ROLE OF STIMULATING PACKAGES IN COGNITIVE DEVELOPMENT: AN EMPIRICAL STUDY

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ABSTRACT

The present paper discusses that stimulation packages comprising of group of activities, plans and subjects adopted to understand new concepts, would have a positive impact on the cognitive development of the children. This study involves manipulating 'anganwadi' programme as the independent variable and cognitive development status of children as dependent variable. The special activity programme based on selected concepts (verbal, perception, quantitative, memory and spatial relations) and operations was administered to 4-6 years children of experimental groups I & II to assess the impact on their cognitive development. The results show that there was improvement in performance of all the three study groups, including control group and two experimental groups, but there were significant differences in post intervention scores of control and experimental group children. The hypothesis stands accepted, implying that stimulating packages do pay to enhance the cognitive development of the children.

Key words: *cognitive development, stimulating packages, control group, experimental group, cognitive aspects, spatial relations, memory, perception, etc.*

INTRODUCTION

Cognitive development is a very crucial aspect of development. It refers to higher mental process and the functions involved in understanding and dealing with the surrounding world. It is a process of knowing and is the result of interaction between individual and the outside world. Cognition involves the development of skills like sensing, perceiving, recognizing, conceiving, conceptualizing, judging, reasoning and problem solving, It is very broad aspect and includes a set of different functions interrelated with each other which develop differently under the force of environmental factors (Gupta, 1992) . According to Piaget (1952) cognitive developments is a continuous process of unfolding. It unfolds in stage like sequence whose stages are in order and uniform for all children. Every child goes through a sequence of developments that can be observed from small to large complex thinking, from one world utterance to lengthy sentence and from scalable to representational drawings. Development refers to change over time in the structure, thought or behaviour of a person as a result of both biological and environmental influence (Craig, 1986) .

Cognitive development is characterized by (i) acquisition

of language and number skills and the rules that govern the use of these symbols (ii) differentiation of perceptual experience and learning the rules of logic and how to apply them to reason out problems (Hendrick,1988). Cognitive development is jointly determined by the biological characteristics of the individual and the type of environment in which the person grows. The rate of development is neither biologically predetermined nor completely responsive manipulation (Kirti, 1988).

Cognitive development is a long-term and continuous process that results from an interaction between the subject and an environment. In terms of successful procedures for fostering cognitive development, this means that the more active the subjects, the more successful his learning is likely to be. Intellectual activity is stimulated if the opportunities for acting on objects or observing other people's action or discussing correspond to the subject's level of development (Mussen et al., 1960). In psychology also cognitive development is defined as an extremely broad term which includes attention, perception, memory, language formation and development, reading and writing thinking, problem-solving, intelligence, creativity, imagination, expectations, intention and beliefs (Shaver and Tarpy, 1993).

Stimulated packages are need based and help to enhance cognitive development. The packages are comprised of group of activities, plans and subject adopted to understand new concepts. They are subjective methods of collecting inputs in order to arrive at final or semifinal decisions. These packages facilitate cognitive understanding in the same way that paper and pencil simplifies mental arithmetic and counting on figures simplified learning strategy.

Inhelder *et al*. (1974) also explained that cognitive development results essentially from an interaction between the subject and the environment. In terms of successful procedures for fostering the cognitive development, this means that the more active the subject is, more successful his learning is likely to be. As an organized stimulus presentation is expected to better recall them an unorganized one, attempts are made to create and administer organized stimulus.

According to Padmini (1989) the question of providing appropriate experiences to foster cognitive development in schools can be considered on four basic principles, namely, appropriate environmental stimulation with adequate breadth and depth; learning as an active process; priority of intellectual activities based on actual experiences; and importance of social interactions among children.

RESEARCH METHODOLOGY

The present work was designed as an experimental study to develop a programme for enhancing cognitive development in 4-6 years old pre-school children attending 'angnwadis'. This study involved manipulated 'anganwadi' activity programme as the independent variable and cognitive development status of children as dependent variable. This special activity programme was based on selected concepts (verbal, perception, quantitative, memory and spatial relations) and operations. This special activity programme was offered to children of Experimental Group I and Experimental Group II for a period of 8 weeks and about 50 to 60 minutes were devoted to each group. The Control Group children were not provided any intervention. The gain in cognitive development status of Experimental Group I and Experimental Group II achieved through the programme were analysed in comparison with the gain in control group to establish the worth and productivity of the programme. This was done through popular McCarthy Scales of Children's Abilities (MSCA) developed by McCarthy Dorothea.

