Section E

Doing and Learning

‘I do and I understand’, goes the age old maxim. The design ideas in this section provide ample open-ended opportunities to children, through activity boards for doing, making or expressing themselves creatively. A chance for each child to assert individuality through experiences of fun and enjoyment! The physical accessibility and concrete experience of such opportunities is possible in the built environment.

25 Activity Boards and Surfaces on Walls
26 Dot Boards on Floor and Walls
27 Grid Boards
Introduction

There is no single, unified learning process. Each child brings a unique combination of experiences, skills and perceptions while exploring or using an activity or material. It is because of this that the same activity can be performed in different ways by different children, so as to make it understandable and meaningful to its individual user. Open-ended activities, within a school, that allows divergent uses are important for reinforcing the diverse natural learning processes of children. However, most curriculum related school activities are convergent in nature. By confining children to structured classroom activities, natural processes of learning may get hampered. Often schools do not provide sufficient additional opportunity for natural learning behaviours and activity.

Activity Boards and Surfaces offer a range of wallboards, that provide spaces for open-ended creative experiences with a variety of shapes and patterns that the children find in their world. The shapes can range from those of leaves, alphabets, thumb prints or regular geometrical figures to irregular squiggles. This kind of active engagement through fun provides a multiplicity of active learning experiences of language, art, geometry, appreciating nature or sensory perceptions, in non-threatening and enjoyable ways.

Teaching-Learning Activities

Activity 1: Shape Poems

All classes

Shape poem boards can be used to draw or write within or outside the shapes provided. The teacher should first demonstrate a few shape poems and then encourage children to make their own.
**Activity 2: Alphabet Shapes**

**Classes II, III, IV**

Similarly demonstrate making funny and exciting animals out of alphabet shapes.

**Teacher’s Role**

Because these boards are intended to provide many informal learning situations, the teacher’s main role is to encourage the use of these boards to develop the creativity of the children. She must make sure that white chalk and coloured chalk are freely available.

A damp cloth or duster must be in a special place nearby.

Do use these boards yourself and encourage children to use them. When children use the board in a creative manner, be sure to appreciate it and show it to other students.

**Objectives**

1. To be used in many informal situations as wished.
2. To be used for particular purposes such as a poem shape board or alphabet shape boards.
3. To promote creativity and confidence in a non-threatening situation.
4. To promote experimentation with drawing, making patterns and designs, playing with alphabet designs.
5. To develop social skills in small groups.

The plain Children’s Wall could be outside on school walls or on a boundary wall in the garden. Generally it will be used for free artistic activities.

**Suggested Activities**

1. Shape Poems
2. Alphabet Shapes
3. Using the Geometrical Board
4. Using a Thumb Print Board
5. Theme on a Mural on Childrens’ Wall
Activity 3: Using the Geometrical Board  
Classes III, IV, V

The geometrical boards supplement math activities. Children can be given three or four or more different colours of chalk and asked to fill in patterns on the boards.

Activity 4: Using a Thumb Print Board  
Classes III, IV, V

Thumb prints of different sizes and combinations can be used to fuel imaginations of children to make various expression animals or objects around them. Some of these ideas are given in the guide on the top of Thumb Print Board.

Space for Notes
Activity 5: Theme on a Mural in Childrens' Wall

Classes V, VI, VII, VIII

a) You can sometimes plan a mural with a whole class. A topic or theme could be taken and thoroughly planned and discussed. Children can be given different sections to draw and colour.
b) Similarly a large mural can be planned. It would have to be well planned in advance and preliminary drawings done before the work starts. This involves fairly detailed planning which gives children valuable experience in executing projects.
26 Dot Boards on Floor and Walls

Introduction
Drawing and scribbling are natural behaviours for children. However, learning to draw regular shapes or outlines of specific objects in a realistic way, requires skill and practice. Copying and drawing on a blank sheet can be difficult. The regularly spaced dots in rows and columns can be helpful to make symmetrical images, geometrical shapes or play games.

Suggested Activities
1. Following Directions and Angles
2. Representing Symmetry and Reflections
3. Understanding Geometrical Concepts
4. Drawing Repetitive Patterns
5. Playing Games
6. Understanding Measurements
7. Bar Line Graphs
8. Drawing
9. Addition
10. Conversion Graphs
11. Exploring Three Dimensions

Teaching-Learning Activities

Activity 1: Following Directions and Angles
Classes IV, V, VI
Listening to and following instructions, e.g., starting at A, moving one dot to the right, two dots up, and so on. These could also be given as moving East, moving North, etc. for more complex usage. In addition to this, the instructions may reinforce different angles, e.g., drawing a path from C to D using 3 right angles, as shown.

