Chapter 7 – EPL & Sensorial

Sensorial derives from the word sense or senses. The term Sensorial means where the five senses are used or stimulated. There are mainly 5 senses - sight, sound, smell, touch, and taste. Through sensorial activities, the child is capable to concentrate on the refinement of all his senses, from visual to stereognostic. Certain amount of development is inherent. In human beings many abstract ideas in mind come from some stimulation in the environment. The main aim of Sensorial work is for the child to obtain clear, conscious, information and to be able to then make classifications in his environment. Montessori assumed that sensorial experiences began at birth. Through his senses, the child studies his environment. Through this study, the child then begins to understand his environment. The child, to Montessori, is a "sensorial explorer". Through work with the sensorial materials, the child is given the keys to classifying the things around him, which leads to the child making his own experiences in his environment. Through the classification, the child is also offered the first steps in organizing his intelligence, which then leads to his adapting to his environment. She moreover said that activity must be given to the children for accuracy and precision.

Dr. Montessori when working with the mentally challenged children thought of making apparatus for the normal children also. Dr. Montessori's sensorial materials were basically taken from the objects used by Itard and Seguin. The apparatus were partly taken from the materials used for psychological tests and partly from the materials she herself invented through her own experimental works. When she made her own apparatus for the normal children she had let the children work with them she observed the frequency of use by the children and she also noticed the advantages derived from them. Through the trial and error method she modified her apparatus. She also believed in the muscular activity of the children, which later on make the children ready for more complex work --- writing.

The sensorial apparatus are exact scientific guide for the refinement of the five senses. The apparatus for educating the five senses provides the child a key to guide his discovery of the world. The sensorial apparatus hence offer Sensory motor activity to the child that understands movements through the five senses. The materials which are used gives a kind of guide to observation, for it classifies the impression that each sense can receive; the colors, noise, forms and sizes, touch sensation and odor and taste. In every group there are materials of same quality but in different degree. There is a regular but gradual distinction between various materials and wherever possible gradation is mathematically fixed that is why they are called Controlled Seriation. Limitations are there in the apparatus that is there is a maximum limit and minimum limit in the material which the child can easily determine. These are the main characteristics of the Montessori apparatus.

Learning occurs by taking stimulation from the surrounding and adopting them and then graduating it so that it is possible for the child to differentiate and classify. A child is already exposed to stimulus. He/she is learning to distinguish and classify by isolating one sense and by negating the other senses so that the child has an intense knowledge so that the child's attention is drawn immediately to that particular activity and can also perceive the truth. After perceiving the truth the child experiences and connects the knowledge to reality and internalization of knowledge takes place. The nature of the apparatus to some extent is a form of culture, for it leads the child to pay attention both to ourselves and to our surroundings.

The activity that the child does through the different apparatus not only helps the child to get knowledge but to build up this knowledge through the exercises that are introduced.

Through the Sensorial apparatus intellectual development occurs, it also heightens the sensitivity of the child and makes the child aware of the capacity to categories which leads the child to classify.

The Sensorial apparatus gives the child concrete experiences which is more useful than mere reasoning. The Montessori Method moves from concrete experience to abstract and there is also reasoning. Lastly another learning that takes place through the Sensorial apparatus is the Muscular Memory impression. After working with the apparatus it help the child to stretch hands sufficiently for the necessary grasp.

The adult gives presentation to the child individually. Adult should realize that the materials meet the inner urge of the child. The instructions that are needed for the main presentation must be brief and the words utilized must be simple and also should be pronounced correctly as the child's mind during this period is an Absorbent Mind. The lesson should be given objectively. The teacher should forget oneself while giving the presentation. The Lesson should be precise and simple. The teacher should note the child's interest. The child should not be forced. The activity should not be repeated if the child does not show any interest. The spontaneity of the child should not be hampered even if the child makes any mistake. The adults' movement must be precise or economized and must be systematic while presenting the activity. Invitation should be in a proper way to arouse the child's interest. The working surface must be free of any objects. The adult should know how to stimulate the child's knowledge. But if there is under stimulation which may be caused by inexperienced teachers can hinder the child's perception. So the right stimulation must be given to the child, which only an experienced teacher can give.

The aim of sensorial education is the development of philosophical and psychological life which prepares the child for perfecting his sense organs. Through the Sensorial apparatus the

child senses the object and also pays attention due to the sameness of the material. Therefore perception takes place. Through the name lessons language development is there. As the child learns the name cognitive aim is attained. Therefore the child connects the knowledge he has received to reality so internalization takes place.

Through the sensorial apparatus defects can be figured at an early stage and can be corrected. For example the color boxes can detect color blindness and the sound boxes can detect deafness. The sensorial education gives the child auto education, stimulates the senses. Then there is opportunity of language development, through the control of error the child can rectify their own errors if any in the activity. The child who is familiar with the sensorial apparatus has not only acquired greater skills in use of the hands , but has also achieved a higher degree of perceptiveness towards those stimuli which comes to the child from the outside world. To this extent the outside world has become enriched for the child, because the child is able to appreciate delicate differences which, to a less perceptive person might as well not exist.

To quote Dr. Maria Montessori "The aim is not an external one that is to say it is not the object that the child should learn how to place the cylinders and that he should know how to perform an exercise.

The aim is an inner one namely that the child train himself to observe, that he be led to make comparison between objects to form judgments to reason and to decide and it is in the indefinite repetition of this exercise of attention and of intelligence that a real development ensues."

Exercise Groups

Sensorial Exercises were designed by Montessori to cover every quality that can be perceived by the senses such as size, shape, composition, texture, loudness or softness, matching, weight, temperature, etc. Because the Exercises cover such a wide range of senses, Montessori categorized the Exercises into eight different groups: Visual, Tactile, Baric, Thermic, Auditory, Olfactory, Gustatory, and Stereognostic.

In the Visual Sense Exercises, the child learns how to visually distinguish differences between similar objects and differing objects.

In the Tactile Sense Exercises, the child learns through his sense of touch. "Although the sense of touch is spread throughout the surface of the body, the Exercises given to the children are restricted to the tips of the fingers, and particularly, to those of the right hand.

This helps the child to really focus on what he is feeling, through a concentration of a small part of his body.

In the Baric sense Exercises, the child learns to feel the dissimilarity of pressure or weight of different objects. This sense is heightened through the use of a blindfold or of closing your eyes.

In the Thermic Sense Exercises, the child works to refine his sense of temperature.

In the Auditory Sense Exercises, the child distinguishes between different sounds. In doing these different Exercises, the child will refine and make him more sensitive to the sounds in his environment.

In the Olfactory and Gustatory Sense Exercises, the child is given a key to his smelling and tasting sense. Although not all smells or tastes are given to the child in these Exercises, the child does work to differentiate one smell from another or one taste from another. He can then take these senses, and apply them to other smells or tastes in his environment.

In the Stereognostic Sense Exercises, the child learns to feel objects and make recognitions based on what he feels. "When the hand and arm are moved about an object, an impression of movement is added to that touch. Such an impression is contributed to a special, sixth sense, which is called a muscular sense, and which allows many impressions to be stored in a "muscular memory", which recalls movements that have been made.

<u>The Designed Material</u>

Montessori materials for the Sensorial work came from her own observations and from ideas and materials from the French doctors Itard and Seguin. The material is presented in a specific way or in a specific pattern where the child learns to match the similar things, then he is shown how to grade the material based on its quality, and then he receives the language related to his work. In presenting the material to the child in this way allows him to fully understand the concept of his work.

- **All of the Sensorial materials were designed keeping the same ideas in mind.**
- **All of the material isolates the one quality that is to be worked with by the child. This allows the child to focus on that one quality.**
- **All of the materials have, what is called, a control of error. This calls to the child to make the corrections himself.**

- **All of the material is esthetically pleasing. Such as with the Practical Life materials, this attracts the child's attention to the objects and allows the child to manipulate the materials with ease.**

- **All of the material must be complete. This allows the child who is working with the material to finish through the entire piece of work without having to stop and find a missing piece.**

- **All of the material is limited. The first use of the term limited refers to the fact that there is only one of each material in the environment. This calls for other students to build on their patience. The second use of the word limited is in reference to the idea that not all, but few are presented, with quality or piece of information is given to the child. The child is not given every color in the world, but only a select few.**

This gives the child the keys to the information so it peaks his curiosity and leads him to learn more out of his own interest.

Most importantly, all of the material could be called "materialized abstractions". This means that though Montessori's Sensorial materials, abstract concepts are made into concrete materials.

Montessori saw the importance of the manipulation of objects to help the child in better understanding his surroundings. Through the child's work with Sensorial material, the child is helped to make abstractions, he is helped in making distinctions in his environment, and the child is given the knowledge through his own experiences.

<u>Exercises</u>

The first activity that we present with the Sensorial materials is known Parent Activity. Children repeat these activities and gradually become conscious of the physical properties. Before they loose interest in those activities, more challenging ones with the same materials are presented. Concept becomes clearer. Only then the child can discover his or her environment noticing the significant details. There are many types of exercises:

- **Simple: Reverse pairing at random, reverse pairing in succession**

- **Group: with Pink Tower**

- **Eyes closed: with Pink Tower**

- **Special Exercises: Long Stairs**

- **Stereognostic Exercise**

- **Memory Exercise**

Memory 1: With pairing material one part

Cylinder Blocks

Name of the Activity: Cylinder Blocks

Material Description: Four wooden blocks, all of neutral color. Each blocks containing 10 cylinders, each with a knob on top. The cylinders all vary in size by ½ cm, in each dimension. Block A has cylinders varying in height and diameter from tall and wide to short and narrow. Block B has cylinders varying in height and diameter from short and wide to tall and narrow. Block C has cylinders which vary only in diameter. Block C1 has cylinders varying only in height. Mat.

Material Display: It is kept on the sensorial shelf

Age: 2 ½ yrs

Nature of Activity:

Individual

Presentation:

Maintain work cycle. Hold the block with the thumb and the three fingers on either side or the little finger below the block. Take out the cylinders holding the knob with the writing fingers in a particular way starting from the widest in serration. Take out all the cylinders and keep them in a mixed pool. Take one cylinder from the mixed pool at random, compare it visually with the sockets and place the cylinder into the socket without making noise. Complete the activity by putting all the cylinders into their respective sockets. Check by placing the index finger on each cylinder. Take out the cylinders and keep them in a mixed pool. Call the child to do the activity and then check. Complete work cycle.

Points of Interest:

- **Carrying the block in an appropriate manner.**
- **Holding the knob with the writing fingers.**
- **Removing cylinders in serration and putting them in a mixed pool, pick one at random comparing with the cylinder**

Placing the cylinders in the socket without any noise

Control of Error:

It lies in the material. If the cylinders are not properly paired there will be one loose or one may not go into the socket so the activity will remain incomplete.

Language:

None

Direct Aims:

The child will learn to pair the cylinder with their respective sockets with the awareness for dimensional differences.

