(1) **Plan and Design of the study:**

This study was planned in the format of a Two-Factor (Factor A: Groups, Factor B: Testings), $2 \times 5$ (corresponding levels of the two Factors), factorial ANOVA design, with repeated measures of the second (testing) factor. The two levels of Factor-A are: $A_1 =$ Experimental (with intervention training) and $A_2 =$ Control (without intervention training) groups, with 30 subjects in each group. The five levels of Factor-B are testings: One prior to intervention, one during intervention, and three after intervention (immediate, one month after, and six months after). Table 1 schematically presents the PLAN and DESIGN of the Study.
Table I

Schematic Presentation of the PLAN AND DESIGN OF THE STUDY

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Groups</th>
<th>Pre-Intervention</th>
<th>Intervention One-week periods</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>n = 30</td>
<td>**</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Control</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

** The final testing after 6 months was on n = 24 per group.


Demographic Characteristics:

The place where this research was conducted is Sana Arjipalli, a Nolia village 6 k.m. south east of Chhatrapur town, the headquarter of Ganjam district in the state of Orissa. To its east lies the Bay of Bengal, south the Gopalpur port and Indian Rare Earth sand complex. To its south west lies Berhampur the biggest town of the district and a busy business centre. Though the place is very close to the urban centre there is no sign of influence on them. The people till now are deprived of civic facilities. Orissa has a population of about 31,512,070. The population of Ganjam is about 3,143,120, i.e. 9.97% of the state (census of India, 1991). The Ganjam district has 450 panchayats. Arjipalli, the place of research, comes under the Kanamana panchayat. The population of this panchayat is 10,600. Arjipalli is a hamlet with an area of 11,575 square kilometers. The number of dwellings in the village is 1135. Total population is 2,160 (Male 1083, Female 1076). Arjipalli has a literate population of 151 persons (Male 123, Female 28). Schedule caste population is (Male 11, Female 4). The families are almost identical in economic, social and cultural spheres. The children under research come from economically and educationally lower class. Most of the adult male population earn their livelihood from fishing, the female population work on the village lands. They are mostly casual seasonal labourers.
Sample Selection:

At first the parents were individually interviewed with the help of a Structured Interview Questionnaire by the investigator for establishment of rapport and collection of information. The questions were thoroughly explained and the parents were asked to respond freely to each question asked by the researcher. From the questionnaire and on the basis of family background data, 100 non-schooled children from the age group of 5 to 10 were identified.

After establishing rapport and good cooperation with the parents the researcher explained to the parents the objectives of the study and its practical utilities for the children and assured them that the children will be given some training which would be beneficial to them in the long run.

The identified children (100), were given some preliminary tests by the investigator to determine minimum reception, comprehension, and expression skills of the children. Only 80 children out of 100 completed all the tasks. From these 80 children, 60 children in the age group of 5 to 10 years were selected randomly and these 60 children were again divided into two (2) groups randomly.
(4) **Age, sex and Description of the Samples:**

So, the final sample of this study consisted of 60 children, 30 in the Experimental group and 30 in the Control group. The age range of both the groups was 5 to 10 years. The boys : girls ratios in the two groups (experimental and control) were 21 : 9 and 19 : 11 respectively. Table 2 presents the sample characteristics.

<table>
<thead>
<tr>
<th>Sample Characteristic</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mean age</td>
<td>7.67</td>
<td>7.63</td>
</tr>
<tr>
<td>2. Age range</td>
<td>5-10 years</td>
<td>5-10 years</td>
</tr>
<tr>
<td>3. Sex : Boys</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

(5) **Research Techniques / Tools:**

The following questionnaire / tests / tasks were used in this reason: (i) Family Background Inventory and Structured Interview Schedule for parents, (ii) Assessment Tests (7), (a) Piagetian Cognitive Tests (5), (b) Verbal learning and Memory Test (1), (c) Non-Verbal Intelligence Test (1), (iii) Training Tasks (13).

All these are described below in detail.
Family Background Inventory and Structured Interview Questionnaire:

This Questionnaire was developed by the researcher for the establishment of rapport and collection of family background information from the parents. The family Background Inventory sought information about the names of parents, their approximate age, level of education, type of occupation, profession or work, income and total members in their family as well as their sex, age and type of relation with each member. The Structured Interview Questionnaire contained 12 questions, concerning the life style, common needs, social relationships and behaviours of the respondents. They were requested to respond to the questions asked by the researcher freely and frankly. The 12 questions were as follows:

1. How much education you have received? What difficulties did you face? Do your children face any problem to study?

2. Do you consider that your children need education? If yes, what kind of education do your children need?

3. Are you happy in your life? (a) If yes, what has/have made you happy? (b) If not, why? What will make you happy?
4. How will you live happily? How did you know that these are essential to make you happy?