In first phase activities related to various aspects of cognition were planned. For each activity a detailed procedure was prepared in written format. The second step was to organize and assemble the resources to arrange the activities in an orderly manner. After organizing the activities, material resources for different activities were collected. Resources consist of various assets and tools required to achieve maximum gain. Some of the material resources were common for different activities.

After planning and organization and assembling resources, the programme was implemented. During the demonstration it was kept in mind that every child must participate and show interest in it. The concepts which were interrelated were provided at a time for instance, perception was provided with spatial relations; verbal with memory; and quantitative with conceptual development. A revision of all concepts covered was done towards the end of every week.

After implementation of the programme for eight weeks, a gap of one month was given. After a gap of one month cognitive level of children was tested with the help of MSCA scale and Test of Cognitive Development.

To select children in Control Group, Experimental Group I and Experimental Group II, separate lists of boys and girls were prepared with general cognition in an ascending order. Then equal numbers of children with similar performance were paired for three groups. For Control Group children were selected from Fatehpur village (District Kaithal-Haryana) and for Experimental Groups children were selected from Mirzapur village (District Kurukshetra-Haryana). Frequencies are presented in Table 1.

Intervention was imparted separately to Experimental Group I and Experimental Group II. Experimental Group II was comprised of only children and Experimental Group I was comprised of children and their mothers. Intervention programme was implemented for a period of 8 weeks in the Anganwadi centers.

IMPACT OF STIMULATING PACKAGES

This section comprises of pre intervention performance of children, intervention programme, post intervention

performance of children; comparison of pre and post intervention performance of children; comparison of pre and post intervention mean scores of Control and Experimental Groups. Mean gain in different cognitive aspects of Control and Experimental Group; comparison of mean gain in Control and Experimental Groups are also part of this section.

Pre intervention performance of children: The pre intervention performance of children was measured on Scale of MSCA and the performance was assessed in terms of General Cognitive Index. The pre-intervention mean scores of control and experimental groups are presented in Table 2. The table reveals that for Control Group means of general cognition, verbal, perception, quantitative, memory and spatial relations aspects were 83.83, 41.93, 40.57, 41.20, 42.20 and 7.40 respectively. For Experimental Group I the mean of general cognition was 83.83, while that of verbal and perception aspects were 42.23 and 41.30 respectively. Means of quantitative and memory aspects were 41.47 and 42.40 respectively, while for spatial relations the mean was 7.41.

For Experimental Group II mean of general cognition was 83.83. Means of verbal and perception aspects were 41.73 and 40.60 respectively. Means of quantitative and memory aspects were 41.40 and 42.47 respectively, while for spatial relations the means worked out at 7.46. As the performances of three groups were similar, it is mentioned again that children in control groups were paired on the basis of their general cognition.

Post intervention performance of children: After imparting intervention programme, children were post tested after a gap of one month to assess impact of stimulating packages. Post-intervention mean scores of control and experimental groups are presented in Table 3. It can be seen that for Control Group, Experimental Group I and Experimental Group II mean scores for general cognition were the highest (86.20, 94.53 and 92.80) and that for spatial relations the lowest (7.61, 9.62 and 9.47). However, the mean score for verbal, perception and quantitative aspects fall almost at the same level.

Comparison of pre and post intervention performance of control and experimental group children: Separate paired t-tests were computed to compare the pre intervention and post intervention performance of Control and Experimental Group children. Table 4 reveals that there were significant differences in pre and post intervention performance of all the three categories of children. Also, there was significant improvement in pre and post intervention performance of children in three study groups. Higher t values for Experimental Group I and Experimental Group II indicate that after intervention, experimental group children performed much better and this improvement can be attributed to intervention provided to these children. However, improvement in control group might be normal development over a course of time which could not be controlled.

Comparisons of post intervention mean scores of control and experimental groups: Paired t-tests revealed significant differences in pre and post intervention performance of control and experimental groups children. Therefore, for further clarification in three study groups, multivariate analysis of variance was applied on post intervention mean scores of control and experimental groups. Duncan Multiple Range test was further applied to examine where the differences lay in three study groups. The results are presented in Table 5.