Indirect Aims:

- **Preparing the child for writing.**
- **Strengthening the writing fingers.**
- **Developing visual perception for dimension.**
- **Developing hand eye coordination.**
- **Providing controlled serration.**
- **Gets to know the basic language with Name lesson**
- **It is also essential for mathematics, practice in decimal system as he works in 10 s.**

When the child becomes mechanical with the cylinder block, exercises are introduced.

Exercise 1:

- **The Adult place the pointer at random in the socket.**
- **The child finds the corresponding cylinder for that particular socket.**

After the child has done it once or twice the child can place the pointer all by himself and find the corresponding cylinder. The child finishes his work and checks.

Exercise 2:

- **The child places the cylinder in a mixed pool.**

- **The adult puts the pointer in sockets in serration and the child finds the corresponding cylinder and completes the work.**

Exercise 3:

- **The child takes out the cylinders in a seriated manner and puts them in a mixed pool.**
- **The child seriates the cylinders and places them in front of the block corresponding to the sockets. He completes his work.**

Exercise 4:

- **The Adult keeps the block away from the child.**
- **The cylinders kept in a mixed pool.**
- **From the mixed pool the child places the cylinders in a serration.**

Completes the work

Exercise 5:

- **The Adult places the cylinder on a tray and the tray is placed far from the block.**
- **The adult places the pointer at random and tells the child to visually compare and place the cylinders in the corresponding sockets.**
- **Then the child is said to place the pointer by himself and continue the exercise. This is called Memory exercise 1.**

Exercise 6:

- **The block is placed on the mat. The adult places the cylinders in different places in the environment, but within the reach of the child.**
- **The adult places the pointer in serration and the child places the cylinders in the corresponding socket by comparing visually.**
- **The child continues the activity and finishes the work. This is also called Memory Exercise 2.**

When the child becomes mechanical with the presentation block, then the blocks B, C, C1 are introduced.

Name Lesson:

- **Tall and short.**
- **Wide and Narrow.**

Superlative:

- **Tall, taller, tallest**
- **Short, shorter, shortest.**

<u>Pink Tower</u>

Name of Activity: Pink Tower (PT)

Material Display: There are 10 pink wooden cubes which are varying in size from 1cubic centimeter to 1 cubic decimeter. It varies from big to small. A wooden stool (chowki) Mat

Material Display: There are 10 pink wooden cubes kept in a tower form on a small wooden chowki near the Sensorial shelf on the floor. The chowki has two small wooden strips attached to the sides to help the child to balance the cube. The chowki is half cm bigger than the largest cube.

Nature of the Activity:

Individual

Age: 2 ½ yrs.

Presentation:

Work cycle maintained. The Adult calls the child and shows the child where the Pink Tower is kept. The Adult brings all the cubes holding it from the top with all the fingers on four sides. The Adult keeps the cubes on the mat one by one. For the larger cubes the palm is kept underneath the cube. The cubes are now placed in a mixed pool. At random a cube is brought in front and are compared and rejected and kept in a separate pool till the largest cube in isolated. In this manner the cubes are placed on one top of the other in serration and the tower is formed. The Adult checks the tower from the top and seeing equal distances from all the sides and by tactile impression. Then ask the child whether he wants to do the activity. Adult keeps it in a mixed pool. The child completes the activity and both child and adult checks. Work cycle completed.

The points of interests are:

- **Holding the cubes between five fingers.**

- **Bringing and placing the cubes one at a time.**
- **Placing the cubes noiselessly and at one go in the centre.**

Control of Error:

Control of error lies:

- **In the material because if wrongly built it will fall.**
- **In the visual inspection from the top, seeing equal distances on all sides.**
- **In tactile impression.**

Language:

None

Direct Aims:

Child learns how to build the Pink Tower with dimensional awareness.

Indirect Aims:

- **Develops the child's visual perception of dimension.**
- **Coordination of movement**
- **Provides useful experience of cubes of different sizes of controlled seriation.**
- **Basic development of language.**
- **Prehensile movement.**
- **Preparation for mathematics.**

Once the child becomes mechanical, exercises of Pink Tower are introduced.

Exercises:

- **The adult asks the child to close his eyes. The adult removes any cube and places it in front of the child and asks the child to construct the tower back. The child will find the correct place for the missing cube.**

- **The adult asks the child to close his eyes and the adult will remove a cube and hide the cube. The adult will ask the child to look for the cube and place the missing cube in the right place and construct the tower.**
- **The cubes are scattered in the environment within the vicinity of the child. The child brings them and constructs the Pink Tower. This is Memory Exercise 2.**

Name Lesson: Big and Small

<u>Brown Stairs</u>

Name of Activity: Brown Stairs (BS)

Material Description: There are ten wooden prisms, having same length and height and breadth increases by 1cm. The narrowest prism being 1cm and the largest being 1dm. Mat.

Material Display: The Brown Stairs are kept on the sensorial shelf.

Nature of Activity: Individual.

Age: Between 2 ½ yrs and 3 yrs.

Presentation:

Work cycle maintained. The adult calls the child and shows the child where the Brown Stairs are kept. The Adult brings the prisms, bringing the narrowest first holding with the thumb on one side and four fingers on the other side and places the prisms on the mat one at a time in a mixed pool. Prism is taken at random and compared and rejected and kept in a separate pool till the broadest is recognized. Adult compares visually and also by tactile impression making the child aware of the differences between the height and the width. By this method of isolating, comparing and eliminating the narrow prism, the broad prisms are recognized and are kept in a stair pattern in seriation diagonally. The adult checks by tactile impression and also points out the two walls on either side or also checks by placing the narrowest prism on each step. The adult asks the child whether he wants to do it. The adult will keep the prisms in a mixed pool. The child will form the brown stairs and both the adult and the child will check. Work cycle is completed.

Points of Interest:

The points of interests are:

- **Holding the prism across the breath so that the child can feel the muscular impression.**
- **All the prisms are compared and placed noiselessly.**
- **Constructing diagonally with wall on two sides.**

Control of Error:

The control of error lies in:

- **The material by placing the narrowest prism on the step of the prisms.**
- **By tactile impression.**

Language: None

Direct Aims:

Helping the child to learn how to construct Brown Stairs with awareness for height and for width.

Indirect Aims:

- **Develops the child's visual perception of dimension**
- **Co ordination of movement.**
- **Helps in preparation for mathematics.**
- **Language development**
- **Controlled seriation work.**

When the child becomes mechanical with the Brown Stairs then the exercises on Brown Stairs are introduced to the child.

Exercises:

- **Same as Pink Tower**

- **Combination exercise of Brown Stairs and Pink Tower. Adult and child both bring in the BS and the PT and put them on the mat in a mixed pool. Adult isolates the broadest prism by comparing and eliminating, and placing it at the edge of the mat. The child does the same thing with Pink Tower and places it next to the Brown Stairs. Adult then places the next broadest prism and the child the next big cube. The child can take over and finish the wall. Then both adult and child checks. Work cycle completed.**

Name lesson:

Broad and Narrow

Superlative:

- **Broad, broader, broadest.**
- **Narrow, narrower, narrowest.**

<u>Long Rods</u>

Name of Activity: Long Rods (LR)

Material Description: There are 10 red wooden rods all with similar thickness but they vary in length from 1 decimeter to 1 meter. Each rod increase in length by the length of the smallest rod

Material Display: lrs are kept on the Sensorial shelf.

Age: 2 ½ yrs to 3 yrs.

Nature of Activity: Individual

Presentation:

Work cycle maintained. The child is shown where the lrs are kept. The adult shows how to hold the lrs in between two fingers. The adult brings the lrs and puts them on the mat in a mixed pool. From the mixed pool isolating any rod at random. Compare visually and by tracing the length of the rod recognizes the longest rod. Place the longest rod at the edge of the mat in the centre. In this way all the rods seriated according to the length and placed in such a manner that on the left sides a wall is formed. After completion the adult points out to the wall on the left side. Adult runs two fingers (by tactile impression on the right side to feel the difference. Adult also places the shortest rod next to each rod in order to check the

activity. Adult calls the child to do the activity. The adult keeps the rods in a mixed pool. The child completes the activity. Both the adult and child checks. Work cycle is completed.

Points of Interest:

- **Holding the rods in a particular way.**
- **Isolating, comparing and recognizing the longest rod.**
- **A red wall on the left side.**

Control of Error:

- **It lies in the material**
- **Adult puts the shortest rod on the steps and shows each rod varies by the length of the shortest rod.**
- **By tactile impression.**

Language: None

Direct Aims: The child is arranging the rods in seriation with awareness for length.

Indirect Aims:

- **Visual perception of length.**
- **Hand and eye co ordination**
- **Experience in controlled seriation.**
- **Indirect preparation for mathematics.**
- **Language development.**

Once the child is mechanical the exercises of lrs will be given.

Exercises:

- **Same as PT**
- **The Adult takes out the longest rod and the second longest rod from the made lrs and asks the child to find one rod which fits in the gap and make the second longest rod equal to the longest rod. In this manner it is done to the rest of the rods. Then the child can take over.**

- **The adult takes the shortest rod and places it on the mat in the centre and then asks the child to find the next rod and shows the child how to place the rod at the end of the rod placed there and then the child finishes the work in seriation and forms a MAZE.**

Name Lesson: Long and Short.

Superlatives:

- **Long, longer, longest.**
- **Short, shorter, shortest.**

<u>Color Box I</u>

Name of the Activity: Color Box 1 (CB)

Material Description: A box containing 6 tablets with 2 blue, 2 yellow and 2 red tablets. The tablets are fixed on wooden frames on both sides. These are the primary colors. A mat.

Material Display: The box is kept on the Sensorial shelf

Age: 3 yrs

Nature of Activity: Individual

Presentation:

Work cycle begins. The Adult invites the child and shows where the box is kept. Then adult shows the child how the tablets are brought out using the writing fingers. The adult gives instruction to the child that the colored part should not be touched at all. The tablets comes out in A, B, B, A manner where A is red and B is blue. Then the adult isolates any color tablet compares it and pairs the tablets. After completing, the adult asks the child to do so. Adult puts the tablets in a mixed pool and the child does the activity. If the child has done the activity properly, the adult will tell the child there are more colors. Adult take out the third color. Adult pairs one set and the child does the rest. Adult and child both checks visually and completes the activity. Work cycle completed.

Points of Interest:

- **Holding the tablets in a particular way and also giving instruction to the child.**
- **Taking it out in ABBA manner.**

- **Isolating any one comparing it and pairing the tablets.**

Control of Error:

- **It lies in the material itself**
- **The chromatic sense awareness of the child.**

Language: None

Direct Aims: The child is pairing the colors with awareness of chromatic sense.

Indirect Aims:

- **Visually discriminating colors.**
- **Strengthening the writing fingers.**
- **Preparation for reading and writing.**
- **Language development with Name Lesson.**
- **Identifying defects if any.**

When the child becomes mechanical with the color box activity then the exercises are introduced.