Activity 2: Representing Symmetry and Reflections
Classes IV, V, VI
Drawing a figure and forming mirror or inverted images in different directions.

Dot Boards on the walls of classroom, corridor and in walls of external spaces
Dot Board on the floor of a terrace
Teacher’s Role
The teacher will need to study his textbook and use the Dot Board as an aid to study geometrical shapes, symmetry, addition of areas, directions.

The teacher needs to devise problems for the children to solve. For example, if the teacher wishes to teach mapping of the school or town, the Dot Board will help children estimate distances better than just using a plain piece of paper.

Objectives
1. To follow directions.
2. To understand mathematical vocabulary concerning geometry such as angles, shapes, symmetry, parallel.
3. To understand the relationships between shapes.
4. To understand measurements.
5. To understand area.
6. To represent volume.
7. To invent games.
8. To draw patterns.
9. To represent data.
10. To develop and enhance creativity.

Activity 3: Understanding Geometrical Concepts
Classes III, IV, V, VI, VII, VIII
Drawing regular geometrical shapes can be done on the Dot Board. These may further be divided into two, three or four equal parts to make other shapes, which children may then identify. E.g. a square may be divided into triangles. The children could count the number of dots enclosed within each shape or they may count the number of sides and corners. The teacher may give instructions such as;
   a) draw a rectangle
   b) draw diagonals in the rectangle
   c) measure the bisected lengths of the diagonals and find their relationship

Using Dot Boards for making patterns and kolams in classroom, corridors or boundary walls
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Class VI, VII and VIII can use the dots to calculate areas.
Also, teachers can conveniently demonstrate higher geometrical concepts such as quadrilaterals, parallelogram, rectangle, square, rhombus and trapezium. Children may be asked to draw them on the board and verify their properties. It is easy to use the Dot Board to draw exact figures.

**Activity 4: Drawing Repetitive Patterns**

**Classes III, IV, V, VI**

Patterns in the form of simple steps that can keep growing may also be provided in the borders of Dot Boards. These dots may be also used for drawing Kolams and other traditional patterns.

**Activity 5: Playing Games**

**Classes II, III, IV, V**

Children like to play a game known as ‘Dot-Dot’. One child takes pink chalk and draws a line from one dot to another dot. Then the next child takes a blue chalk and draws a line from one dot to the next. She tries to make sure that her opponent cannot draw a box, while she draws a box. When one child makes a complete box, she puts her initial in it.

**Activity 6: Understanding Measurements**

**Classes IV, V, VI**

a) Children can explore measurements by joining dots that have been spaced by 5cm and by increasing the number of dots joined to form lines. Square numbers like 2 x 2, 3 x 3, 5 x 5, can be explored visually by using the dots, as shown. The corresponding increase in the length and the width can be measured and noted.

b) Draw a right angle triangle without geometrical instruments. Does the angle change as you extend the lines?

c) Draw approximate angles 135°, 45° with the help of the dots.

d) Make different types of triangles with the help of the dots.
Activity 7: Bar Line Graphs

Classes III, IV, V, VI, VII, VIII

These graphs can be made using the Dot Board.

Suppose you want to make a record of milk producing animals. First make a data collection and record it on the chalk board.

Cows: \(\text{IIIII IIII II} = 12\)

Buffaloes: \(\text{IIIII IIII IIII III = 18}\)

Goats: \(\text{IIIII III} = 8\)

Then make the graph on the Dot Board with a title:

*Milk Producing Animals in a community*

The children will notice that the bar-line graph has:

- a title
- labelled axis
- a vertical line bar for each animal
- equal spaces between the lines

Activity 8: Drawing

Classes II, III, IV, V, VI, VII, VIII

You can draw many *Rangoli* patterns using the Dot Board.

Activity 9: Addition

Classes V, VI, VII, VIII

Shade the area between the 8 dots horizontally and 4 dots vertically. A statement problem such as the following may be framed:

Eight children are sitting in a row. There are four such rows. How many children are sitting there?
26 Dot Boards on Floor and Walls

Teachers must encourage children to solve these problems and then discuss how they have solved them. Likely solutions could be:

- $8+8+8+8 = 32$ or
- $(4+4) + (4+4) + (4+4) + (4+4) = 32$ or
- $(8+8) + (8+8) = 32$ or
- $16+16 = 32$ or
- $8 \times 4 = 32$ or
- $4 \times 8 = 32$

Another problem could be to add dots covered under two rectangular arrays namely:

- $8 \times 4$ dots
- $2 \times 6$ dots

Solutions can be:

- $(8 \times 4) + (2 \times 6) \quad 32 + 12 = 44$ or
- $(10 \times 4) + (2 \times 2) \quad 40 + 4 = 44$

Activity 10: Conversion Graphs

Class VI, VII, VIII

Once children have hands-on experience of measurements, they can be asked to draw conversion graphs on the Dot Board and learn to read them.

