UNIT 18 DEVELOPING CONCEPTS OF SHAPE, SIZE AND SPACE

Structure

18.1 INTRODUCTION

In Unit 16 of MCD-002, you have read about how children develop concepts of space, shape, and size during preschool years by exploring and spontaneously interacting with their environment, and through planned play-based activities. You have also read in the previous Unit of this Block (Unit 17) about how the abilities to consider another person's perspective, conserve, classify, and seriate help children in developing concepts of shape, size, and space.

In this Unit, we will read about activities that can be carried out with children in Grade 1 and 2 to further develop their concepts of shape, size, and space.

Objectives

After reading this Unit, you will be able to:

- plan and conduct activities that foster children's concepts of space, shape, and size in early primary classes (Grades 1 and 2);
- describe children's abilities to read pictures and maps;
- discuss how children employ their understanding of space, shape, and size in their drawings; and
- plan activities for fostering children's ability to read pictures/maps.

18.2 THE ROLE OF ADULTS IN DEVELOPING CONCEPTS OF SHAPE, SIZE AND SPACE

As is true for all other concepts that the child acquires during the early years, the concepts of shape, space, and size emerge as children interact spontaneously with their environment, handle and play with objects of

different shapes and sizes, and see how they occupy space. You may ask – If the child discovers and develops these concepts in the process of growing up as a result of interaction with the environment, what is the role of the adult and the teacher? The role of the adult lies in:

- creating an environment where such investigations and discoveries are possible;
- providing the children the opportunity to talk about their discoveries; and
- helping children make meaning of their investigations and discoveries by engaging them in discussions and asking them questions.

This will help the children to extend their concepts. This may seem simple but often, we adults, prevent children from exploration and do not give them enough opportunity to talk about their experiences and explain their viewpoints and thinking. When children ask a question, our immediate response is to give an answer and close the query. The children want to talk with us but we are in a hurry to conclude the conversation. We are too busy to respond to them when they want to talk with us.

Children require appropriate activities to help them understand and develop concepts related to space, shape, and size. These activities can be conducted with the whole class in small groups or with individual children. Through these activities, children also learn the related mathematical language.

Can you recall what is meant by appropriate activities?

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Appropriate activities:

- are in accordance with children's age and abilities – neither so difficult that children experience failure and then hesitate to try them out; and neither so easy that there is no challenge in doing them;
- are enjoyable for the children;
- are relevant to children's experiences and context so that children can relate to them; and
- do not make the children feel hesitant, fearful, or tense.

While conducting any activity with children, you must be clear in your mind about the objective behind the activity. The focus is not only on engaging children in enjoyable activities – while enjoyment is crucial, the activities should also be able to help children understand different concepts. So each time, you will need to evaluate whether the activity is fulfilling its purpose by helping the children in developing specific concepts. This also means that you will have to note the times when these activities do not work so that you can bring about changes accordingly.

Generally, in many classrooms, emphasis is placed on rote learning when teaching these concepts. For instance, in most preschools, children are repeatedly shown the standard shapes of squares, triangles, and rectangles in the form of paper cut-outs or drawings and made to memorize their names. However, these paper cut-outs are merely two-dimensional representations of a variety of shapes that exist in the environment. Learning about shapes would be more meaningful if the educator used real objects and materials. Learning the names of the standard shapes is no indicator that the child has an understanding of the concept of shape. Children will learn the names of shapes in any case as a consequence of handling different objects and materials during activities. When the focus becomes learning the names of shapes only, it is then the educator's approach becomes restricted.

Let us understand this point with the help of an example!

Let us see how two different teachers taught the same concept differently.

Situation 1

The teacher showed pictures of different shapes to children, such as – rectangles, squares, circles, and triangles, and then asked children to identify objects in their surroundings in which had the respective shapes and draw these in their notebooks. Children drew the sun and moon (to depict circles), an almirah, a TV (to depict rectangle),and a birthday cap, a sand heap (to depict a triangle).

Situation 2

One day before, the teacher asked the children to bring an object from their home which they could carry easily to school. The next day, all the children brought some objects with them.

Teacher (Mehak) – "Show me your objects".

(All the children showed their things to each other and the teacher.)

After that, Mehak helped them make three groups with five children in each group. All five groups sat in their respective circles.

Mehak asked the children to trace their objects on individual sheets of paper provided to them. She showed an example by tracing the "duster" on the board. After that, all the children started tracing their objects.

Then, the children were asked to trace at least another 3 objects by borrowing the objects from their friends. During this activity, one child, while looking at another child's drawing and showing him his own drawing said, "You have also traced the same bowl, why it is different?"

The second child responded, "You have traced it wrong."

Mehak was observing all this. She said, "Let us trace it again."

Mehak asked the first child to trace. The child traced the bowl with its base touching the paper. When the second child was asked to trace, she turned the bowl upside down and then traced it. Then the first child immediately said, "She traced it by turning it upside down!"

