is important to remember when introducing number names. When using objects for teaching counting, we tend to arrange them in a fixed pattern for a particular number name each time. For example,

we usually tend to arrange two pebbles as $\bullet\bullet$, three pebbles as $\bullet\bullet\bullet$ and four pebbles as $\bullet\bullet\bullet\bullet$. Here the child may begin to think that it is something about the arrangement of objects that is called 'two', 'three', 'four', and so on. So, for instance, this child may say that $\bullet\bullet\bullet$ is two pebbles. This problem can be avoided if we **keep changing the patterns**. Thus, when showing three objects, on one occasion we may put them in a row, on another as a triangle. Four objects could be arranged as



Why don't you try an exercise now?

E8) A woman was trying to teach her three-year-old child the numbers from 1 to 5 from a children's book on numbers. Each number was illustrated by the same number of trees drawn next to it, like

1.	
2.	
3.	

and so on. The mother would point at a number, and the trees alongside, and say the number. The child would repeat everything after her. After a few days, when the child was asked to point to four in the book, she would do so correctly. Do you think the child has grasped the meaning of the numbers from one to five? What problems do you think this method of teaching has?

So far we have discussed ways of introducing children to natural numbers. How would you teach them what 'zero' means? Would you do it the way my teacher did it — by saying that it means 'nothing'? He would say, "If you have five sweets, and you eat all of them up, then you have none left. That is zero." But many children, who are taught in this way, are confused when they come across 0°C , or the point 'zero' on the number line. So, it is better to let children experience zero like they did the other numbers, that is, using a variety of concrete objects. You could take three pencils; take one away, two remain; take one more away, one remains; take that one away, zero pencils remain. This will show that **zero of something** is nothing. So, it is only nothing, as an adjective.

But, as a noun, it is as much a number, as any other. To reinforce the idea in children that 'zero' is not nothing, you could organise games involving a version of the number line on the ground. Any point on a straight line drawn on the ground can be taken as 'zero'. Points in front of it could then be 1, 2, 3, A child could hop forward thrice, then hop back once to Point 2, then once more to Point 1, and then once more to Point 0. Variations of this game, and other games, can be played to help children realise that zero is not 'nothing'.

Now here's something that we need to think about.

?

When would you introduce a child to the symbol for zero — after she has understood the concept, or when you start explaining the concept to her?

Numerals should be introduced only after children have had considerable exposure in counting, using concrete objects.

Most of us find it easier to introduce 'zero' to children by writing '0' on the board, rather than using objects to get the idea across. In fact, we tend to introduce any number name to children, by writing its numeral (i.e., the symbol for it) on the board or on paper. But, if we do this, children may begin to think that, for instance, 'two' has something to do with the shape of the written symbol '2', instead of understanding that the symbol is just an arbitrary way of denoting 'twoness'. Therefore, numerals should be introduced only after the child has some concept of numbers. For example, when you are exposing a child to several groups of four objects, and the child is able to show you four marbles (say), then you could write 4 on the board (or on paper). This way the child starts recognising the numeral first. Only after this recognition is achieved should the child be asked to write the numeral.

Once children are familiar with numerals, you could show them how arbitrary the symbols are. This could be done by showing them different numeral systems that were used in the past and some that are in use at present (see Table 1).

Table 1 : Different numeral systems.

Hindu-Arabic	1	2	3	4	5	10
Chinese	一	二	三	四	五	十
Roman	I	II	III	IV	V	X
Devnagari	१	२	३	४	५	१०

Now for an exercise !

E9) The following were some suggestions we have made regarding ways of introducing counting to children. Briefly explain the rationale behind these suggestions.

- We should introduce number names to children by using a variety of objects that are familiar to them.
- Children should first meet number names as adjectives and not as nouns.
- Numerals should be introduced to children only after they have had considerable experience in counting concrete objects.
- Zero is not 'nothing'.

So far we have discussed various ways of helping the child acquire the concept of number, and the ability to count. It is important to remember that the suggestions will be useful only if you give enough time to the child to grasp

the concepts and skills involved. We would also like to stress that our suggestions are based on our experiences. You could think of other more effective ways of teaching children counting.