Exercise: In this activity memory exercise 1 is applicable. Adult takes one of red, yellow and blue tablets and places them on a tray and keeps it on the shelf. The other red, yellow and blue are kept on the mat. Adult places a pointer at random and child through chromatic memory finds the corresponding tablet. Then the child can place the pointer by himself and completes pairing. Both the adult and child checks.

Name Lesson: Red, Blue, Yellow.

<u>Name Lesson</u>

Name of the Activity: Name Lesson

Material Description: The tray having 2 pair of color tablets. A mat.

Material Display: The color box 1 containing the tablets kept on the Sensorial shelf and the mat kept in the environment.

Age: After 3 yrs.

Nature of Activity: Individual.

Presentation:

Work cycle maintained. Adult brings in the pairs of 2 color tablets on a tray and keeps it next to the adult. The adult first brings out the red tablet and puts away the tray so that the child cannot see the tray. When giving the name lesson to the child, adult must pronounce the word clearly, loudly and distinctly so that the child can say the word properly.

First Period:

- **Adult points to the object, gives a name and asks the child to repeat the word clearly and distinctly.**
- **Adult repeats the word till the child says the word properly and distinctly.**
- **Then another color is taken out and in the same manner the name is introduced to the child.**
- **Adult allows necessary time to lapse and after a few moments the second period starts.**

Second Period:

- **Adult is not pointing at the object nor looking at it , but gives the child several instructions like 'give me red', 'hide blue', 'keep red in front of you' etc.**
- **During the session the adult brings in the pair of each of the color. And repeats the same.**
- **The second period is long and must enable the child to recognize the object as the name is given to the child.**
- **At the end of the second period the tablets are matched and put together in front on the mat.**

Third Period:

- **This period adult verifies the child understands.**
- **Adult pointing to the object asks the child "what is this?"**
- **Here the child will remember the name and says it clearly and properly.**

Noise Box-Pairing

Name of Activity: Noise Box (Pairing)

Material Description: There are two wooden boxes containing 6 cylinders each. The cylinders are filled with different objects so that when shaken they give different sound. In one box there are 6 cylinders with red lid and yellow body and in the other box there are 6 cylinders with blue lids and yellow body. One box has the pair of the other box. A mat.

Material Display: The Noise boxes are kept in the Sensorial shelf. The mat kept in the environment.

Age: 3yrs to 3 ½ yrs. The child should be given the Silence Game.

Nature of Activity: Individual

Presentation:

- **Work cycle to be maintained.**
- **Adult invites the child and shows where the material is kept.**
- **Adult will bring the box and place it on the mat.**
- **Adult will take out the cylinders in ABBA manner. Where A is the loudest cylinder and B is the softest cylinder.**
- **Adult keeps them in a mixed pool on the mat.**
- **Adult gives the child instruction that only the yellow part should be touched.**
- **Adult isolates any cylinder and compares and pairs them.**
- **After pairing adult will check and asks the child to repeat the activity.**
- **Adult will keep the cylinders in a mixed pool and the child will do the activity.**
- **The adult will say that there are more sounds which we will do the next day.**

Points of Interest:

- **Holding the cylinders in a particular way.**
- **Giving instruction that only the yellow portion to be touched.**
- **Taking it out in AB BA manner.**

- **Controlled wrist movement and continuous movement.**
- **Isolating any cylinder comparing and pairing it with the other.**
- **Control of Error: Lies in the auditory sense and in the material that is there is indication marks at the bottom of every cylinder of one box to the cylinders of the other box.**

Language: None

Direct Aims: Child pairs sounds with awareness of auditory sense.

Indirect Aims:

- **Child gets practice in discriminating in different sound and helps the child to concentrate on various other sounds.**
- **Develops auditory perception.**
- **Language development.**
- **Indirect preparation for writing because of controlled wrist movement.**
- **If the child has any hearing defect it can be detected through this activity.**

When the child becomes mechanical in Noise Box pairing adult introduces some exercises.

Exercise:

- **Memory exercise 1 is applicable.**
- **Adult places the cylinders of one box on a tray and keeps the cylinders of the other box in seriation on the mat.**
- **Adult places a pointer at random and asks the child to find the pair.**
- **Child isolates, compares and pairs through auditory senses.**
- **Child can place the pointer by himself and complete the activity.**
- **Both adult and child checks.**

Name Lesson: Loud and Soft.

<u>Touch Board</u>

Name of the Activity: Touch Board

Material Description:

- **A wooden box containing 4 Touch Boards.**
- **Presentation is given with the first board which has two textures namely smooth and rough.**
- **The smooth texture has a laminated top and the rough texture has a sandpaper top.**
- **These are pasted on a wooden board.**
- **Touch boards are brought on a tray.**
- **A chowki, a mat, a blindfold and a bowl with tepid water.**

Material Display: Touch Board box is kept on the Sensorial Shelf. The chowki, mat blindfold and a bowl kept in the environment.

Age: 3yrs to 3 ½ yrs.

Nature of Activity: Individual

Presentation:

- **Work cycle maintained.**
- **Adult will invite the child and show where the material is kept.**
- **Adult will bring the first Touch Board on a tray and places it on the mat.**
- **Adult will ask the child to dip finger in the tepid water.**
- **Adult will place the Touch Board on the chowki.**
- **Adult closes eyes and with two fingers traces the smooth surface first and says "smooth" and then traces the rough surface and say "rough".**
- **Adult repeats again. Invites the child to do the same.**
- **Child closes eyes and adult asks the child to repeat saying smooth and rough.**
- **In the second period the adult asks the child to trace and say which is smooth and which is rough.**

- **In the third period adult guides the child's hand to any of the surface and tells the child to trace the surface and say the kind of surface it is.**

Then adult will connect it to reality. Adult may ask the child to anything rough in the environment or smooth in the environment.

- **Work cycle completed.**

Points of Interest:

- **Fingers to dip in tepid water.**
- **Instruction to trace lightly**
- **Using 2 fingers to trace from top to bottom.**
- **Tracing one surface at a time.**

Control of Error:

Lies in visual impression and also lies in the tactile impression for smooth and rough surface. Lies in the material.

Language: Rough and Smooth

Direct Aims: Helps the child to trace 2 different textures with awareness for tactile sense.

Indirect Aims:

- **Understanding different textures in the environment (rough and smooth)**
- **Improves co ordination**
- **Preparation for writing**
- **Language development**

When the child is thorough with Touch Board 1 then the other boards are introduced.

<u>Geometry Presentation Tray Game</u>

Name of Activity: Geometry Presentation Tray

Material Description: On the wooden frame are kept 3 basic figures, namely triangle, square and circle. The figures are blue in color and the frame is yellow in color. Interior of the frame is blue. For every figure there is an empty space left immediately above or below the figure.

The dark blue interior is surrounded by a raised border about 1/8th inch height and 3/4th inch wide. On this there is a hinged frame made up of wooden strips about 1/4th inch thick crossed in such a way so as to fit exactly over the other below it dividing the latter into 6 equal squares by 1 cross and 2 longitudinal strips. This open cover swings on a small hinge and fastened in front with a small pin. 6 individual frames 4 inch square and 1/4th inch thick thus fit exactly on the blue background in yellow color and are held securely in place by the lattice work close over them. The open cover holds the square firmly in place. A mat. A bowl of tepid water.

Material Display: The presentation tray is kept on top of the Geometric cabinet in the Geometrical section of the Sensorial shelf. The mat and the bowl kept in the environment.

Age: 3 ½ yrs

Nature of Activity: Individual

Presentation:

- **Work cycle maintained.**
- **Adult invites the child and shows where the material is kept.**
- **Adult brings in the tray and places it on the mat in front.**
- **Both adult and child dip fingers in tepid water.**
- **Adult gives instruction to the child "trace lightly and stop at the starting point and do not lift fingers while tracing.**
- **The triangle is removed first with the left hand using the writing fingers. The figure is traced with 2 fingers in a clockwise direction.**
- **After tracing the figure it is placed below in the empty space.**

Points of Interest:

1. Holding the knob firmly with the left hand using the writing finger.

2. Tracing the figure lightly.

3. Trace with two fingers.

4. Stop where started from.

5. Not to take away the hand in the middle of the tracing.

6. To follow the directionality.

Control of Error:

Lies in the material that works as the frame. Otherwise it will reject the wrong figure and in visual inspection.

Language: None

Direct Aims:

1. This activity introduces the child to the wide world of geometry.

2. The child is introduced to 3 basic figures - triangle, square and circle at Sensorial level through tactile sense.

Indirect Aims:

1. Indirect preparation for writing.

2. Co ordination of movements.

3. Understanding different shapes.

Name Lesson:

Triangle, square, circle

Introduction to EPL

EXERCISES OF PRACTICAL LIFE (EPL)

Practical Life is basic, useful, purposeful life. In another word, it means the ways of living. Practical life Exercises are activities in a Montessori environment so the child can learn how to do living activities in a purposeful way. The purpose and aim of Exercises of Practical Life is to help the child gain control in the coordination of his movement, gain independence and adapt to his society (environment). It is therefore important to "direct, not correcting" in order to allow the child to be a fully functional member in his own society. Practical Life Exercises also aid the growth and development of the child's intellect and concentration and will in turn also help the child develop an orderly way of thinking.

The EPL are planned to teach the child to function in his own environment by teaching him how to cope with the things around him. The daily functions of our house are routine and

simple to us but they are new and exciting to a child. So often we scold a young child for banging doors etc. And yet have we ever taken the time to show him the proper way of doing things.

It is only after he has learnt to master his home environment, then the child is prepare to begin the more complicated process of learning. In the Montessori environment the child is introduced to activities like threading, which helps in the strengthening of the writing fingers. Likewise different activities like Solid Pouring and Liquid Pouring enhances the child's concentration. He learns the significance of hygiene through activities like sneezing, coughing etc. And social graces through activities like "Aslam o Alekum"," Hi" These activities indirectly helps the child to move forward in the different areas of learning.

EPL Means Exercises Of Practical Life:

A child is learning all the time, from his surroundings and from the adults they come across in it. It is the best way to enrich the environment and for adults to serve as role models, rather than try to impose learning from the outside. Scientific observation has established that the children are as deep as an ocean to store the water of learning .They are the best observers to penetrate into the thing and deeply learn it with their extraordinary quality of mind. Education is not what the teacher gives to the child; it is also a part of the environment in which the child learns automatically by his adults, atmosphere of the home as well as the culture. Many lessons in Montessori programs are resulting from having children participate in daily work routines. Children are happy when they perform any task by their own self.