For the main effect of groups, univariate F-tests were significant for general cognition, $F(2,94) = 11.29$, $p<.001$; verbal, $F(2,94) = 7.60$, $p<.01$; perception, $F(2,94) = 4.73$, $p<.05$; quantitative, $F(2,94) = 3.25$, $p<.05$ memory, $F(2,94) = 5.65$, $p<.01$; and spatial relations, $F(2,94) = 3.35$, $p<.05$.

Further, the general cognition mean score of Control Group (M=86.20) children was significantly lower than mean scores of Experimental Group I (M = 94.53) and Experimental Group II (M = 92.80) children. Control group children's verbal aspect mean score (M = 43.33) was significantly lower than mean scores of Experimental Group I (M = 47.10) and Experimental Group II (M = 5.63). Mean score of Control Group children for perception (M = 41.24) were significantly lower than Experimental Group I and Experimental Group II (MS = 44.63 and 43.50 respectively). For quantitative and memory aspects mean scores of control group (MS = 41.47 and 42.70 respectively) were significantly lower than mean scores of Experimental Group I (MS = 44.00 and 46.13 respectively) and Experimental Group II (MS = 43.60 and 44.97 respectively). Finally, for spatial relations also mean scores of Control Group (M = 7.61) was lower than that of Experimental Group I (M = 9.62) and Experimental Group II (M = 9.47).

Mean and net gains in different cognitive aspects of control and experimental groups: Table 6 shows the gain in general cognition, verbal, perception, quantitative memory and spatial relation aspects of cognition of Control and Experimental Groups.

It is clear from the analysis based on the Table 8 that there were significant gains in all aspects of cognition of Control and Experimental Group children. Though the control group children did not receive any intervention, there was a gain in their scores of all cognitive aspects. This gain might be either natural gain or it may be due to some other factors that could not be controlled.

For main effect of group, univariate F-tests were significant with respect to gains for general cognition $F(2,94)=237.23$; verbal, $F(2,94)=143.11$, perception, $F(2,94)=96.49$; quantitative, $F(2,94)=96.01$; memory, $F(2,94)=65.95$, and spatial relations, $F(2,95)=50.01$ $ps<.001$.

As presented in the table under reference, Duncan Multiple Range Test revealed that for the control group mean gain in general cognition (M=2.37), verbal aspect (M=1.40), perception (M=.67), quantitative (M=.27), memory (M=.50) and spatial relations (M=.21) were lower than the gain in these aspects of Experimental Group I (MS=10.70, 4.87, 3.33, 2.53, 3.73 and 2.20 respectively) and Experimental Group II (MS = 8.97, 3.90, 2.90, 2.20, 2.00 and 2.01 respectively).

It is also clear from the table that gain in general cognition, verbal, perception and memory aspects of Experimental Group I was significantly higher than gain in these aspects of Experimental Group II.

RESULTS AND DISCUSSIONS

In conclusion, after intervention, majority of the children in Experimental Group I and Experimental Group II fell in the average category and none of the child could be identified as mentally retarded.

The results of this study show that, although there was improvement in performance of all the three study groups in general cognition, verbal, perception, quantitative, memory and spatial relations aspect of cognition get, there were significant differences in post intervention scores of Control and Experimental Group children.

It was hypothesized that stimulation packages would have impact on cognitive development of Experimental Group Children. Results of the present study support this hypothesis as there was significant improvement in cognitive development of both the Experimental Group children after receiving intervention. Mean gain in different aspects of cognition was computed for three study groups. It was found that mean gain in all these aspects of experiment groups was significantly higher than those of control group children. However significant differences were also observed between two experimental groups for general cognition, verbal, perception and memory aspects.

Table 1. Sample Selection of Study Group Children

n=96

Age Group and Gender	Control Group N=32	Experimental Group-In=32	Experimental Group-IIn=32
4 - 5 yrs.			
Boys	8	8	8
Girls	8	8	8
5^{+} - 6 yrs.			
Boys	8	8	8
Girls	8	8	8
4 - 6 yrs.			
Boys	16	16	16
Girls	16	16	16
Total	32	32	32

Although the control group children did not receive any intervention, there was gain in their scores of general cognition, verbal, perception, quantitative, memory and spatial relations aspects of cognition. This gain might be a natural gain or it may be due to some other factors that could not be controlled. Whatever could be the reason, these factors might-have been operating behind the gain in the two experimental groups.