5. What type of education you and your children require to make yourselves happy?

6. Are you happy with your earning? If not, why? What do you want to do to earn more so that you will be happy?

7. Are others happy with your behaviour? If not, why?

8. Do you have any family problems? If yes, how you face and solve these problems?

9. What type of relation you have with others? What sort of knowledge would you like to have, so that you will have good relation with others?

10. What do you do if anybody needs some help from you? Do you help or not? If so, what type of help?

11. Does anybody cheat you? If yes, what sort of knowledge would you like to have, so that nobody can cheat you?

12. In your opinion, fulfillment of which necessities would make someone great in life and society?

(ii) Assessment Tests:

For the assessment of cognitive development, five Piagetian, one language development and one non-verbal intelligence tests were selected which are provided below.
Piagetian cognitive tests:

1. Conservation of Number: The test consisted of white buttons arranged in two lines, each containing ten buttons in approximately one to one correspondence. The child was asked: Are the buttons lying in the two rows same or are the buttons in the top row same as the second row? After the child gave the response "yes" the buttons of the bottom row were rearranged so that bottom row looked longer and the buttons did not correspond to the buttons in the top row. Then the child was asked the same questions as above. If the child agreed to equality then the justification of the response was asked. The respondent scored zero if the equality was not understood by him or her while the rows were parallel with equal number of buttons. He/she got a score of 1 if agreed to equality of the buttons and 2 if gave the correct answer for his/her justification.

2. Conservation of Liquid: In this test an equal amount of liquid (water) was poured into two equal size glasses. Then the child was asked: whether the amount of water in the two glasses are same or not? After he/she agreed equality, the water from one of the glasses was poured into a wider glass. Then the child was asked the same question as above. If the child agreed to equality he/she was asked for the justification of response. Then the scoring was done like conservation of number.
3. Conservation of Length: In this test three rods were used. One rod was ten inch long and other two were five inch each. They were lying parallel and the bottom two rods were kept in such a way that the ends of the first rod were in alignment with the ends of the bottom two rods. Then the child was asked: "Are the rods the same length that is the length of the top rod equal to the bottom two rods?" After the child gave the response "Yes" the bottom two rods were moved one to the left and the other to the right so that their ends were no longer in alignment. If the child agree to equality he/she was asked for the justification of the response. The scoring was done like the above conservation tasks.

4. Class Inclusion: A Class Inclusion task assesses "the child's requisite structures of thought that enable a child to compare a subset with the total set of which it is a part, which in effect entails the logical operation of the addition and subtraction of classes." It involves the logical comprehension that, when the subclass A (e.g., girls) and A' (e.g., boys) additively compose or constitute the superordinate class B (e.g., children), then $B > A$ and $B - A' = A$. In this test seven red beads and five green beads were used. Then the following questions were asked: (1) Are there more green beads or more red beads? (2) Are there more green beads or more beads? (3) If all green beads
would be removed what would be left? (4) If all the beads would be removed what would be left? Correct answer to each question were given a score of 1. In this test maximum possible score was 4.

5. **Multiple Seriation Matrices**: Multiple seriation refers to the simultaneous seriation of an object according to the size or quantity. In this test children were provided with a series of five (2 x 2, 2 x 3, 2 x 4, 3 x 3, and 3 x 5) matrix problem. The goal in each problem was to fill some empty cells in the matrix. The scores each child got for each cell is 1. As there were all total 16 empty cells the maximum score each one could get is 16. If he/she could not fill any cell at all a score of zero (0) was awarded.

**Non-verbal Intelligence Test**

6. **Draw a child Test**: This is a drawing test, where the child was asked to draw the figure of a child, usually boys were asked to draw a boy and girls were asked to draw a girl. The test was originally developed by Goodenough (1926). Subsequent revision and extension of the Goodenough Draw a man scale was made by Harris (1963). This test, in itself, is not a test of intelligence, but its correlation with other intelligence tests are very substantial for children between ages 5-10 years. Its' results help in detection of severe
intellectual and conceptual retardation and in identification of such children as would require greater care and attention. It also gives a picture about a young child's gross general mental ability level. The drawing reflects the child's concepts which grow with age, experience and knowledge. In this test the figure was evaluated by assigning one point for each part of the human body drawn or shown. Additional credit of one point was given for showing garments or clothes. The maximum possible score one could get was 10.