***" If teaching is to be effective with young children, it must assist them to advance on the way to independence. It must initiate them into those kinds of activities, which they can perform themselves. We must help them to learn how to walk without assistance, to run, to go up and down the stairs, to pick up fallen objects, to dress and undress, to wash themselves, to express their needs, and to attempt to satisfy their desires through their own efforts. All this is part of an education for independence. "*…. (The Discovery of the Child)**

Exercise Groups

Practical Life Exercises can be categorized into four different groups:

1) In the Preliminary Exercises, the child learns the basic movements of all societies such as - Opening & Closing, Threading, Cutting, Sewing, Folding, Walking on a line, The Silence Game.

2) In the Applied Exercises, the child learns about the care and maintenance that helps everyday life. These activities are, for example, the care of the person (i.e. The washing of the hand) and the care of the environment (i.e. Dusting a table or outdoor sweeping), Polishing, Care of Garden, Indoor Plants, Flowers, Care of Pets, Cooking Skills.

3) In the Grace and Courtesy Exercises, the children work on the interactions of people to people. Greeting People, Interrupting with Excuse Me, Conduct with a visitor, Speaking to a Group, Behavior on Outings, Special Occasions Helping Out, Table Manners and Use of Eating Utensils.

These are some names of practical life exercises which can be taught to the kids, not only in school but also in the home environment.

4) Montessori Practical Life Exercises for Self Care like - Polishing Shoes & Folding Clothes, Blowing Nose & Coughing, Care of Teeth, Nails, & Hair, Toilet Training.

Reason for Practical Life Exercises:

Children are obviously interested in activities they have witnessed. Therefore, Dr. Montessori began using what she called "Practical Life Exercises" to let the child to do activities of daily life and therefore familiarize and orientate himself in his society. It is therefore the Directress's task to show the correct way of doing these Exercises in a way that allows the child to fully observe the movements. Montessori says, "If talking doesn't move, if moving doesn't talk".

The directress must also keep in mind that the objective is to show the actions so that the child can repeat the activity in his own successful way. Montessori says, "Our task is to show how the action is done and at the same time destroy the possibility of imitation". The child must build up his own way of doing these activities so that the movements become real and not artificial.

During the child's sensitive period between birth and 6, the child is constructing the inner building blocks of his person. It is therefore imperative for the child to partake in activities to prepare him for his environment, that enable him to grow independently and use his motor skills, as well as permit the child to scrutinize difficulties he may have in the exercise and problem solve successfully.

Montessori also saw the child's need for order, repetition, and succession in movements. Practical Life Exercises also helps to support the child to develop his coordination in movement, his balance and his gracefulness in his environment as well as his need to develop the power of being silent.

Characteristics of Practical Life:

Because Practical Life Exercises are meant to resemble everyday activities, it is essential that all materials be familiar, real, breakable, and functional. The materials must also be related to the child's time and culture. In order to let the child to fully finish the exercise and to therefore finish the full cycle of the activity, the material must be complete.

In the environment, the Directress may want to color code the materials as well as organize the materials based on difficulties in order to facilitate the classification and arrangements of the work by the children. The attractiveness is also of greatest importance as Montessori said that the child must be presented what is most beautiful and pleasing to the eye so as to assist the child enter into a "more refined and subtle world".

Introduction to Language

Language is a system of symbols with an agreed upon meaning that is used by a group of people. Language is a means of communication ideas or feelings by the use of conventionalized sounds and signs, thus, being the spoken and written language.

The History of Language

It is a human tendency to communicate with others and this could motivate the emergence of language. Montessori said, "To talk is in the nature of man." Humans wanted language in order to communicate, and soon, the powers that come with language were discovered. The evolution of the human language began when communication was done through pictograms or pictures and drawings.

It then developed into ideograms when pictures began to turn into symbols. Later, these symbols became words, words involved letters, vowels emerged, one symbol came to symbolize one sound, an alphabet was created, and then came the alphabet which we use today. Just as language evolved hundreds of thousands of years ago, it also changes with each generation. Language rose and continues to mount with the collective intelligence.

The Importance of Language in the Early Years

Maria Montessori observed that the child acquired language rapidly from birth until six years of age without being taught. She believed that this phenomenon gave evidence for her theory on the Absorbent Mind (Montessori, 1949). The Absorbent Mind states that children from birth until three unconsciously take in their environment and shape themselves from any information and stimulation they can come into contact with. The child from three to six years of age is deliberately using specific things in his environment to develop his mental and physical faculties. Linguists today found, language seems to be learned almost naturally and the child is born with the instinct to decipher and acquire the language of their culture (Chomsky, 2000).

Children absorb language from their environment and easily learn how to speak, read and write if language in its various forms present in their environment during the period of the Absorbent Mind (Montessori, 1949). Maria Montessori called this window of opportunity for learning as Sensitive Period. "So language like vision and most other brain functions, is bounded by a critical period, an early phase in which a child must experience language, or else its hardware won't wire up right" (Eliot, 1999). The quality and quantity of language a child is exposed to during the sensitive period influence his language skills and brain organization (Eliot, 1999). Therefore, it is important that parents of young children talk to them and give them a multitude of vocabulary. The television is also an unacceptable substitute for giving language because language should be linked to emotion and for a child to acquire the language they must be spoken to directly (Eliot, 1999). Children's early experiences with language in their surroundings greatly affect their social, emotional, and intellectual development; "Language should commence at early age: by just three years of age, children are already headed down vastly different paths of verbal achievement as a result of their cumulative experience with language" (Eliot, 1999).

Language in the Classroom

Evidence has been provided for Maria Montessori's theory on the Absorbent Mind as it has been observed that children, without ever being taught, seemingly explode into language, reading and writing. Within the Montessori primary environment, language is given in all the areas- Language, Reading and Writing and throughout the day . Enriching the child's vocabulary expands his ability to clearly communicate to others and express himself. Once the child is able to express himself, his personality begins to truly surface and shine.

Language in the Montessori Language Area is taught with the Three Period Lesson. With this lesson the teacher can assess the child's understanding without pressure, so that his intrinsic motivation is not thwarted. "The three periods might be thought of as association, recognition, and recall" (Lillard A. S., 2005). The adult first states the name of an object. Next, the adult asks the child to hand her or point to the object when she states the name. Lastly, the child is asked when the adult points to a particular object to recall that object's name. If a child fails to complete a certain stage of the lesson, the Guide stops and begins it from the very first another day. With this lesson the Guide is able to see if the child understands the presentation's concept and language.

<u>The Language Area of the Montessori Primary Environment</u>

The child has an urge to learn his language in this particular period because from birth to age six, he is going through a critical period for language acquisition (Lillard P. A., 2003). During this time, the child can learn his language effortlessly and without fatigue. After the age of six, when the sensitive period has passed, it becomes much difficult for the child to learn to read and write (Pinker, 1994). Hence, in the Montessori environment, the child undergoes mastering his language before the elementary years. The Language Area in the Montessori Primary environment, existing of Spoken Language, Enrichment of Vocabulary, Written Language, Area of Reading, Reading Classification, Word Study, Function of Words, Reading Analysis, Interpretative Reading, and Language Extension provides the child with many forms of language to help satisfy his need to clearly communicate and to fully adapt to his culture.

<u>Vocabulary</u>

The Enrichment of Vocabulary section within the Language Area of the Montessori environment is for providing the child with new words for objects in his world. From two years old and on until elementary, the child is constantly absorbing new vocabulary at an amazing rate, "By the time a child is six, it's been estimated that he understands some 13,000 words, though he doesn't speak nearly that many" (Eliot, 1999).

Writing

Written Language in the Montessori environment is given as early as age 2 and a 3 half with Sound Games. The Guide tells to a group of children, "I am thinking of an object that begins with the sound 'A'," and have the children look around the environment and guess 'A' words. With this knowledge the child can start to explore word sounds, and discover that each word is made up of these sounds. It has been said that writing is one of the first academic obstacles a child must conquer, however in the Montessori environment the different obstacles this task is made up of are broken down, so that the child overcomes them one at a time when working with other materials (Montessori, 1967). When the child is finally presented with the task of writing, when he is prepared and can meet this challenge with success. In Montessori education, the child learns the phonetic sounds of the letters and learns to write in cursive. With fluid cursive writing, the child can more easily create the letters and connect them to form words. After the child knows about 10-12 letters, including the vowels, he can start creating words with the moveable alphabet. Though writing with a pencil at this time may create too many troubles, the child of 3 ½ can simply take the cursive letters of the moveable alphabet and begin connecting them to create words that he has analyzed. With little practice, the child will be able to use a chalkboard to write, and then paper. Maria Montessori deemed this sequence of learning to write "the method of spontaneous writing" (Montessori, 1967).

Writing with the Moveable Alphabet

Reading

In Montessori education, the child learns how to write prior to reading. The child has less problem constructing a word that he is analyzing and thinking of than reading, because reading has an additional dimension of difficulty; it is a synthesis of the sounds in a word that are in the mind of someone else. In the Area of Reading, the child has learned during many Sound Games that words are made of sounds, he knows the sounds and symbols of the letters, and is starting to break down many words into sounds. After some time working with the movable alphabet, the child is ready to be shown the first presentation in this area: the Phonetic Object Box. The Guide takes out small replicas of objects, they are recognized, and then the Guide writes the name of one of the objects down and gives it to the child. For the first time the child reads; he first makes the sound of each letter, and when instructed to make them faster the sounds blend and the child can identify the word. The child is then told to place the label next to the proper object. With this exercise, the child learns that reading is silent communication.

Reading Classification

Now that the child is reading, he is been introduced to the Reading Classification, Word Study, Function of Words, Reading Analysis, Interpretative Reading, and Language Extension areas. In Reading Classification the child is given a set of cards with a picture on each which relates to one specific category for example rainforest animals, a set of labels, and control cards that have both picture and label on them. The child names and lays out the cards, and then reads each label and matches them to the correct card. When completed, the child is able to utilize the control cards to verify his own work. It is at this point that the child is very much interested in reading and labeling his environment (Montessori, 1967).

Word Study & Function of Words

The child enters into the areas of Word Study and Function of Words. Here the child is capable of identifying the deeper meaning behind words, guiding him closer to Total Reading, which is the ability to fully understand and actively interpret the meaning of what another has written. These exercises are more like games which provide the child with a simple and fun experience with grammar.

Reading Analysis & Interpretive Reading

Reading Analysis and Interpretive Reading take the child into Total Reading. These exercises help the child further to identify that reading sentences and stories give him a sight of another's thoughts and feelings.

Language Completions of the First Plane

As the child leaves the Montessori classroom after the age of six, he will develop into an articulate person, being able to communicate his feelings in well-formed sentences and in writing. He will be capable enough to write these thoughts and feelings in a skillful handwriting. He will have the ability to write in different styles and about a variety of subjects.

Mathematics in Montessori

This phase explores a child's introduction to the world of Math- the merging of the abstract with the concrete with the use of apparatus that not only manipulates the senses but also develop the various concepts like less and more and odds and even .