Conversion graphs could be for feet to inches, miles to kilometres, length, area, volume, mass, power and so on.
Activity 11: Exploring Three Dimensions

Class V, VI, VII, VIII

These boards have dots staggered in such a way that they are aligned diagonally. Such staggered dots are ideal for drawing three dimensional shapes. Dot boards with staggered dots may be placed in the Classrooms of IV to VIII so that children can try and draw the various three dimensional shapes on to the dots.

Space for Notes
Grid Boards

Introduction

Grid Boards are provided at suitable heights so that teachers and students can use them. Squares on the boards are large enough to be seen from a distance. Also, children can easily write in them. These boards are in the classrooms, corridors, and outdoor settings.

Grid Boards are writing surfaces composed of 100 squares arranged as 10 rows and 10 columns. A wide border, surrounding the grid, provides additional surface for writing and explaining the activity that is happening. When the teacher has demonstrated the activity, then children can move to the Grid Boards on the corridor walls, classroom walls, and floor and do exercises given by the teacher.

Suggested Activities

1. Learning Numbers
2. Number Activities
3. Number Activities for Greater Challenges
4. Fill in the Blanks
5. Number Patterns
6. Fractions
7. Higher Multiplication Tables
8. Nature Walk

Teaching-Learning Activities

Activity 1: Learning Numbers
Classes I, II, III, IV
Numbers 1 to 100
The Grid Board next to the chalk board is for the use by the teacher. In class 1 children must use concrete materials such as leaves, stones or seeds. The teacher can

Using classroom Grid Boards
Language activities on Grid Boards
Mathematical activity on Grid Board
**Teacher’s Role**

Because the Grid Board has immense possibilities, the teacher will need to know what the requirements of the syllabus are. The National Curriculum Framework (NCF) 2005 encourages the teacher to use the environment around the student to enhance learning. Your Grid Boards can constantly facilitate various uses. Equally important, you can give many exercises for practice, where children work alone or in groups.

**Objectives**

Grid Boards can facilitate understanding of:

1. Numbers
2. Numbers – before and after
3. Number patterns
4. Even and odd numbers
5. Ascending and descending numbers
6. Place value
7. Multiplication
8. Fractions
9. Pictographs and bar graphs
10. Mathematical operations
11. Making coordinates and graphs
12. Drawing
13. Mapping exercises
14. Geometrical shapes
15. Making figures based on geometrical shapes
16. Language activities

Be creative!!

Circle number two and children can put out 2 leaves. She may circle number 7 and the children put out 7 leaves. Gradually the board will be filled with numbers to 100.

**Activity 2: Number Activities**

**Classes I, II, III, IV**

Children find it difficult to conceptualize numbers to 100. As they practice filling in the Grid Board, they can:

- Drawing different types of figures
- Coordinates on Grid Board

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they will slowly understand. Teachers need to know that years of practice is required. It helps to have the Grid Board divided by a heavily painted horizontal and vertical lines showing four distinct quarters. It helps children to find the numbers easily.

The following instructions can be given. You will need to decide what your children are capable of. These are just examples.

- Point to number 5
- Point to number 8
- Where is 40 written?
- Where is 20 written?
- Place the pointer on 12
- Place the pointer on 12+1
- Put the pointer on 20+20
- Place the pointer on 50+50
- Place the pointer on 13-1
- Show me the number before 16
- Point to 30+2
- Show me the number that is one half of 20.
- Point to the number that is one half of 6

Note: Have variety in your language.

**Activity 3: Number Activities for Greater Challenges**

**Classes II, III, IV, V**

Mark out 10 squares by 10 squares on the grid. Do NOT put in any numbers.

Do exercises similar to the above. Children will have seen a pattern in the numbered board and now can find the correct numbers in the empty Grid Board.