Verbal Learning and Memory Test

7. Story Telling: This test assessed the child's verbal learning and memory skills. Here the child was asked to tell a story of his/her own choice. If the child was able to tell a whole story then he/she got a score of 3. If he/she could tell some few sentences of the story then got a score of 2 and a score of 1 if told one, two sentences of the story. But if he/she could not tell anything then he/she got a score of zero.

(iii) Training Tasks:

Piagetian tasks: Operations of seriation and classification are the basis for development of complex cognitive abilities like class inclusion, multiple seriation as well as conservation skills. The children
of disadvantaged homes do not have learning cues beforehand for these cognitive abilities. So it was hypothesized that training programmes on classification and seriation activities would influence subsequent cognitive structure. The following types of classification and seriation training have been found to generalized conceptual enhancement.

1. **Seriation**

Materials used - Sticks and beads of various sizes.

In this task children were given training to arrange objects according to an increasing or decreasing order. Children were first provided with a number of sticks in an increasing order of length. Then two sticks were taken and the children were asked to tell which one was big and which one was small. If the children responded correctly then they were provided with a number of sticks and were asked to arrange them in the ascending order. If they were unable to respond correctly then they were told how to order them. After giving training to the children in the absolute seriation skill, as above, then they were presented with three sticks placed in a descending order and then pointing to the middle one the children were asked which one was bigger and smaller in relation to one being pointed at. This is called relative seriation. Then the children were provided with five sticks and five beads of varying sizes and were asked to make a stick bead pair according to the size.
2. **Classification:**

Materials used. - Picture cards and geometrical figures of different sizes and colours as well as shapes. In classification training children were first asked to name different objects that were presented to them. At first they were provided with the pictures of different concrete objects in which except one all objects belonged to the same category. Suppose they were provided with five objects, four belonged to one category and the fifth to another. Then they were asked which objects were "similar", could be "placed in one group", "designated by one word", as well as which "did not belong in the same group", or could not be designated by the word that applied to the other four. In order to make the point clear the sample which was demonstrated to the children were like this - the children were shown four objects (mangoes) in one group and exclude the fifth (a flower). Following this training, children were then asked similar questions.

Then the children were provided with geometrical figures in the form of blocks. The blocks were provided to acquaint them with geometrical figures. The material consisted of twelve plastic blocks. The blocks used were squares and circles of two different size, large and small. The colours of the blocks were red and white. Then there were two large red squares, two small red squares, two
large red circles, two small red circles, two large white squares, two small white squares. Then the children were asked to classify them in terms of shape, size and colour.

After giving them training in the above classification skills then the children were provided with a number of objects that could be classified into more than one group. The objects were selected in such a way that they could be classified according to one of the two principles, (a) reference to a taxonomic category, and (b) participation in a practical situation. A group of objects such as a hammer, a saw, a log and an axe met these requirements. They could be classified according to the abstract, taxonomic criterion "tools" (hammer, saw, axe) or in keeping with a practical situation (sawing and chopping wood). The later would include those objects used to perform some function in such a situation (saw, log, axe). These criteria were used to select a number of other objects. Children were also provided with three objects that clearly belonged to one category and asked to select an appropriate fourth object from two or three objects. These objects were presented in the form of drawing. The investigator used the blackboard to draw objects so that all the thirty children could be able to see. When the children responded they were also asked to justify their response. During the course of training if the children grouped objects according to a practical situation, they were told that it could be grouped in such a way.
Vocabulary Development:

Materials used - Pictorial charts and cards.

Vocabulary development is an integral part of language competence, labelling of concepts, story-telling, singing, inter-personal communication and conversation. Vocabulary development to a large extent depends upon concept development. In disadvantaged homes and communities stimulation for conceptual and linguistic development as well as language models available for the children are inadequate. So it was hypothesized that training in vocabulary development would enhance or would generalize to other aspects of language competence such as story-telling, singing and interpersonal communication skills.