After all the children had traced at least 2 objects, Mehak asked each child to show their traced drawing to their group members. As each child showed their drawings, the others in the group had to guess what the object was. All the children were engaged in observing and identifying the objects and talking about these.

Mehak then said, "Now that you have seen all the traced figures, make groups of similar figures."

In their groups, the children started classifying the figures. In one of the groups, the children's discussion while looking at the figures was as follows:

Child 1 – "Give me these round figures [O (circle)], and I will collect them"(Along with showing one traced drawing of the circle)

Child 2 – "Hmm, we will separate round objects."

In another group, children were separating some figures.

Mehak asked them, "Why did you put all these things in one group?"

Child – "All of them are alike."

Mehak – "What is alike in all these?"

Another Child – "All of them are small."

Mehak –"All right!"

Mehak moved from group to group and asked the children the reasons for their categorizations.

Then Mehak held out some of the figures and named these. She said, "All the circular tracing are circles, these are square, and these are triangle."

In the next class, Mehak asked children to combine cut-outs of different shapes to make different figures and geometrical patterns. In this process, children explored on their own how to organize and combine cut-outs of various shapes to create figures. They also named the shapes in their figures.

In the first example, while the teacher introduced the concept of shapes, she did not highlight the difference between 2-D and 3-D shapes. For example, a circle is a 2-D shape and its 3-D form is that of a sphere. Children did not have actual objects to be explored in terms of shape, but they merely had to use their visualization and identify a 2-dimensional shape within a 3-dimensional object.

In the second example, children began with using some concrete objects to learn about shapes, and understood the relationship between 3-dimensional objects and their 2-dimensional representation. With constant support and practice, gradually children will reach the stage where they will not need the concrete materials to identify shapes, but on hearing the names of the shapes, they will be able to visualize the shape.

In Sub-sections 17.3 & 17.4, we will describe some play activities for strengthening concepts of shape, size, and space for children in classes 1 and 2. In Unit 12 of Block 4 of MCD-002, you have read about activities to develop these concepts among pre-primary children. You have also read

about play activities for developing the cognitive abilities of matching, classification, and seriation which also help to develop concepts of shape, size, and space.

Make a list of these activities that you have read, in the margin, before you read further.

18.3 ACTIVITIES TO DEVELOP THE CONCEPT OF SPACE

The following are some activities that can help to specifically develop the concept of space. You should think of some more activities relevant to your own context.

Activity 1 (Grade 1)

Divide children into small groups, and give each group a picture card depicting a variety of objects placed in certain locations/positions. Whatever is depicted on the picture card should be familiar to the children. Ask children in each group to look at the card and name the objects. Then they should discuss how the objects have been shown on the card in relation to each other – which objects are placed **above** a particular object and which are placed **below**? Which objects are **nearest** to a particular object and which are placed **at a distance** from that object?

If there is only one picture card, then the whole class can be involved in a game together. Divide the class into two groups – one group asks questions such as the following and the other group answers the questions. Then they reverse the roles. The questions, based on the picture can be as follows:

- What objects are there **inside** the basket?
- Which objects are **outside** the basket?
- Which objects are placed **above** the table?
- Which objects are near the table?

Similarly, you as the teacher can ask the children questions related to the classroom:

- What objects are **inside** this classroom?
- Who is sitting **in front of** me (the teacher)?
- What objects are there **behind** me?
- Who is sitting **on the right of** Ram?
- Who is sitting **on his left**?

When children get familiar with this activity, they can ask similar questions with respect to the school as well as any familiar place.

Activity 2 (Grade 1)

Many action songs require children to make movements. They are fun to sing and act out and help in developing space-related concepts:

One example is as follows:

Put your right hand in/in front

Put your right hand out /at the back

Hold it up

Put it down

Then all turn around.

Put your left hand in…

The song continues, requiring the children to move their right and left legs.

Activity 3 (Grade 2)

An important aspect of spatial understanding is that all objects enclose a certain space. Objects contain space and are themselves contained within space. A bigger/larger object with more space contains a smaller object. Help children to see these connections by asking them to make related sentences such as:

- The classroom is inside the school.
- Almirah is inside the classroom.
- The book is inside the almirah.
- Pages are inside the book.

To help the children, you begin with the first sentence and then ask the children to continue.

Another example is as follows:

- The chair is **in** the class.
- The book is **on** the chair.
- The pencil is **in** the book.

After a set of such sentences, ask children questions such as – which is the biggest object, and which is the smallest? In the first set of questions, the 'biggest' is the school and the 'smallest' is the page.

In the second set of questions, you can ask questions such as: What is below the book?

During this activity, children will also develop space and size-related vocabulary.

Now you devise a set of sentences like the above, which can help in developing an understanding of –'in front', 'at the back', etc.