Arithmetic deals with shape, space, numbers, and their relationships and attributes by the use of numbers and symbols. It is a study of the science of pattern which includes patterns of all kinds, such as numerical patterns, abstract patterns, patterns of shape and motion. In the Montessori classroom, five families with math are offered to the child: arithmetic, geometry, statistics and calculus. The concepts covered in the Primary class are numeration, the decimal system, computation, the arithmetic tables, whole numbers, fractions, and positive numbers. Montessori took this idea that the human has a mathematical mind from the French philosopher Pascal. The mathematical mind tends to estimate, needs to quantify, to see identity, similarity, difference, and patterns, to make order and sequence and to control error.

Introduction of mathematics is when the child is 3yrs of age. But when the child comes to the Montessori environment the child already knows how to count up to certain numbers. At home adults may train the child to bring 3 more plates or glasses. So the child when he comes is familiar to numbers in the quantitative sense but does not know the written symbols. The child in the Montessori environment is surrounded by numbers, sizes, quantities, dates etc. From the age of 2 ½ yrs of age. The child is not intellectually conscious of the numbers at this age but is sensitive to quantitative aspect of numbers. The number system is very crucial. It is a single logically constructed structure having many complicated as well as interrelated parts. A child has to be taught the number system to be able to promote the child's knowledge and development. This is done in our method by the use of different apparatus, materials, aids and etc. So that the child learns numbers through active experience and thus the subject becomes meaningful to the child.

In the olden days children learnt through the rote memory. Numbers 1 to 10 are essential as they are repeated again and again in different names. The child learns the quantity. The work of the adult is to let the child actively take part in understanding the number so that the child gets a positive approach towards the subject.

Montessori Math cannot be taught only by mathematic materials. Sensorial training is of great significance in learning the basics of mathematics. Also in practical life, the

development of order, concentration, coordination and independence are essential for mathematical mind. Order is the basic foundation of math because it is not possible without sequence. Coordination is also important for mathematics to develop logical thinking. Children require doing activities that develop the hand eye coordination.

DEFINITION OF MATHEMATICS

- **It is the world of numbers.**
- **Measuring levels.**
- **Deals with exactness.**
- **Science of numbers.**
- **It shows the relationship between non-entity and entity at a quantitative level.**
- **Math is abstract or has an abstract meaning.**
- **Systematic number system.**

AIMS

•The subject mathematics has to be introduced to the child in a meaningful way as an interesting subject so that the child can build up positive attitude.

• Develop the child's appreciation towards the subject and also the creative aspect of the subject. The different working method helps in later solving problems.

•It teaches the child different mathematic skills and knowledge, reasoning and the four operations.

•Helps the child to attain the mathematical language and the use of math, beyond the classroom. This is true in giving the education of math when the child realizes that it is not limited within the classroom but also applicable to the world outside and also used as a social utility in business.

•Finally the main purpose of introducing math is to help the child to think clearly and logically with confidence, independence and flexibility of the mind which leads to mental discipline as it trains the mind.

Mental discipline is very important because it trains the mind and in the run the child gain logical thinking and reasoning power. The child in the Montessori environment at 3yrs is sensitive to quantities and is so going through the sensitive period. This is done through the mathematical experiences, concepts and processes.

Math is abstract and the child has to be ready for the abstract math. First of all the child has to be introduced to the numbers in a concrete form. The environment is planned as a practical preparation to create interest. The number system is sequential in nature so the child has to be trained sequential aspects of math namely sequence in numbers, sequence in math topic and sequential in placement of numbers. Even the four operational areas in the olden days were learnt through the rote memory. But nowadays the child also learns other concepts like volume, weight, seriation, length, units, conservation and reversibility, geometry, topology.

Pre-Mathematical Concepts

The child is introduced to main mathematical concepts like sorting , classifying, one to one correspondence, comparing , sequencing , putting things in order, the concept of more and less, number rhymes and stories relating to numbers.

Preliminary Activities

Some of the preliminary activities which can be done to introduce the child to numbers:

- **Measuring the head. As most of the Montessori environment have vertical grouping there will be dissimilarity in the measurement of the head.**
- **Measuring the feet. The adult will call few children and on a paper their feet will be drawn and then measured with a string. The children will be asked which string is the longest.**
- **The adult can take the children where the Pink Tower is kept and can determine the height with the help of a measuring tape.**
- **Adult brings a chowki and some coasters. The adult calls a child and will ask the child to cover the chowki with coasters. After doing that the adult will ask the child count how many coasters were used to cover the chowki.**
- **The adult will bring a long rod to measure the room from wall to wall. Likewise with the long rod a chair or a desk can be measured.**

•Adult brings in play dough and shows them the various shapes that can be done with it.

•Before starting with the Montessori Apparatus the child should be given the concept of heavy and light. This can be done by inviting a child and asking him to pick up a chowki and then a small mat. The adult will then ask the child which is heavy and which is light.

•The concept of more and less is given to the child before the child starts Mathematics. The adult will invite two children and give the first child few counters and to the other child some more. The adult will ask the child to say who has more. Can be done with coasters.

•Instead of a long rod, the length of a room can be measured with the stride and the measurement of a table or a chowki can be done with the span of the palm or by cubits.

•The adult can bring in a bowl of water and show the children the level and later puts in some stones and show them how the level of water has increased.

•The concept of long and short, heavy and light can be taught by asking them to show in their surroundings.

SANDPAPER NUMERALS PRESENTATION

Name of Activity: Sandpaper numerals

Material Description: A box comprising of masonite board with sandpaper symbols on it and is blue in color and contains numbers from 1 to 9. A mat and a chowki. The sandpaper symbols come on a tray.

Material Display: The box is placed on the arithmetic shelf. The mat and the chowki are kept in the environment.

Nature of Activity: Individual

Age: 3yrs the child should have done Touch Board 1.

Presentation:

•Maintain work cycle.

•Adult calls the child and shows the child where the material is kept.

•Adult brings the first board on a tray.

•Both adult and the child dip fingers in tepid water for tracing.

•Adult places one on the chowki and the red line must be closer to self.

•Adults instruct the child to trace lightly and say the name while tracing.

•Adult traces and tells the name of the numeral.

•The child does the same.

•In the second stage the adult gives different instructions to the child. The child traces the number and follows the direction given by the adult.

•In the third stage the adult will ask the child to trace and say the name of the numeral.

•Work cycle completed.

One name to be given to the child at a time. But if the child is ready to take another name adult should give.

Points of Interest:

- **To trace lightly.**
- **To tell the name while tracing.**
- **The red line towards self.**

Control of Error:

Lays in the material the red line towards self.

Direct Aims: The child is introduced to correct symbol with the corresponding names.

Indirect Aims:

- **Preparation for writing**
- **Hand eye coordination**

After spindle box presentation, zero is introduced to the child. In order to make the child understand 0 in a concretized manner and instruction to stop where started from.

Number Rods

Name of Activity: Number Rods.

Material Display:

There are 10 number rods in total similar to the Long Rods. Each rod is alternately colored and demarcated with red and blue. They symbolize a unit each. A mat.

Material Display: The rods are kept on the arithmetic shelf. The mat kept in the environment.

Nature of Activity: Individual

Age: 3yrs. The child should have worked with the Long Rods.

Presentation:

- **Work cycle maintained.**
- **The adult calls the child and ask whether he knows Long Rods. The adult shows where the math shelf is and introduces the child to the shelf.**
- **Adult brings the first two rods that is the rod of one and two.**
- **The adult will take the small rod and count and says" this is rod of one". The child repeats after him.**
- **The adult will take the second rod and in the similar manner will count and will say "this is rod of two".**
- **In the second stage the adult tells the child to count and gives the child different instructions. The child counts and follows the instructions.**
- **In the third stage the adult asks the child will point at any rod and ask the child to count and say which rod that is.**
- **Work cycle completed.**

Points of Interest:

•Counting and associating the names.

•Red wall is formed on the left side.

•Three period lesson

Control of Error:

Lies in the material that is a pattern emerges and in counting the rods.

Language: Mathematical names.

Direct Aims: child associates quantity with traditional names in a concrete manner.

Indirect Aims:

- **Exploring into the world of mathematics.**
- **Better understanding of abstract quantity.**
- **Understanding seriation.**
- **Language development.**
- **Co ordination of movements.**
- **Concentration.**

Each time two rods will be introduced to the child.

Number Rods & Cards

Name of Activity: Number rods and cards.

Material Description: There are 10 number rods and a wooden box comprising of 10 white masonite cards with numbers 1 – 10 written in black. The box has a lid. A mat.

Material Display: The box and the number rods are kept on the arithmetic shelf. The mat kept in the environment.

Nature of Activity: Individual

Age: 3yrs onwards

Presentation:

- **Work cycle maintained.**
- **Adult calls a child and asks the child to bring the number rods.**
- **Adult will bring the number cards on a tray.**
- **The adult will isolate any number card at random and ask the child to recognize the number and find the corresponding rod by counting.**
- **Child identifies the card and isolates the rod and places the card next to that particular rod.**
- **In this manner it is done till 9 and then the adult will ask the child to isolate the rod of 10.**
- **The adult will show the child the card of 10 and say "this is how 10 is written".**
- **The adult will ask the child to put the rods in seriation only after counting the rods and saying the number on the card.**
- **Work checked by both adult and child.**
- **Work cycle completed.**

Point of Interest:

•Adult isolates cards at random and the child recognizes and isolates the rod and places it to the corresponding rod.

•Child is asked to isolates the rod of 10 and then only card of 10 is shown to the child.

Control of Error:

Lies in the material that is the cards are corresponding to the number rods.

Direct Aims:

•The child associates the quantity with the names and the written symbols.

•The child is introduced to the written symbol of 10.

Indirect Aims:

•Moving further in understanding the number system.

•Understanding the abstract of written symbols.

•Further preparation for decimal system and addition.

•Language development.

<u>Spindle Box</u>

Name of Activity: Spindle box.

Material Description: There are two wooden trays which are divided into compartments with 0 – 9 written on the walls of the compartment in black. There are 45 spindles in all. They look like pencils and are of neutral color placed in the compartment corresponding to the numbers.

Material Display: The two trays are kept on the mathematics shelf. The mat kept in the environment.

Nature of Activity: Individual.

Age: 3yrs to 3 ½ yrs.

Presentation:

- **Work cycle maintained.**
- **Adult invites the child and shows where the material is kept.**
- **Adult brings the first tray and places it on the mat.**
- **Adult introduces the child to the spindles and also shows the child how to hold the spindles.**
- **The adult takes out the spindles one by one and keeps the spindles on the mat in a straight line.**
- **The adult will ask the child to identify the written symbols on each compartment.**
- **For the first compartment the adult will say" this is 0 and has no quantity and so it has no spindles".**
- **After identifying the written numbers the adult tells the child to count with the adult while putting back the spindles in their corresponding compartment.**
- **Adult will ask the child to check and will tell the child to do the activity.**
- **Both adult and child checks.**
- **Work cycle completed.**

When the child becomes mechanical with the first box the second box is given to the child.