**Activity 4: Fill in the Blanks**

**Classes I, II, III,**

In order to understand numbers before and after and in-between, the teacher should fill-in some numbers in the Grid Board and leave other spaces blank. The children will fill-in the correct numbers.
Activity 5: Number Patterns

Classes II, III, IV, V

a) The teacher may write numbers 1 to 100. Children can then group them into 2's (or 3's or 4's) with coloured chalk. Children will notice the pattern. Grouping by 2's may start by demonstrating body parts that come in 2's. This work should be done concretely with sticks or seeds before using the Grid Board.

b) The teacher colours in alternate numbers on the Grid Board, such as 2, 4, 6, ... Then children must predict the pattern. This can also be done by drawing a pattern in the grid squares and asking children to complete the pattern. For example, teacher can divide a square by drawing two diagonal lines with a dot in two triangles and children can continue the pattern.

c) Multiplication tables are also patterns. First children should make the multiplication tables with seeds. Then fill in the tables on the Grid Board with coloured chalk. All the different tables make different patterns.

As children use the Grid Board and patterns appear, mathematical vocabulary such as parallel, diagonal, even, odd, blank, groups, skip can be introduced when it is appropriate.

d) Point out patterns such as 10+10, 20+10, 30+10. Write them on the board. Notice the pattern. What comes next? Or 5+10, 15+10, 25+10. A pattern now appears. Continue to make the patterns.

e) Point out the patterns of diagonals. In any square formation, the total sum of numbers on both the diagonal lines is the same. Let children find other patterns. 1+12+23=36 and 3+12+21=36. The teacher can mark squares on the board with coloured chalk and have children add diagonals.

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Activity 6: Fractions

Classes III, IV, V, VI, VII, VIII

a) Just as numbers were identified on the Grid Board, fractions can also be identified.

Examples are:
- What is half of 24?
- What is half of 44?
- What is 1/4 of 100?

While doing this, teacher may also write on the writing surface. ½ of 4 or ½ x 4 or 4/2, depending on the ages and stages of the children.

b) Fractions may also be shown on the Grid Board without any number. One row or column can be shown by darkening the lines. Now colour one square and show that it is one square out of 10 or 1/10.

Now add one more square and write 1/10 + 1/10 = 2/10

When the whole board is considered then the name of one square changes to 1/100 or one square of one hundred squares.

After doing this exercise a number of times, children can be given problems and asked to work by themselves.

Activity 7: Higher Multiplication Tables

Classes V, VI, VII, VIII

Two columns on the Grid Board may be highlighted with chalk. A diagonal line can be made with a different colour of chalk.

Suppose the table of 12 is to be made. Write the tables of 1 and 2 as shown in the diagram.

The number in the right hand corner has a place value of ones.
The two numbers in the center have a place value of ten.
The number in the left corner has a place value of 100.

Now look at the bottom row. 12 X 1 = 2 + (0+10) + 0 = 12
Now look at the second row. 12 X 2 = 4 + (0+ 20 ) +0 = 24

Soon children will learn the pattern. Children will play with this pattern and soon will not need the equations. When three columns are used one can make the table of 125. Children can now make tables of large numbers with this method.
Do you realize that if you make the tables up to 9 on the Grid Board, you can even make the table of 9876543210!

**Activity 8: Nature Walk**

**All Classes**

a) This activity helps children understand the abstract concepts of mapping, space and distances. Design your activity depending on whether you live in a village or a town. Label your Grid Board as shown in the illustration with vertical numbers and horizontal alphabets. Then draw in pictures of things in your locality. Then write a story similar to this one.

Shaheen and Nancy went for a walk in the fields. They saw sugar cane, *arhar dal* and a tractor. As they stood on the bridge they saw a turtle. Look at the Grid Board and find a cotton field, carrots, *arhar dal*, sugarcane and wheat fields. Then answer the questions below the grid.

You, as the teacher can write questions similar to those below. Children can write on the writing surface or in their notebooks.

- What is the question if the answer is 2B?
- What is the question if the answer is 4F?
- What is the question if the answer is 7G?
- Where did they see a tree trunk?
- Where did they see storks flying?
- What is the question if the answer is 1B?
- Where did they see wheat fields?

b) Increase the complexity for higher classes.

You can write:

- If each block in the square is one quarter (1/4) square kilometer and Shaheen and Nancy started from the bridge, approximately how far did they walk to reach the cotton field? The tree, etc.?
- From the bridge approximately how far will they go to reach the wheat fields?
- If you put 4 square blocks together how many square kilometers is it?

c) To further help children with mapping concepts, look at your classroom and decide which wall faces North, South, East and West. Take a chalk and mark it on the floor or on the walls.

**Space for Notes**