Table 2. Pre Intervention Means and SDs for Scores of Cognitive Aspects of Control and Experimental Group Children

Cognitive Aspects	Control Group n=32	Experimental Group-In=32	Experimental Group-IIn=32
General cognition	83.83 ± 6.05	83.83 ± 6.06	83.83 ± 6.05
Verbal	41.93 ± 3.43	42.23 ± 3.56	41.73 ± 3.41
Perception	40.57 ± 4.49	41.30 ± 3.92	40.60 ± 3.78
Quantitative	41.20 ±3.82	41.47 ± 3.91	41.40 ± 3.70
Memory	42.20 ±3.87	42.40 ± 3.87	42.47 ± 3.56
Spatial relations	7.40 ± 2.01	7.41 ± 2.00	7.46 ± 2.00

Note : *± refer to Deviation.*

Table 3. Post Intervention Means and SDs for Scores of Cognitive Aspects of Control and Experimental Group Children

Cognitive Aspects	Control Group n=32	Experimental Group-In=32	Experimental Group-IIn=32
General cognition	86.20 ± 6.07	94.53 ± 7.25	92.80 ± 6.87
Verbal	43.33 ± 3.42	47.10 ± 3.99	45.63 ± 3.55
Perception	41.24 ± 3.90	44.63 ± 4.28	43.50 ± 3.86
Quantitative	41.47 ± 3.90	44.00 ± 4.28	43.60 ± 3.86
Memory	42.70 ± 3.74	46.13 ± 4.05	44.97 ± 3.69
Spatial relations	7.61 ± 2.31	9.61 ± 3.11	9.47 ± 3.01

Note : *± refer to Deviation.*

Table 4. Pre and Post Intervention Paired t Values for Cognitive Aspects of Study Groups

Cognitive Aspects	Pre Intervention Mean	Post Intervention Mean	Mean difference	t value
Control Group				
General cognition	83.83	86.20	2.37	10.19**
Verbal	41.93	43.33	1.40	9.96**
Perception	40.57	41.24	0.67	4.82**
Quantitative	41.20	41.47	0.27	2.80**
Memory	42.20	42.70	0.50	4.76**
Spatial relations	07.40	07.61	0.21	2.50**
Experimental Group-I				
General cognition	83.83	94.53	10.70	29.52***
Verbal	42.23	47.10	4.87	26.67***
Perception	41.30	44.63	3.33	17.23***
Quantitative	41.47	44.00	2.53	19.75***
Memory	42.40	46.13	3.73	29.52***
Spatial relations	07.41	09.61	2.20	11.36**
Experimental Group-II				
General cognition	83.83	92.80	8.97	24.73***
Verbal	41.73	45.63	3.90	25.60***
Perception	40.60	43.50	2.90	15.43***
Quantitative	41.40	43.60	2.20	13.17***
Memory	42.47	44.97	2.50	16.70***
Spatial relations	07.46	9.47	2.01	10.00**

Note: Significant at ** p<.01 and *** p<.001

Table 5. Comparison of Post Intervention Mean Scores of Control and Experimental Group Children

Cognitive Aspects	Control Group	Experimental Group-I	Experimental Group-II	F
General cognition	86.20	94.53	92.80	11.29***
Verbal	43.33	47.10	45.63	7.60**
Perception	41.24	44.63	43.50	4.73**
Quantitative	41.47	44.00	43.60	3.25*
Memory	42.70	46.13	44.97	5.65**
Spatial relations	7.61	9.61	9.47	3.35*

Note: Significant at * p<.05; ** p<.01; and *** p<.001

Table 6. Total Gain in Groups

Cognitive Aspects	Group			F
	Control	Experimental-I	Experimental-II	
General cognition gain	2.37[a] ± 1.27	10.70[c] ± 1.99	8.97[b] ± 1.10	237.23***
Verbal gain	1.40[a] ± .70	4.87[c] ± .90	3.90[b] ± .80	143.11***
Perception gain	0.67[a] ± 76	3.33[c] ± .71	2.90[b] ± .92	96.49***
Quantitative gain	0.27[a] ± 52	2.53[b] ± .90	2.20[b] ± .61	96.01***
Memory gain	0.50[a] ± 57	3.73[c] ± 1.55	2.50[b] ± 82	65.95***
Spatial relations gain	0.21[a] ± .51	2.20[b] ± .81	2.01[b] ± .78	50.01***

Note: Significant at *** p<.001

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