Points of Interest:

•Introduce the spindles to the child and to show how to hold the spindles with the writing fingers.

•Zero for the first time is introduced to the child by giving appropriate concept.

•The child identifies the written number and counts the spindles and placing in the respective compartments.

Control of Error:

Lies in the material that is the child identifies the numbers and counts the spindles.

Language: Mathematical terms.

Direct Aims:

- **Child is introduced to the concept of 0 in a concrete manner.**
- **Child is associating loose quantity with the written symbols for the first time.**

Indirect Aims:

- **Indirect preparation for addition.**
- **Further development of mathematics.**
- **Language development.**
- **Hand and mind co-ordination develop.**
- **Fine motor movements.**

<u>Cards & Counters</u>

Name of Activity: Cards and counters.

Material Description: There are small cards 1 – 10 which are white in color and the numbers written on them are in black and these are kept in a wooden box. The total numbers of counters are 55. A mat.

Material Display: The box containing the cards and counters are kept on the mathematic shelf. The mat kept in the environment.

Nature of Activity: Individual.

Age: 3yrs to 3 ½ yrs

Presentation:

- **Work cycle maintained.**
- **Adult invites the child and shows where the material is kept**
- **Adult brings the box and keeps it on the mat.**
- **Adult asks the child to place the cards in a row at the edge of the mat in seriation.**
- **Adult tells the child to count the counters when placing them underneath the cards.**
- **Adult places the counters from 1 – 4 till a pattern takes place after which the adult can ask the child to take over.**
- **The child will recognize the number and place the counters underneath the corresponding number.**
- **Both adult and child will check the work.**
- **Work cycle completed.**

Points of Interest:

- **Arranging cards in order.**
- **Counting the counters and placing them to the corresponding cards.**

Control of Error:

Lies in the material and the number cards.

Language: Mathematical terms.

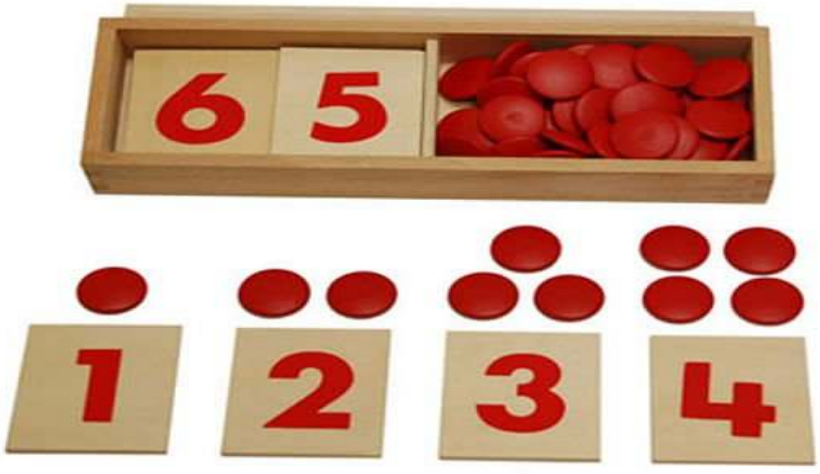
Direct Aims:

Child is associating written symbols in loose cards with loose quantity.

Indirect Aims:

- **Preparation for mathematics**
- **Reinforcement of decimal system**
- **Language development.**

When the child has done cards and counters, adult introduces the concept of odds and even.



Odds & Evens

Name of Activity: Odds and evens.

Material Description: There are small cards white in color from 1- 10 written in black and are kept in a wooden box. The total number of counters is 55. A mat and a pointer.

Material Display: The box containing the cards and counters are kept on the mathematics shelf. The mat and the pointer kept in the environment.

Nature of Activity: Individual.

Age: 3yrs – 3 ½ yrs.

Presentation:

- **Work cycle maintained.**
- **Adult invites the child. The child can bring the box containing cards and counters.**
- **Child arranges the cards and counter in a proper manner.**
- **Adult puts the pointer in the rows of pattern.**
- **Adult explains that as there is no friend for the counter therefore it is oddly placed. So 1 is an odd number.**
- **Similarly the pointer is placed in the next number and the adult says "This has a friend, so it is evenly placed. So 2 is and even number."**
- **In this manner all the numbers till 5 will be shown by the adult, after that the child can take over.**
- **Both adult and child checks.**
- **Work cycle completed.**

Points of Interest:

- **Placement of counters in a particular way.**
- **Placement of pointer in between the counters.**

Control of Error:

Lies in the pattern and placement of the counters.

Language: Mathematical terms.

Direct Aims:

Child is introduced to odds and evens which are the characteristics of number.

Indirect Aims:

- **Preparation for math.**
- **Re inforcement of decimal system.**
- **Language development.**

<u>Computer Based Learning-:</u>

The environments in which students learn, and the ways in which people work and live, are constantly being transformed by existing and emerging technologies. To be well informed

and active participants in our changing society, students will need to be self-directed learners, able to recognize issues, pose questions, synthesize ideas, find out solutions to problems and build up capabilities and confidence with a range of technologies. Use of computers alone will not progress learning. The advent, over the years, of other technologies, including television, the tape recorder and the overhead projector, which were each heralded as the panacea to teaching and learning, have provided us with sufficient evidence to support this view. Technologies can be important tools and can transform the way we do things, but simply having access to them is not sufficient for students to develop their learning. Computer-based learning needs to be driven by what students can do with the software rather than what the software provides. The critical factor in the successful introduction of computing activities into the school curriculum relates to teachers and how they make sure that learning with computers is meaningful to students.

Principles

The following interrelated principles provide as a useful guide to discover a possible interpretation of what constitutes "meaningful engagement". Each of these principles of learning has implications for the design, development, implementation and evaluation of teaching and learning programs incorporating computer-based technologies.

• Learning includes the active construction of knowledge through the process of inquiry, thinking, and problem solving, creating and communicating.

• Learning is purposeful and derives from a desire to make sense of the world and act upon it.

• Learning is based on earlier knowledge and requires challenges to the initial conceptions which students bring from their home and other familiar environments. The challenges lead to new insights which require students to reorganize or extend their existing framework of knowledge.

• Learning is interactive. It is more successful when students are engaged in interaction with the teacher, other students and resources, including technology.

• Learning takes place in a context of use, i.e. The situational and interactional circumstances in which knowledge is constructed and used.

• Learning is most effective when conceptual content is interrelated. It involves making associations and forming knowledge structures.

Science and Technology

• Learning is holistic: it involves undertaking responsibilities as a whole rather than breaking them down into parts.

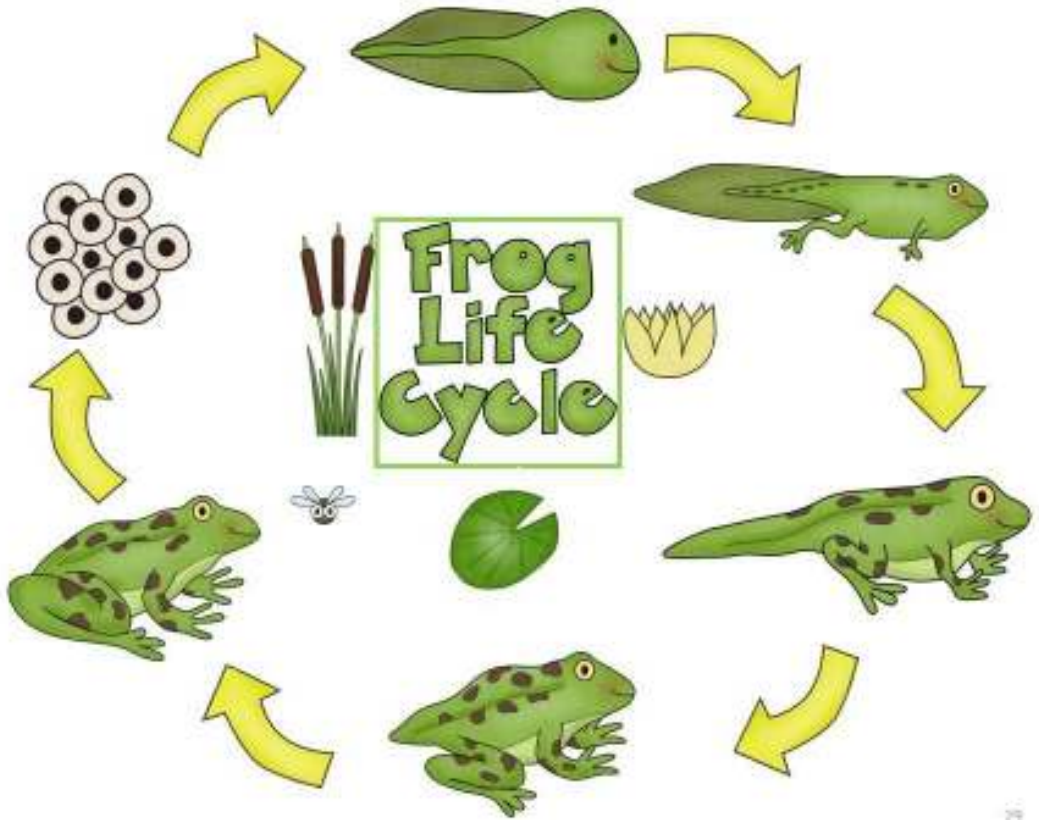
• Learning is spiral, not linear; concepts are developed at differing levels of depth and need revisiting in new contexts, thereby extending and elaborating students' frameworks of knowledge.

• Learning needs support or scaffolding. Support may be given in instructions or through resources, including technology.

• Learning depends upon students' attitude and disposition to learning.

• Learning can be enhanced through reflecting and increasing conscious awareness of patterns underlying knowledge and strategies used to trigger knowledge: planning, undertaking, monitoring and evaluating action.

These form a particular set of beliefs of learning. They are in line with current thought on learning; though, they are not universal. Learning materials, including computer software, implicitly reflect and embody learning theory. The way in which they are conceptualized and built is not simply the result of objective descriptions of the instructional sequence, but rather they reveal the authors' beliefs about how learners learn and what the objectives of learning are. Much of the commercially accessible computer-based software is lock-step and does not permit students to build up the types of skills, knowledge and understandings. In choosing software suitable for students, it is important that teachers evaluate it, not only in terms of its content, but mainly in terms of how effective it is in fostering learning. Many teachers find open ended software packages, such as Hyper Studio or Kid Pix, particularly effective in supporting them to integrate computer-based learning activities into their teaching programs in a meaningful way. These software packages are useful because they are comparatively content free and offer students with tools to create, import and export text, images, sounds and animations in response to a particular learning task. The following samples of students' work from a Year two class at Mount Riverview Public School, for instance, show an innovative approach to the use of Kid Pix. One of the activities involves students writing their factual text and drawing diagrams depicting the life cycle of frogs. In this way the students are developing computer-based capabilities, in addition to achieving syllabus outcomes.