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Activity 4 (Grade 2)

This activity will help the children to understand the concept of inside and outside (space). For this activity, ask children to collect a variety of objects such as pencils, sharpeners, dusters, pebbles, wood, leaves, etc. Now make a circle on the ground and put some objects inside it and some objects outside the circle. Ask the children to name the objects inside the circle and those that are outside it. In this manner, change the location of objects, and ask children the same questions.

The same activity can be made more challenging by putting some of the objects inside a container and leaving a few outside. Ask the children which objects are inside the container. This will also sharpen children's memory.

Check Your Progress Exercise 1

1) Which of the following statements is NOT true about the role of adults in developing children's concept of shape, space, and size?
   a) They should allow children to talk about their understanding of these concepts and 'discoveries' related to these.
   b) They should ask children to learn these concepts on their own with no adult help.
   c) They should engage children in discussions about these concepts and ask them questions.
   d) They should teach these concepts primarily with the help of cut-outs of shapes.
   e) They should create an environment where children can pursue investigations and discoveries around these concepts.
2) Plan an activity to foster the understanding of the following aspects of space:
   a) Inside and Outside

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   b) Left and right

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18.4 ACTIVITIES TO DEVELOP THE CONCEPT OF SHAPE AND SIZE

Activity 1 (Grade 1)

Divide the children into various groups. Provide each group with objects such as a pen, pencil, rubber, sharpener, sketch pen, ruler, pencil box, or other such objects. Now ask each group to place the given objects in a series according to their length. This activity helps to develop the concept of size – big and small. It also helps children to understand that objects are bigger and smaller in comparison with each other – relative size. Initially, give children three objects to seriate (arrange according to increasing/decreasing length). More objects may confuse them. When they can seriate three objects, add another one.

Once all the groups seriate the objects, ask them to examine each other's seriation. Help them to identify if some objects are in the same position in the two series – for example, is the rubber the first object in both series? They will also realize that the same object can be the biggest in one group and smaller than others in another group. The terms 'big' and 'small' represent relative notions and whenever we say 'big' and 'small' it is in comparison to something else. While it is not necessary to share this with children, it is important to keep it in mind.

Activity 2 (Grade 1)

Give children empty matchboxes and ask them to make different structures using these. This will help them to understand different sizes and shapes. Then they can be asked to tell which structure is bigger and which one is smaller. The same activity can be conducted using matchsticks using which children can make different kinds of shapes such as triangles, rectangles, etc.

Activity 3 (Grade 1)

To help learners develop the ability to classify, give two sets of objects that are very different from each other, such as pencils and beads. Now tell the child to put similar things together. Ask her the reason for making the two groups.

To make the activity difficult, give her sets of two objects that can be classified based on two properties – for example, blue and white beads in small and big sizes. These can be grouped based on colour or size. Now ask the child to put the beads into two groups. What you have to see is whether the child can retain the property she has chosen for classification throughout the process of making the groups. If the child chose colour, as the property for classification, then there should be one group of blue and one group of white beads (having both big and small beads, in each group). If the child selected size as the property per classification, then there should be one group of big beads and one group of small beads (having both blue and white beads in each group). If the groups formed by the child are mixed groups (eg. blue big, blue small and white small beads in one group), then it shows that the child is not retaining the criteria of size or colour for classification

consistently. In such a situation, talk to the child and find out whether she understands the need to retain one property for making the groups. If not, help the child to understand through discussions the need for consistently maintaining a property for classification.

Activity 4: What Slides and What Rolls (Grade 2)

You will need a flat wooden plank and objects of different shapes for conducting this activity. These objects can be a pencil, small powder boxes, thread reels, marbles, sharpeners, books, rulers, etc. Raise the plank to form a slide by placing a pile of books underneath one of its sides. Ask children to pick up the objects one-by-one, and make an estimate (predict) whether the object will slide or roll down the plank. Then keep one of the objects on the plank. The object will either slide or roll down the plank, depending on its shape. Sometimes, this would also depend upon which side of the object has been placed on the plank. This means that the same object can slide or roll down the slide, depending upon which of its sides is touching the plank's surface. For example, a round powder tin with a flat base will slide down if kept on its base on the plank and roll down if placed with its curved surface on the plank.

The children record the results of their experiment in a tabular form (Stage 1). This table can be provided on a worksheet (see below) or drawn on the class blackboard.

Stage 1 **Name of Object/ Picture of object**	**Slides**	**Rolls**
Powder box Marble		

After they note down their observations for each object (Stage 1), help them to analyze the results they have obtained and present the result as shown below. This will be Stage 2.

Stage 2 **Only slides**	**Only rolls**	**Slides and Rolls**
Sharpener	Marble	Powder Box

Once this data is recorded, help children to analyze the properties of the surfaces of different objects. For example, which objects slide and why do they do so? This will help in enhancing children's understanding of shapes and their properties.

Activity 5 (Grade 2)

Divide children into groups of four or five children. Ask the children in each group to arrange themselves in a line with an increasing/ decreasing order of height. Then one child from each group has to name the tallest child and the one who is the shortest in the group.