Let us now briefly summarise what we've talked about in this unit.

5.5 SUMMARY

In this unit we have

- 1) discussed what counting means, and stressed that it is **not** the ability to recite number names.
- 2) talked about the need for a child to understand several pre-number concepts (classifying, seriating and placing objects in 1-to-1 correspondence) **before and while** she is learning to count.
- 3) given suggestions for activities for developing the pre-number concepts.
- 4) suggested ways of introducing counting to a child.
- 5) stressed the need to introduce a child to the written symbols for numbers from 0 to 9, only **after** they have understood the meaning of those numbers.

5.6 COMMENTS ON EXERCISES

- E2) i) False. If a child is able to recite number names it is no indication that the child can count.
- ii) True.
- iii) False. Once a child has understood the concept of 'five', she is able to use the word 'five' in both its senses.
- iv) True.
- E3) i) You could collect leaves of three different shapes and ask children to "put together the leaves that look alike". Initially you may need to help them. Show them the three different leaf shapes and indicate that they form three groups. Gradually such help should be lessened. Then you may word your instruction as "Put the things that belong together in one group". **Get them to talk about what they are doing, and why.**
- ii) You could give children buttons which vary only in terms of colour (or shape, or size), and ask them to put the similar buttons together. If children find it difficult to carry out the activity based on this general instruction, you could be more specific and ask them to "put all the round ones together", and so on.
- iii) You could fill a box each with a variety of shells, seeds, beads, or stones, and ask children to sort these on the basis of shape, size or colour.
- iv) You could make available items of clothing to be sorted on the basis of colour or function.
- v) When children have had many experiences with concrete objects, you can organise classification activities that involve pictorial representation. For example, draw an apple, a banana, an orange, an onion, brinjal and radish, and ask the children to colour the objects that go together.

- vi) You can give children several objects which very obviously vary in weight, and ask them to separate the heavy ones from the light ones. Discuss with them the basis on which they have separated the things.
- E4)
- i) You can give children containers or rings of different sizes to be fitted into each other so that none remain; or you could ask children to stack play material according to size, with the big ones first, then the smaller ones and then the smallest ones on the top.
 - ii) Give children materials of obviously different textures (like sandpaper and smooth cotton) and ask them to arrange them from the smoothest to the roughest.
 - iii) Give children three or four familiar objects which are distinctly different in weight such as a ball, a rubber, a pencil, a thick book, and ask them to put the lightest first and then the next lightest, ending with the heaviest.
- E5)
- i) You could give her a handful of toffees, and ask her if they are as **many** as the number of her friends that are present. If not, which is more? Then you could ask her to pair one sweet with one friend, to build her understanding of one-to-one correspondence.
 - ii) You could also use playing cards for this purpose.
- E6) For example, suppose a child has always been taught to “share” rather than “dividè among” Then the first time she hears this new term she may not be able to do a sum involving it, even though she may be perfectly capable of doing division.
- E7)
- a) Since all the round buttons were purple in colour, it is possible that the child may imagine that ‘round’ has something to do with ‘purple’. The child may perform the activity correctly by selecting the purple buttons, whereas the teacher would be thinking that the child is choosing them because of their shape.
 - b) No, for reasons given in (a), and others that you should list.
 - c) In this activity all the buttons could be of a single colour, so that the only common property the child perceives is roundness.
- E8) She may not have understood what ‘four’ means in general. She could have just memorised the word and related it to the symbol and pictures in the book. Such a method would reinforce wrong notions like those Mariamma (in Example 5) had.
- E9)
- a) This helps them to realise that a particular number name refers to a collection as large as that amount of any object.
 - b) This helps them to see that a number name refers to a certain quantity, for instance, three spoons, three jumps, etc. From this they will gradually understand the abstract concept of number, which is a noun.
 - c) Introducing numerals early can block a child from seeing numbers in relation to objects and quantities.
 - d) Zero is as much a number as any other number. On the number line its representation is the same as that of any of the other numbers.