In order to give training in vocabulary development the children were provided with pictorial charts of animals, birds, fruits etc. Then the children were asked to name the pictures in the chart. If they failed to name, they were prompted the names of different pictures and the class to which these pictures belonged. Then they were provided with pictures of living creatures doing some action. For example, the picture of a crow standing near a pot. Then the children were asked questions about the creatures and their actions shown in different cards. If the children failed to respond then they were explained about the pictures of the card. In this way a number of picture cards were presented. Then the children were asked to
identify the appropriate picture corresponding to each sentence. They were also asked to say appropriate sentence corresponding to each picture.

(iii) Imitation and communicating through gestures:

Human infants in the first hours of life are already capable of spontaneous imitations of simple motor activities, without previous training or reward. These suggest that it is an innate process. Although it is an innate process yet learning by imitation of complex motor acts was observed in children of a certain developmental stage which is necessary for the vocabulary and conceptual development of children. So it was hypothesized that training in imitation would facilitate the language and vocabulary development of children.

While giving training the children were standing in a row. Pointing the fingers to a particular child his/her name was asked and he/she replied to the same. Then it was asked when personally you have not been asked the question how could you know that the reply was to be given by you. To this the child replied that as the finger was pointed out to me, I replied the question. This is the simplest way of communicating through gestures. Similarly a child was called by moving the fingers of the hand inward. On reply to this the child indicated he was called to come and
by moving the fingers outward he came to know that he had to go away. In the same manner the children were shown gestures in various activities like drinking, eating, cutting, crying etc and were asked what these gestures correspond to. Then they were also asked to show appropriate gestures corresponding to each word. They were also asked to imitate the sound and movements of animals and birds and people of different professions. These include the sounds of different animals and birds like dog, fox, goat, cat etc. So also they were asked to walk like an old man/woman, to jump like a frog and swim like a fish and so on.

(iv) **Perceptual - Motor activities**

Perceptual motor activity is the origin for the development of seriation and classification activities as well as other conceptual development of children. It is not only the foundation for the development of cognitive activities but it continues to provide input to cognitive structures through out life. It is also said that language and motor development almost go hand in hand. On the basis of these assumptions it was hypothesized that training in fine motor skills like cutting, threading, colouring, block building and paper folding would accelerate cognitive skills like classification, seriation and number concepts.
Fine Motor skills:

(a) Cutting:

Materials used - scissor, paper sheet, colour pencils.
A small scissor was brought and exhibited to the children and they were asked whether they had seen it before. Most of the children answered positively to this but they said that they did not know how to use it. So the children were explained about the function of the scissor. The scissor was held by the thumb and forefinger, when it was closed. By moving both the fingers the scissor was opened. A strip of paper was brought and by again moving both the fingers the paper was cut, to two pieces. It was explained to the children that a large piece of paper can also be cut into two pieces if the scissor would be moved forward. A big piece of paper was brought and two children were asked to hold the same paper from two sides. By moving the scissor forward the sheet of paper was cut to two pieces. A sheet of paper was brought whose length was 2 times its breadth. Different types of designs were drawn on the sheets of paper and supplied to them to be cut the same in proper form by following the outline of the design. Then the design was cut into different pieces. The design was coloured before cutting it into pieces. Then the children were provided with the pieces to assemble them and get the original design.
(b) **Threading**

Materials used - Plastic thread and beads of different colour and size.

The researcher brought different sizes of beads of different colours like red, green, yellow. Straws of different colours and plastic white thread were also presented to the children. The children were asked to name the colour of the beads. After naming the colour of beads, the children were asked to group 10 beads of one colour into one group. In this way different colour beads were grouped. Then the children were shown how to prepare a necklace only using the red beads. They were also provided with a number of beads of different colour and were asked to prepare a necklace using beads in a harmonic manner. They were also provided with long straws and were asked to divide them into 3 to 4 pants and thread between the beads.

(c) **Colouring**

Materials used - colouring pencils, papers.

At first, children were asked, "how many colours have you seen?" In reply to this they told different original colours like black, white, red, yellow, green, blue. They were asked whether they have seen rainbow during the rainy season. In reply to this most of them said "Yes" and
some "no". Then they were told that the rainbow consists of seven colours and the colours are like this. Then different colour pencils were brought and they were exhibited on a piece of drawing were. Then the children were told the name of each colour. After providing with the knowledge of different colours the national flag was brought and different colours of the national flag were exhibited to them. On a paper four lines were drawn and the students were asked to fill up the paper to make it into a national flag. They were asked to fill up the blank with in the lines so that one colour will not overlap the other.