Now ask one child from a group to leave his/her group and try to find where he/she should stand in the next group. When this child finds his position and stands in the line, the other children have to say whether the child selected the correct position. In this way give turn to every child.

Activity 6 (Grade 2)

To help children understand the difference in the relative size of two objects, you can carry out the following two activities:

a) Show children two containers of different shapes, and ask them which of these is bigger. Ask them why they think so. This will help to develop their ability for abstract thinking and why something is being considered bigger or smaller as compared to something else.

   If they are not able to tell, then ask them to fill up one container with water to the brim and then pour it into another container. Help them to understand their observations by asking them questions such as:

   - Could all the water from the container be poured into the second one?
   - Is some water left in the first container?
   - Did the second container get filled to its brim?
   - Which container could take more water?
   - Based on their responses help them to identify– Which container is bigger?

   Even if the children could identify correctly in the beginning which container is bigger, help them to verify their answer by carrying out the above activity of pouring water.

b) Show children a jug full of water and a glass. Ask them to estimate how many glasses of water can be filled from the water in the jug.

c) The size and shape of objects determine their capacity (how much of something they can contain) and ultimately their use. Ask children the following questions about containers usually used in the house:

   - Why is a certain container appropriate for storing sugar and another for water?
   - What container will be used for storing rice or wheat? Would it be alright to store salt in the same container?

Activity 7 (Grade 2)

By changing the questions given in Activity 6, you can help the children to understand the principle of conservation. Give the child a glassful of water

and another empty glass of a different shape. First, ask her to estimate whether all the water from the first glass can be poured into the second glass. Then, tell her to pour the water into the second glass. When all the water is poured into the second glass, ask her whether the water was more in the previous glass or this glass or if the amount of water is the same. Help her to reach the answer by asking her questions which make her focus on the height and width of the two glasses.

Activity 8 (Grade 2)

This activity will help to develop specific vocabulary related to shape and space. It will also help strengthen the ability to take another person's perspective.

Divide the class into 3-4 groups. Provide each group with cut-outs of shapes such as squares, triangles, rectangles, and circles. Ask one child in each group to make any figure using these shapes, such as Figure 18a below.

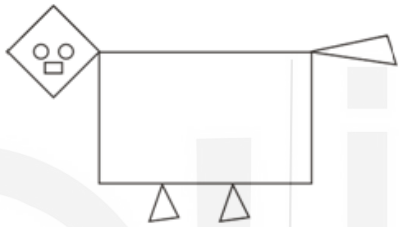

Fig. 18a

The other children in the group should not be able to see what the child has made. Then ask this child to give directions to the other children in her group in such a manner that they too can make the figure as she has made. While giving directions, the child is not allowed to use her hands to indicate or point out something, nor is she allowed to use statements such as "put the tail" or "make the head". The child can use the names of the geometric shape and can also use words that indicate the relative placement of the shapes with respect to each other such as below, above, to the right, topmost, bottom, diagonally, and centre. Thus she can say, "Put the triangle below the rectangle in the middle." You will have to ensure that all children can hear the directions and do not copy each other's creations.

After the activity is over, it is fun for children to compare with each other what they made as well as with what the child giving the directions had made. Ask the children questions like the following – Do all the figures look alike? In what ways are they different?

Do you think the figures made by the children would be similar since they were getting similar directions? Do you think their figures will be like the figure made by the child giving the instructions? If not, what do you think are the reasons for this?

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When this activity was carried out with a group of children in class 2, it was found that the figure made by each child was different. One reason for this was that children differed with respect to their vocabulary related to space and shape. Thus, at times, the instructions given by the child were not adequate and at other times the children making the figure did not understand the instructions. Also, children found it difficult to take another person's perspective. To give instructions, the child has to imagine what the figure would appear to the other children.

You can repeat this activity so that each child gets to make his/her own figure and give directions to others. You can ask the child to be more careful while giving directions now that he/she has participated once in the activity. Do figures made by the children in the group become more like the original figure gradually?

Activity 9 (Grade 2)

To help children understand that things appear different from different perspectives (angles or positions) carry out the following activity:

- Ask the child to describe or draw how the things in the room would appear if they were to peep into the room from the ceiling.
- Ask them to describe or draw how their house would appear to an ant.
- Ask them how the classroom would appear if they were to look at it upside down.

Activity 10 (Grade 2)

This activity is called 'Composing Pictures'. It includes composing pictures using basic shapes. You would need basic shapes cut out of greeting card paper, newspaper, colours, and gum.

Begin with composing figures made up of basic shapes on the blackboard, e.g., a boat, a house, or a fish, and then ask the children to come up and pick up as many pieces of each shape that they need to make the pictures and stick these on their sheet. They could stick the pieces, and colour them or make designs on them.

As the children are working, go around and have a conversation with them – How many circles did you need; how many semi-circles?

At a later stage, the children could be asked to make say two boats or three buses. They have to pick up as many pieces as they need. The teacher engages them in conversation about the pictures they have made and about the number of pieces they have picked.