Drama:

Engaging All Learning Styles

Drama is highly regarded as an effective and important teaching strategy because of its unique capacity to engage reflective, constructivist and active learning in the classroom as well as enhancing oral skills development. As teachers, we often search for valuable ways to improve our classes and motivate the students. Here we will talk about some of the benefits of using drama as a teaching strategy, its power to engage all learning styles and offer some practical classroom teaching activities which include various learning styles in English as a foreign or second language. Teachers are encouraged to try some of these strategies and provide a more active and engaging learning experience for students in the classroom.

Engaging All Learning Styles

Drama has the unique ability to engage many different learning styles, thus facilitating connections with students and inspiring most learners today. As teachers, we know that people learn differently and at different paces because of their biological and psychological differences. Learning styles not only include the cognitive domain, but also the affective and physiological domains. Learning style is now considered to be multidimensional. Strong,

Silver and Perini (2001) divided verbal-linguistic intelligence into four learning preferences including mastery (knowing), interpersonal (connecting with people; social skills), understanding (discovery and reasoning) and self-expressive (creativity). If learning styles are matched with suitable teaching approaches, then student motivation, performance and achievement is more expected to increase. Great strength of drama is in its appeal to various learning styles yet many teachers are wary of using it for many reasons like fear of losing control in the classroom, students who may become too boisterous or unruly, unnecessarily loud noise levels, disturbing nearby classes and/or mass chaos. With clearly structured activities, most of these fears are unfounded. Students take pleasure in the activities, work together in groups and share their creative expressions. Even the shyest students are able to profit from drama when they take on a new role and visualize themselves to be someone else. Howard Gardner (1989) described his vision for schools which use multiple intelligences to incorporate authentic learning. Drama has the capability to provide authentic learning as most of the intelligences are utilized in learning activities. For example, drama incorporates *verbal linguistic* learning through the use of language, scripts, vocabulary and reading. *Intrapersonal* learning relates to the

Feelings and emotions which is involved in drama, characterizations and how we respond as an individual, while interpersonal learning comes from working with others to create a scene or role play. Kinesthetic learning activates the physical self, the body and doing actions. As students reconstruct images, pictures, visual details, staging, movement, location and direction with drama their spatial learning skills are developed. Logical learning follows from using rational patterns, cause and effect relationships and other believable concepts involved with the drama. Sometimes music, or the music of language, is also used in working with drama. A long time advocate of drama as a valuable teaching strategy, Dorothy Heathcote (in Wagner, 1976) stated:

If you cannot increase reflective power in people, you might as well not teach, because reflection is the only thing in the long run that teaches anybody. Reflection is what makes the knowing something that can be touched on and assimilated for further use.

This illustrates Heathcote's belief in the power of drama to enhance reflection in students, teach and build on knowledge for further use. In the last decade, constructivist learning has got better attention and become more and more significant as a learning theory. Dewey in the 1900's was a constructivist proponent, as Piaget who studied the developmental patterns of his own children. Vygotsky (1978) stated: What a child can do in a group today, tomorrow he can do alone. Constructivist learning consists of social, active learning; creates a powerful learning environment; is authentic and understanding-based; cooperative and collaborative; self-controlled; goal-oriented and draws on emotional intelligence. Constructivist learning

helps to build confidence in students who are developing new skills. Drama enhances all of these skills, engages multiple intelligences and also increases the power of reflection in constructing knowledge. All of these attributes add to the power of drama in engaging all learning styles.

Validity and Historical Appeal of Drama in Education

The power of drama to involve all learning styles is obvious through its history and development. Even though drama in education is more recent, other military, government and corporate business institutions have used drama as an important training and teaching method for many years.

Education began to develop and use drama teaching techniques with the beginning of Communicative Language Teaching, particularly during the 1970's. With communication at the center of the curriculum, classroom activities that develop this capability began to emerge. This brief sketch of the background and development of drama through military, government, business and educational institutions shows the ability of drama to effectively teach and train across a broad range of interests. The power of the brain to engage with authentic and understanding-based learning in a self-controlled, goal-oriented and active environment is apparent. Although drama is a fairly recent teaching strategy, more and more teachers are beginning to learn the increased capacity and benefits of drama to encourage enable valuable learning and produce more motivated engagement with learners in the classroom. The benefits of using drama are numerous such as practical teaching activities e.g theatre sports which involve improvisation and creative constructive learning. Drama is also a useful energizer in the classroom where students become energetic, have fun and enjoy their learning experiences. A shy student is easily able to take on an alter ego or persona, different from their reserved self, in order to speak and act. Drama is useful in text studies to recognize literary devices, study language more carefully and to meaningfully enact the words. The benefits of drama in oral skills development help students with pronunciation, intonation and development of emotional intelligence. Students get an understanding of other perspectives, the experience of being human and attaching proper feelings to expressions. Cultural similarities and differences may become more obvious and more understandable through drama activities. Readers' Theatre is another helpful teaching strategy where the students orally take part in reading poetry. Gestures and actions may be applied to improve understanding and learning. Groups of students may share their creative interpretations or role plays related to Readers' Theatre. There are a number of websites for Readers' Theatre or teachers can form their own texts for active, kinesthetic readings. These activities encourage active listening, speaking and action performance in response to the words of the

poetry. Multiple perspectives and interpretations may be presented by different student groups, which support a variety of possible readings.

Practical Classroom Activities

Theatre Sports is entertaining as theatre, which is intended to be watched and observed as well as a game of sports, because it has rules of play and scoring. Literary themes may be exploited, such as love, hate, death, etc. Or various adjectives, adverbs or verbs studied more closely through such games. Students take pleasure in team interplay and preparing their presentations in response to a text. The cooperative learning skills are valuable in addition to speaking; creative improvisation and critical thinking which develop as students improvise together and score other teams. Theatre Sports can be successfully used as a warm-up for a lesson, a theme enhancer or simply as enjoyable speaking activities.

Text Studies: Oxymoron's

Careful analysis of a text is possible with the help of drama activities. For example, oxymoron's can be studied using Shakespeare's *Romeo and Juliet.* 'Sweet sorrow' is an oxymoron as it combines two incongruous or two contradictory words, brought together in order to make a striking expression. Much of *Romeo and Juliet* is about the class of opposites in family feuds, youth and age, life versus death, and so forth.

These oppositions are expressed in the oxymorons in the play when Romeo says:

Here's much to do with hate, but more with love:

Why then, O brawling love, O loving hate,

O any thing of nothing first create!

O heavy lightness, serious vanity,

Misshapen chaos of well-seeming forms,

Feather of lead, bright smoke, cold fire, sick health,

Still-waking sleep that is not what it is!

Juliet also speaks using oxymorons:

O serpent heart, hid with a flow'ring face!

Did ever dragon keep so fair a cave?

Beautiful tyrant, fiend angelical!

Dove-feathered raven, wolvish-ravening lamb!

Despised substance of divinest show!

Just opposite to what thou justly seem'st,

A damned saint, an honorable villain!

After ample explanation, the teacher may tell the students to work with a partner or small group to select one of Romeo's or Juliet's oxymoron's (Romeo has a dozen oxymoron's, Juliet has at least seven). Students can portray the oxymoron as a still photograph, while the class guesses which oxymoron has been selected. Students may also be asked to create oxymorons of their own, acting them out for the class to guess.

<u>Text Studies: Lists - Things She'd Rather Do</u>

Shakespeare was also a great list maker. In *Romeo and Juliet*, Juliet lists all the things she would rather do than marry Paris:

O bid me leap, rather than marry Paris,

From off the battlements of any tower,

Or walk in thievish ways, or bid me lurk

Where serpents are; chain me with roaring bears,

Or hide me nightly in a charnel-house,

O'er covered quite with dead men's rattling bones,

With reeky shanks and yellow chap less skulls;

Or bid me go into a new-made grave,

And hide me with a dead man in his shroud –

Juliet's list naturally lends itself to physical actions. Students will be able to act out this list as one person speaks the lines very slowly, pausing after each item, while the others perform the actions. Alternatively, the lines can be shared in reading as group members take turns to act and speak. Students may also be asked to create their own list of things they would rather do than meet or marry someone not of their choice. Such activities personalize learning by creating associations between the students' own knowledge and that of the text.

Speaking, Reading and Emotional Intelligence

Teachers may give selected short script excerpts for students to workshop and perform. For example a brief love scene or emotionally charged scenario where students are said to engage speaking, reading and emotional intelligence in order to make sense of the scene. Such an example can be the balcony scene from the well-known musical *West Side Story* where students are said to re-create the emotional intensity of Maria and Tony falling in love although each knows that the other is from an opposing gang and thus faced with an unrealistic and impossible courtship. Students could be asked to follow the stage directions carefully like for example - climbing up to the balcony; smiling; grabbing Maria's hand; Maria reaching out to stop Tony; laughing; touching his face, etc while making the scene as realistic as possible. As students take up another character's role, they achieve a greater understanding and empathy with that character. They are able to compare the responses of the characters with their own possible response, and are required to identify and manage emotions in themselves and in others. Using interactive approaches requires emotional intelligence, positive communication and the capability to take others' perspectives and experiences into account. All of these experiences are an essential part of the reflective power of drama to engage all learning styles.

Hot Seat

One of the characters from the scene may take part in Hot Seat. In this activity, the student remains in role as Tony, from the previous scene, and sits in a chair, or hot seat, in front of the class. Classmates are invited to ask him questions which he must answer as Tony. Through the hot seat activity, students achieve a deeper understanding and perspective of the particular character's psychology, ethics and motivation through the questions and answers. This activity also helps the students to verbalize their thoughts by asking questions and interacting with the text, themes and characters being studied.

Conscience Alley

In Conscience Alley, students make two lines to form an alley or pathway and speak as the character's conscience when she/he walks slowly through the alley. Participants should be encouraged to build up their 'conscience alley' comment prior to lining up to form the alleyway. For instance, if the character to walk through conscience alley was Maria from *West Side Story,* students might respond to her love for Tony who is from an opposite gang hated by Maria's family, in a similar way as the Capulets and Montagues in *Romeo and Juliet*. Each person in the conscience alley make individual comments such as: Don't do It, Maria! You know it will never work out. It will only break your heart! Or on the favorable side: Yes, Maria, you know you love him! Love is strong and can overcome any obstacle! Go for it! Such

an activity helps students to respond to the text, the literary themes of the text and the characters involved in a personal way. It is an activity which needs a commitment from the student as they decide whether the character will be successful or has acted responsibly and ethically in a given situation. Alternatively, students can dramatize a conscience alley with their responses to contemporary news items portrayed in the media.