(d) Block building:

Materials used - empty match box, plastic gay-way blocks. At first children were asked whether they had seen buildings, towers, bridges etc. Most of the children answered that they had seen buildings and trains but not the towers as well as bridges. They were provided with empty match boxes and were shown how to make a train, bridge etc. Block sets were provided to the children. Then after joining 3 to 4 blocks, placing 2 blocks beneath these, a culvert was prepared and exhibited to the students. They had been asked to make a train as well as a bridge with 4 spans. Similarly placing one block over the other a tower was prepared and the students were prepare a four storied building following the same method.
(e) Paper Folding:

Materials used - A sheet of paper was brought and exhibited to the children. The same was folded by putting the edges together, the children were asked whether they could reduce the size of the sheet by means of further folding. Brought another sheet of paper and prepared a funnel by rolling the same. Supplied sheet of papers to the children and asked them to make triangular and rectangular forms from the above sheets by folding. In a sheet of paper two triangles were made by diagonally folding a square sheet of paper and both are put together one above the other. Another strip of paper was joined to the base of the triangle to form the shape of an aeroplane and this had been exhibited to the children. In the same manner the papers were folded and different forms like boat, bag were made and exhibited to the children.

Gross Motor activities:

(a) Running: The children were first asked to run, to see how far they were able to maintain balance in running and stopping. Then the children were asked to run in a circle. When the researcher said "five", then they made groups of five. They were again asked to run around in a circle. On the word "four" from the researcher, they made groups of four and this process went on with different number. Children were also asked to run five steps backward. Then counting one to five they stopped there.
In this way they were asked to run backward with different number.

(b) **Jumping** : The children were first encouraged to jump, to see the distance they were able to cover by jumping. The children were then instructed to stand in a row and the researcher stood at a distance and asked each child to reach her by jumping. When a child started jumping, then other children started counting one onwards. When the child reached the spot they informed the researcher the counts of the child. The same practice was followed for each child. The researcher then asked the children to do this with one leg.

(c) **Throwing** : The children were instructed to throw a ball from a distance to a particular point marked on the wall. He/she was asked to throw and count from one onwards until the ball reach the particular point. Then the researcher asked him/her to say the number when the ball reached the point.

(d) **Catching** : The children were instructed to stand in a row. The researcher on the other end threw a ringball to each child and asked him/her to catch. In the meantime the children were asked to count the number he/she caught the ball correctly. In this way the researcher threw the ball to each child.
Procedure:

Development of the training programme - A large number of variety cognitive intervention programmes focusing on selected cognitive skills such as classification, seriation, vocabulary development cutting, jumping, catching etc. appropriate to the age level five to ten years were devised. The materials used were commonly available and easily made and mostly familiar to the children. These training sessions aimed at providing a stimulating array of cognitive experiences, each involving some concepts and informations. These training skills were not directly related to the assessment task used as pre-test and post-test. These training skills were grouped into four major categories. Sometimes the training were given with different forms with different materials in different sessions to generalize. There were eight weeks training sessions, 40 to 45 minutes for each task in each session. The list of assessment and training tasks were given with details before hand.

Administration of Tests and Training Programmes:

Pre Testing: The administration of pre-test had already been described in the sample selection procedure. 80 children were provided with the pre test out of which 60 children (30 from Experimental group and 30 from Control group) were selected. The children were tested individually.
It took approximately fifteen days to complete the administration of pre test.

**Training Programme** : All the training tasks were administered to the children of the Experimental group. The training was carried out in a centrally located place in the children's own village during the forenoon depending on the availability and free time suitable to the children. The training was given for two hours daily, five days a week (from Monday to Friday). As there were thirteen training tasks, and training was given two hours daily for five days, the training period for each task was from 40 to 45 minutes. In this way eight weeks of training was provided to the Experimental group. The order of different training activities were changed from week to week. While the Experimental group did receive training the control group did not receive any training. But certain placibo type social interaction was maintained. The control group children were provided with the same hour of duration as was spent with training group. During this time there was some general conversation between the control group children and the Researcher.

**Post Testing** : The experimental group was provided with 8 weeks of training while the control group received a form of placibo like interaction with the investigation.
Then both the groups were tested immediately. It should be noted here that this was the second retesting as both the groups were already tested once during the training programme. Two more retestings of children of both the groups were done: after one month and after six months. It was found to be difficult in keeping track of all the children during the post testing sessions. At the time of the final testing after six months only 24 children per group would be tested.

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