Check Your Progress Exercise 2

1) 'Round' in everyday terms can stand for ball, bangle, or coin. That is, it can represent a sphere (ball), a disc (coin), and a circular circumference like in a bangle. How would you help children to see the difference?

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18.5 UNDERSTANDING AND READING MAPS AND PICTURES

An important aspect of our understanding of space is the ability to read and draw pictures and maps.

Most children see colourful pictures around them from a young age. A picture is a two-dimensional representation of a three-dimensional object. We, teachers, use pictures in many of our activities with children. Most books for children are full of pictures. We assume that the child will look at the pictures, that the pictures will attract the child and create an interest in her to read the book, and that the pictures will help her to understand the progression of the story. Often, when teaching the children to count, we begin by using a lot of pictures and symbols. But what we need to ask ourselves is – Can young children read pictures and, if they can, what is the sort of information they derive from the pictures? Do children read pictures in the same way as adults?

A map is also a kind of picture. It is a representation of a larger space/landscape/area that exists in the 3-dimensional world by scaling it down to a 2-dimensional representation. Children as young as 4-5 years old may attempt to explore maps in their surroundings and even create one under adult assistance. This would not be like an adult map but would certainly show a child's growing awareness of space.

18.5.1 What is Involved in Reading a Map or Pictures?

The ability to read maps and pictures involves being able to understand how the three-dimensional world is represented on two-dimensional paper. It involves understanding how objects occupy space in the real world and how this is to be represented in a two- dimensional way on paper. As a result of this two-dimensional representation, many features of the object get lost in its drawing. However, to read the map/picture correctly, the child needs to recreate this understanding in the mind and read the picture accordingly. For this, the child needs to understand that pictures, discussions, and maps are a representation of reality and that they are made with certain principles and rules. **These two rules are concerned with proportion and perspective.**

The various parts of an object, person, or scene in a picture are made according to their proportions in real life. We show perspective when we show objects as far or near to the reader and in relation to one another. For example, one of the principles that the child needs to understand while reading pictures is that objects made in the top half of the page can be objects that fly in the sky or they are those which are behind the objects depicted in the lower half of the page. Objects nearer to the reader are shown as bigger and those farther away as smaller. There principles of proportion and perspective are used together in the drawing.

As with other abilities that you have read about, there is a developmental sequence in the emergence of the ability to read pictures – in other words, children become better at reading pictures as they grow because their space-related understanding develops with age. Some of the points that you may

like to think about in this context are the following:

- Does a child see a picture as a whole or does she focus on its parts?
- Does a three-year-old child read a picture in the same way and derive the same information from it as her parents or older brothers and sisters?
- If the child sees a series of related pictures, does she see the link between them?
- There are certain rules that we follow while making a picture, such as that of proportion and perspective. Does the child understand this rule and read the picture accordingly?
- Can the child connect what is shown in the picture with her real-life experiences?
- Do pictures help in learning to read words? Or can they sometimes be the source of confusion?

If you hear children talk while they are examining pictures, or if you ask them what they see in the picture you will find that they do not make the same links as adults do while reading the picture. What children find important in pictures may be quite different from what adults find important in the picture. Generally, children try to link the picture to their experience and try to see themselves in the picture. We can say that they begin to identify with the picture. You may have seen that a young child identifies a woman in the picture as her mother, other children as her brothers and sisters, and animals as her own pet animals. On the other hand, adults look at pictures more objectively. We will answer the questions that we have raised above with the help of examples.

Example 1

A two-and-a-half-year-old girl was reading a picture storybook with her father. The book had the following picture.

Fig. 18b

On seeing the picture, the child said, "Look ! This dog is bigger than the elephant! And how can the elephant stand on top of the house? The house will break !"

The child's father while narrating this incident to his friend said, "My daughter has seen an elephant many times. She knows that an elephant is bigger than a dog. She also knows that a dog or a bird can easily pass from underneath the elephant or the bird can sit on the elephant. However, the picture confused her, she could not interpret the picture properly since she could not understand the depiction of depth and perspective. Of course, this incident happened about four years ago. Now, she knows why the dog was shown bigger and that the elephant was not acually standing on the house."

Read the following questions and try to answer these, and then compare your answers with ours that follow:

- Does the example tell us anything about the child's ability to understand proportions and perspective?
- What is it that the child seems to have understood four years later?

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The two-and a-half year old child does not understand the rules of proportion and perspective in the picture as older children would. Therefore, she does not read the picture in the same way as older children and adults do – that drawings of objects in a picture are made in proportion to the size of the object in real life; and that the size of the object in a drawing depends on the perspective in which it is shown – it will be bigger if shown nearer to the reader and smaller if shown farther away. This understanding develops gradually. As children grow older, they begin to understand the rules of representation on two-dimensional paper and are better able to understand what the writer wants to say through the picture.