Readers' Theatre

Teachers may divide the class into sections or groups to expressively read a passage. There are many books and web sites available with sections of poetry and scripts for readers' theatre or teachers can create their own. Students enjoy choral work, language rhythm, jazz chants, intonation, vocabulary, pronunciation and teamwork. After some rehearsal, teams or groups can be encouraged to share their performance with classmates. Readers' Theatre is motivating, active and enhances oral skills development. An example of Readers' Theatre could be Shakespeare's companion poems *winter* where student groups share the owl's refrain Tu-*whit, tu-who!* And *Spring* where students chant the chorus as *Cuckoo, cuckoo! O word of fear, unpleasing to a married ear!* After a narrator or main group read the verses. In this poem, the purpose is to re-create an exciting ping pong match. The class can be divided into two groups i.e. Group A: who could read the left side words and group B who could read the right side action verbs. The teacher could take the role of a narrator, or referee according to the ping pong game. Alternatively, another student could be asked to referee. Everyone can join in as the game reaches its conclusion in a crescendo. After reading through several times, audience could be asked to move their heads as if following the ping pong ball in the game and verbally express the action of the verbs, especially as the tension builds. Players could mime the action as the teams speak. Readers' Theatre gives an enjoyable way of learning language, speaking, re-creating images of poetry and working in teams.

Conclusion

Drama is an influential and helpful teaching strategy that can be utilized in numerous ways in the contemporary classroom to give active, constructivist learning. The history and development of drama as a teaching strategy is a consequence of valid use in various military, government and corporate business interests throughout the world. Drama involves the brain and physical body in realistic simulation exercises which have proven to be powerful and successful teaching and training techniques for a wide range of institutions. Drama does engage multidimensional learning styles including verbal-linguistic, interpersonal, intrapersonal, kinesthetic, spatial, and logical and often incorporates music, or the music of language. In addition, drama has the capacity to enhance reflection in students and can be used to create powerful social learning environments where students develop improvisational speaking and emotional intelligence awareness skills. Drama is an appealing

teaching strategy which promotes cooperation, collaboration, self-control, goal-oriented learning as well as emotional intelligence skills. Drama is easily adaptable to a variety of text studies. Shy students are encouraged to speak by taking on another role. Students build up confidence in speaking from using language rhythms, expression, intonation, pronunciation and choral work. With so many positive benefits, more teachers should be using drama to engage learners and maximize benefits!

A Brief History OF PBL

For over 100 years, educators such as John Dewey have reported on the importance of experiential, hands-on, student-directed learning.

Most teachers, knowing the value of engaging, give challenging projects to the students, have planned field trips, laboratory investigations, and interdisciplinary activities that enrich and extend the curriculum. Research reveals that learners not only act in response by feeding back information, but they also enthusiastically use what they know to explore, negotiate, interpret, and create. They *construct* solutions, thus shifting the emphasis toward the process of learning. In addition, cognitive research has revealed much more about the nature of problem solving. Education has benefited from this research, as teachers have learned how to effectively scaffold content and activities to amplify and extend the skills and capabilities of students. Nearly all teachers know how the industrial culture has shaped the organization and methods of schools in the 19th and 20th centuries, and they recognize that schools must now adapt to a new century. It is clear that children need both knowledge *and* skills in order to succeed. This want is driven not only by workforce demands for high-performance employees who can plan, collaborate, and communicate, but also by the need to help all young people learn civic responsibility and master their new roles as global citizens. The need for education to adapt to a changing world is the primary reason that PBL is increasingly popular. PBL is an effort to create new instructional practices that reflect the environment in which children now live and learn. As the world continues to change, so does our definition of PBL. The most significant recent shift in education has been the increased emphasis on standards, clear outcomes, and accountability.

Defining Standards-Focused PBL

BIE (Buck Institute for Education) describes standards-focused PBL as a systematic teaching method that involves students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks. This classification encompasses a spectrum ranging from brief projects of one to two weeks based on a single subject in one classroom to yearlong, interdisciplinary projects that involve community participation and adults outside the school. More essential than the

definition it the attributes of effective projects. BIE planning model is based on a number of criteria that differentiate planned projects from other extended activities in the classroom. Outstanding projects:

- **Identify students' inherent *drive to learn,* their ability to do important work, and their need to be taken seriously by putting them at the center of the learning process.**

- **Involves students in the central concepts and principles of discipline. The project work is *central* rather than peripheral to the curriculum.**

- **Emphasize provocative issues or questions that lead students to *in-depth exploration of authentic and main topics.***

- **Need the use of essential *tools and skills,* including technology, for learning, self-management, and project management.**

- **Specify *products* that solve problems, clarify dilemmas, or present information generated through investigation, research, or reasoning.**

- **Include *multiple products* that allow frequent feedback and consistent opportunities for students to learn from experience.**

- **Make use of *performance-based assessments* that communicate high expectations, present rigorous challenges, and need a range of skills and knowledge.**

- **Support *collaboration* in some form, either through small groups, student-led presentations, or whole-class evaluations of project results.**

The BIE model for PBL also addresses a singular need in the field of PBL: to create *standards focused* projects that adjust well with the era of accountability and performance. Often, projects have been used as fun or change-of-pace events completed after students have been pushed through homework assignments, lectures, and tests. In standards-based PBL, students are pulled through the curriculum by a Driving Question or authentic problem that creates a need to know the material. The Driving Question is tied to content standards in the

curriculum, and assessment is explicitly designed to assess the students' knowledge of the content. Likewise, Project Based Learning is at times equated with inquiry-based or experiential learning. Though PBL shares some overlapping characteristics with these two terms, standards-focused PBL is designed to recognize the significance of standards and evaluation of student learning. In an era of accountability, with testing and performance uppermost in the minds of parents and educators, it is necessary that all instructional methods incorporate high standards, rigorous challenges, and valid assessment methods.

The Benefits of PBL

As a field, PBL is still in the developmental stage. There is not adequate research or empirical data to state that PBL is a proven alternative to other forms of instruction. Based on proof gathered over the past ten years, PBL appears to be slightly better model for producing gains in academic achievement, although results differ with the quality of the project and the level of student engagement. Also, PBL is not suitable as a method for teaching certain basic skills such as reading or computation; however, it does provide an environment for the application of those skills. More important, evidence shows that PBL helps the quality of learning and leads to higher-level cognitive development through students' engagement with complex, novel problems. PBL teaches students complex processes and procedures such as planning and communicating. Accomplishing these goals, however, need time for both teachers and students to master the behaviors and strategies needed for successful PBL. In accordance to the research, convincing reports have come from teachers that PBL is a rigorous, relevant, and engaging instructional model that help authentic inquiry and autonomous learning for students. Along with encouraging academic proficiency and meeting the traditional goals of education, PBL has necessary benefits for today's students. Teachers report that PBL:

Overcomes the dichotomy between knowledge and thinking, helping students to both ''know'' and ''do.''

- **Helping students in learning and practicing skills in problem solving, communication, and self-management**

- **Encourages the development of habits of mind connected with lifelong learning, civic responsibility, and personal or career success**

- **Integrates curriculum areas, thematic instruction, and community issues**

- **Assesses performance on content and skills using criteria similar to those in the work world, thus encouraging accountability, goal setting, and enhanced performance**

- **Creates positive communication and collaborative relationships among diverse groups of students**

- **Meets the needs of learners with varying skill levels and learning styles**

- **Engages and motivates uninterested or indifferent students**

PBL can be used effectively or ineffectively. It can help you as a teacher to create a high performing classroom in which you and your students form a powerful learning community focused on achievement, self-mastery, and contribution to the community. It helps you to focus on central ideas and salient issues in your curriculum, form engaging and challenging activities in the classroom, and support self-directed learning among your students.

PBL in your Classroom

Planning for a project must take into account what is possible in your classroom. The scope of a project will be affected by the bell schedule, the time of year, standardized testing, and the other myriad factors that impact your work. Standards-focused projects teach students the same essential information you might teach them through lecture and discussion. PBL teachers also find that they do considerably less ''busy work'' activities in the classroom. And, though projects take time to plan, teachers have more time to work with students once a project is under way

Are your students capable?

Student autonomy is one of the hallmarks of PBL. Still, most teachers introduce student autonomy in stages, depending upon students' age and experience. Before planning your project, think about how much you want your students to be involved in its design and how much autonomy they will have in carrying out project activities. You may want to choose the project topic, mainly for the first project in your classroom. With students who are eager and prepared, you may wish to have them decide on the project topic and define the learning outcomes. Your role becomes one of coach and facilitator, helping students to shape the

project so that it meets content standards and allows for a variety of assessments. If students have not had experience with projects, then they will need training in such skills as collaboration, research, project management, and oral presentations. Plus, you may have to manage them closely until they have mastered self-management skills.

Your style and skills

Once teachers feel comfortable with PBL, they usually find teaching with projects to be more satisfying and enjoyable. PBL is a way of working with students as they find more about themselves and the world, and that brings job satisfaction. However, in addition to strong instructional and organizational skills, PBL requires that teachers facilitate and manage the *process* of learning. PBL teachers must create tasks and conditions under which student thinking can be revealed—a co creative process that involves inquiry, dialogue, and skill building as the project proceeds. Though most teachers identify that active learning is crucial, not all of us react in the same way to an open-ended process. Project is a good time to reflect on your teaching style and skills. Leaders facilitate problem solving in a group and help the group find their own solutions to the problem. Managers control the process and look for prescribed outcomes.

In reality, good teachers go back and forth between the two roles. But if you are hesitant to release control over your students, you may want to avoid projects or start small until you feel comfortable and skilled in project leadership. As a leader, your job is to assist each student produce a superior product by facilitating learning. As students assemble data and progress in their problem solving, they will come across obstacles and opportunities. At the heart of successful PBL is your ability to support and direct students (or on the contrary, your ability to let them struggle with a problem or information as they search out answers and solutions). This requires interpersonal and communication skills, as well as the ability to define the agenda for the class and push a project through to a successful conclusion. It also includes being sensitive to the fact that students complete work at different rates, with different abilities, aptitudes, and learning styles.

PBL and your School

PBL works enormously well in schools that have extended blocks of time instead of 50-minute periods. Likewise, when schools are formed around small learning communities such as academies or houses, PBL is a natural tool for teaching and learning. But if the school does not have these reforms in place, it is still possible to create excellent projects for students. You will also find that good projects in classrooms support changes in the culture and structure of schools. Schools are under tremendous pressure to raise standards, improve climate, and personalize education. PBL can help extensively to this process by encouraging

teacher collaboration, motivating students to accomplish, using the tools and language of project management and organizational change, and helping to incorporate school-wide learning outcomes into the curriculum. In particular, PBL fits well with efforts to create a high-performance school culture that values both rigor and relevance. In addition, projects are a great way to engage parents and community members in the educational process, which often leads to more support for the school and a better understanding of the needs of students. A question often asked by teachers in low-performing schools is: can Project Based Learning work in my school? It can. For students with basic skills issues, it may be essential to include more direct instruction during a project, design shorter projects, or tie projects closely to fewer and more specific standards. But PBL offers all students the opportunity to investigate authentic topics of interest to them, thus engaging them in the learning process in ways that traditional instruction does not.