However, for children to understand these rules and to get familiar with these, they need to be provided many opportunities to see pictures, read pictures, and talk about what is represented in them, with adults and other children. Encouraging the child to talk has many advantages:

- The child gets a chance to express her thoughts and this helps her to clarify her thinking.
- We, adults, get to know what the child thinks.
- As the child talks with others, she gets to know what meaning other children/adults find in the pictures.

Example 2

Hia is in class 1. One day, she was reading a picture storybook with her aunt. Her aunt wanted her to name all the objects and talk about the scenes shown in the book. She showed Hia what she meant by naming a few objects/ creatures and talked about a few scenes as depicted in the book. Now, Hia also began to look carefully at the pictures, and she named objects, and talked about these. While she could name almost all the objects/creatures depicted in the book, the names she used were not the exact names of some. For instance, looking at a rake (a farming tool), she called it a 'comb'. Similarly, in one of the scenes, a girl was swinging high and Hia explained it as the flying girl.

This example brings out that children may not understand a picture in the same way in which we want them to understand it. It was expected that Hia would name the objects as an adult does but this was not the case and it is okay. What conclusions would you draw from this example? Write your response in the margin.

18.5.2 Developmental Progression in Pictures Made by Children

By the time children are two to three years old, they begin to make marks on paper and start to draw. It is possible that we do not find children's 'drawings' meaningful. But if you talk to the child, you will find that the child had a meaning in mind when she made her drawing. She has a definite idea about what she has drawn even if this idea is not evident to you from her drawing.

Young children's drawings do not reflect the correct proportions of objects. When the child makes a drawing, the first thing she makes is what is most significant for her. This object or person or the part of the person or object is usually bigger than the rest. As the drawing develops, each subsequent object/person that is added becomes smaller. Look at some of the following drawings to understand what we mean.

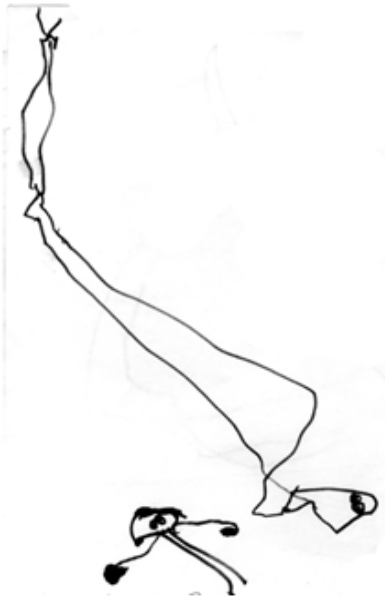

Fig. 18c

The drawing in Fig. 18c has been made by a 3-year-old child. On being asked, the child stated that the bigger figure in the drawing was that of her father and the smaller figure was that of her brother. Since the brother is small, his legs are small and since the father is big, his legs are big, the child clarified. Hardly, any other part of the body has been made. It is clear that the difference in the legs of the brother and the father is what the child found the most significant, that has dominated her thinking and that is what she has made. Of course, from our adult perspective, we would find many things 'incorrect' about the drawing – the proportion of body parts, and the layout of the picture. As a teacher of Grade 1 or Grade 2, what would be your feedback to the child?

- Would you tell her to correct her picture because the proportions and perspective are not appropriate?
- Or would you appreciate her drawing and try to understand what it tells about the child's environment and her thought processes?
- If you tell the child to correct the picture, do you think she would be able to?

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Our answer to the questions above is 'no', 'yes', and 'no' respectively. With respect to the last question, we would like to clarify that telling the child is of no use. What she needs is many opportunities to draw. Gradually, perspectives and proportions in her drawing would change. This is because the drawing is linked to how the child thinks at a particular age. When there is growth and development in the child's thinking, this is represented in her drawings. Telling the child to do something without allowing her to try to find out for herself has no impact.

Fig. 18d

The drawing showing in Figure 18d has been made by a 5-year-old child wherein the child has shown her sister and herself. When asked, the child said that the bigger picture was that of her sister and the smaller was hers. There are many differences between Figure18c and Figure 18d, such as:

- the degree and correctness of detail
- the placement of the figures on the paper
- the proportions of the parts of the body with reference to their actual size.

The drawing made by the five-year-old is more like the actual person and more proportionate as compared to the three-year-old. Can you say why?

Children's drawings are a reflection of their stage of cognitive development. As the child grows, her thought matures, her observational skills grow and the drawings become more and more a closer representation of reality. Can you now understand the point that we have made above – that it is important to understand that there is nothing 'correct' or 'incorrect' about children's drawings?

Children are dominated by what is significant for them and this is evident even when children read pictures. For instance, a child on seeing a picture remarked that of all the animals depicted in the picture, the tiger should have been the biggest as it is the most powerful. So in the drawings of children, what is significant is prominent in location and size.

It is, therefore, important to talk to the children about the pictures they have made to understand their work and also to give them feedback on their work. The feedback has to be subtle and gentle. It could include helping the children draw another similar picture and helping her make it more communicative to the third person. We know the child is not able to look at things from another person's perspective. For her to visualize how another person would look at her drawing is not possible. All of us need to, therefore, look at pictures drawn by children from their point of view and recognize that what we normally would call 'mistakes' and 'errors' are differences of perception.

18.5.3 Activities to Foster Picture /Map Reading

As you would have understood by now, drawing and reading pictures is a way through which children meaningfully express their ideas and thinking. This ability develops with age as they get opportunities to draw and talk about their drawings with adults and other children. Unfortunately, the way our education system is structured, the way our curriculum is framed and the way our teaching is carried out, we hardly give children the opportunity to present their view of the world through their drawings and communicate to us how they think. Of course, we as adults use a lot of pictures in our books and during teaching. Our purpose in using these pictures is to communicate information to the child. We see pictures in a one-sided manner – to communicate what we want to say or tell the child.

We do not bother either to:

- See whether the child has understood the picture the way we wanted the child to; or
- Give the child a chance to draw and show us how she views the world.

The following are some activities that will strengthen children's abilities to read and draw pictures:

Activity 1 (Grade 1)

Divide the children into groups and give each group a picture depicting many things and/or a situation. Remember that whatever you depict, should be familiar to the children. Each team should see the picture and discuss what objects are visible in the picture, what is happening in the picture, which things are the farthest away from a particular object, which objects are in the front, which is at the back, what is above certain objects, what is below certain objects. Then each group describes to the other what they have seen/discussed. You must be careful and see that each child gets a chance to speak.

When the children are examining the picture in groups, the teacher can help the children observe the picture properly, carefully, and in-depth by asking specific questions that focus their attention on various aspects of the picture. You can introduce various space-related words to the children and encourage them to talk about the picture using these words – 'up', 'down', 'below', 'far', 'near', 'inside', and 'outside'.

If the whole class gets the same picture, then the children can be involved in the following activity to strengthen their understanding of space and space-related vocabulary: Divide the children into groups, and then one group asks questions to the other group related to the picture and the second group has to answer these. For example, who is hiding behind the tree?

Activity 2 (Grades 1and 2)

Give children paper and crayons. Let them make drawings and figures as they like. Then ask them questions about what they have drawn or ask them to describe what they have drawn/ what is happening in the picture. Ask them to show what they have drawn to the whole class. This will help children to express their ideas and you will get to know what they think. You can ask the children if they would like to add something more to their drawing. Your questions may stimulate them to extend their drawing without you having to ask them to do so.

Activity 3 (Grade 2)

Take a series of pictures in which an event/situation/process has been shown in its various stages. For example, the life cycle of a tree. Ask the children to arrange the pictures in a meaningful order so that a sequence is evident from the first to the last and a relationship is established between one picture and the one following it. If children do this activity in groups, then they get an opportunity to talk to each other as well.

Once the child/group of children arranges a particular set of pictures in series, the child has to explain the basis for the sequencing – in other words, why

she has arranged the pictures the way she has. This will help the children to articulate their thinking and you will also come to know what the children think.

18.5.4 Activities to Strengthen the Ability to Draw and Map Space

The following are some activities you can carry out to help children develop the ability to map space.

Activity 1: Map Making(Grade 2)

Ask children to make a map of their class, neighbourhood or home.

Figure 18e is a map drawn by the child of her locality. The letter box is the most prominent feature in the drawing as the child found this to be the most important.

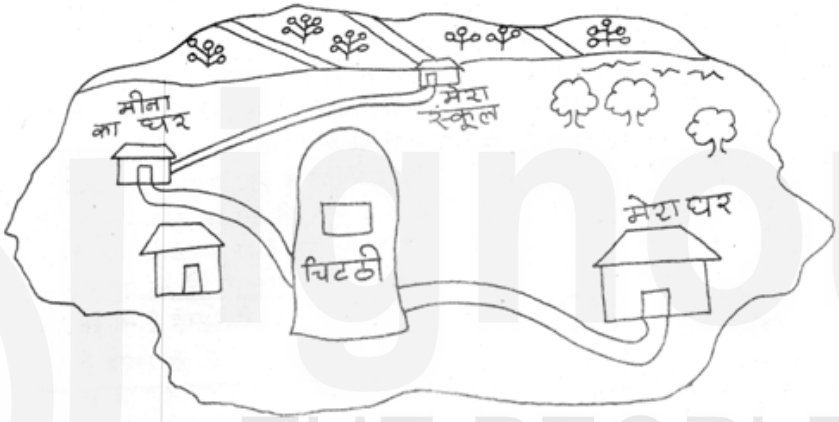

Figure 18e

In this context, an experiment was done in a school. Children were asked to make a drawing of their class. One of the sample drawing in shown in Figure 18f. Some children began with the teacher's desk and made it the largest.

Fig. 18f

Others made their own desk larger than all the other desks in the picture. There were a lot of variations in how the children depicted the legs of the table. Some objects depicted in the drawings had been made larger than what they were in real life because they were important for the child.

Activity 2: Learning about Symmetry

To be able to represent the real world pictorially, the child needs to learn certain space-related rules. We have already spoken about two rules earlier – **proportion and perspective.** Another rule /principle that the child needs to learn is the rule of **symmetry** in an object or among a group of objects.

How will an understanding of the characteristics of symmetry help the child? Suppose you are asked to see an object from a certain angle and then asked to make its drawing as it would appear from various angles. For example, think of a ball. Whichever angle you look at a ball from, it appears the same. This is because the ball is a symmetrical object – it has infinite lines of symmetry and infinite planes of symmetry.

If you can identify the line of symmetry of an object, it is easier to make its picture/ drawing. This is true for children as well. However, in the school curriculum, not much importance has been given to developing the child's ability to understand and use the property of symmetry as well as other rules of representing the three-dimensional world on two-dimensional paper. The result is that even the older child's ability to represent the real world pictorially is severely limited.

Activity 2: Map Reading : Treasure Hunt (Grade 2)

This activity develops children's ability to read maps.

Carry out this activity in the following way:

a) Create a map of the class. The map will need to be a simple representation of the important things in the classroom. Everything does not have to be represented on the map.

b) Divide children into two groups.

c) Ask one group to use the map to hide the treasure. That is, they should hide the treasure only in the locations depicted on the map.

d) Then they should give the map to the other group to use to locate the treasure.

e) Observe how children hide and locate objects and reflect upon what this tells you about their understanding of space.

Check Your Progress Exercise 3

1) Fill in the blanks:

   a) Picture is a ……representation of a three-dimensional object.

   b) The three rules that help to represent the real world pictorially are ……. and ……

   c) In pictures, objects nearer to the reader are shown as …….. and those farther away as …… ..

2) Do you agree with the statements given below? Write down yes or No. Give reasons if you do not agree.

a) The young child may not understand the rules of proportion and perspectives in the picture as older children would and therefore do not read the pictures in the same way as older children and adults.

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b) Young children's drawings reflect the correct proportions of the objects as they exist in the real world.

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3) Carry out the following activity with a three-year-old child, a five-year-old child, and a 10-year-old child.

Show the three children a picture that has situations/ objects familiar to all three children. Ask the children to describe what they see in the picture.

Note if there are any differences in the way each child reads the picture. Write down your observations.

a) For a three-year-old child

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b) For a five-year-old child

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c) For a 10-year-old child

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4) Read a picture storybook with a small child – about three or four years old. The book will have characters repeated on pages and these characters will be involved in different situations and doing different activities. Try to find out by talking to the child whether she realizes that the characters in different pictures are the same or does she thinks that they are new characters each time. Try to find out based on the child's response whether the pictures helped her to understand the story or they created some difficulties for her. Write your conclusions below.

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18.6 SUMMING UP

Children require appropriate activities to help them understand and develop concepts related to space, shape, and size such as those of 'near-far', 'inside-outside', 'before-after', 'above-below', 'right-left', 'big-small', 'relative size', 'taking another person's perspective', 'conserving amount', 'length', 'volume', 'seriating based on a property', etc. Various such activities are described in this Unit.

Most children see pictures around them from a young age. The ability to read pictures involves being able to understand how the three-dimensional world is represented on two-dimensional paper. It involves understanding how objects occupy space and how this is to be represented in space (on paper). The child needs to know the rules that are used while making drawings. **These rules are about proportion, perspective and symmetry.** The young child may not understand the rules of proportion, perspectives, and symmetry in these pictures as older children would and, therefore, do not read the pictures in the same way as older children and adults. There is a developmental sequence in the emergence of this ability. In other words, children become better at reading pictures as they grow because their space-related understanding develops with age.

Children need several opportunities with adults and other children to see pictures, read pictures, and talk about what is represented in them. The ability

to read pictures enables children to learn how to map space. Various activities for fostering picture reading abilities of children have been discussed in this Unit.

18.7 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

1) b and d

2) a) You can ask children to arrange various objects as 'inside' and 'outside' of something. For example, you may ask them to observe the classroom and ask questions such as – what is inside the cupboard, what is the cupboard inside of, what is the class inside of?

   b) You can give them a simple maze (print) and ask them to mention how many left and right will it take for them to cross the maze.

Check Your Progress Exercise 2

1) To get children to see the difference between them, it is important to get them to think of various examples of such items and then categorize them as those that are like a ball (sphere) like a bangle, or like a coin (disc).

Check your Progress Exercise 3

1) a) two-dimensional

   b) proportion, perspective, symmetry

   c) bigger, smaller

2) a) Yes!

   b) No. When the child makes a drawing, the objects or the parts that she finds significant are shown as bigger than they actually are.

3) The children's responses will be different depending on their age. Analyze their response based on what you have read in the text.

4) Probe the child's thinking by asking her different questions. Do not stop with simply one question.