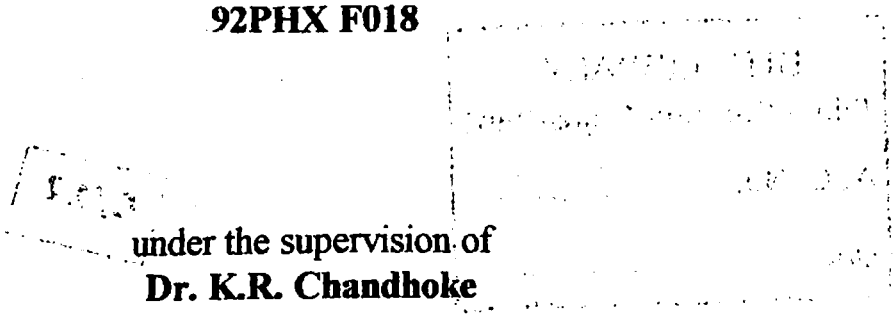
CONCEPTUAL DEVELOPMENT OF TEACHING & LEARNING AIDS FOR EARLY CHILDHOOD AND PRIMARY EDUCATION

THESIS

Submitted in partial fulfilment of the requirements for the Degree of
DOCTOR OF PHILOSOPHY

By
A.K.Bakshi
92PHX F018



under the supervision of
Dr. K.R. Chandhoke

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE
PILANI , (RAJASTHAN), INDIA
1996

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE
PILANI RAJASTHAN

C E R T I F I C A T E

This is to certify that the thesis entitled "CONCEPTUAL DEVELOPMENT OF TEACHING AND LEARNING AIDS FOR EARLY CHILDHOOD AND PRIMARY EDUCATION and submitted by Mr. A.K. BAKSHI ID.NO. 92PHXF018 for award of Ph.D. Degree of the Institute, embodies original work done by him under my supervision.

Signature in full of the Supervisor _____

Name in block letters K.R. CHANDHOKE

Designation Professor and Chief, Community Welfare Unit, B.I.T.S.

Date: 22nd May 1996

TABLE OF CONTENTS

ACKNOWLEDGEMENT

At the on set, I would like to express a profound sense of gratitude and thankfulness to my supervisor, Dr. K.R. Chandhoke, Professor and Chief Community Welfare Unit, for his inspiring guidance, thought provoking criticism and constant encouragement during the entire course of this work.

I gratefully acknowledge Dr. S. Venkateswaran, Director, B.I.T.S.; Dr. L.K. Maheshwari, Dean, R&C Division, B.I.T.S. for my registration and facilities for conducting this research work for the degree of Ph.D.

I sincerely express my gratitudes and thanks to Shri V.P. Beri, Director, Birla Museum and all other staff members of Birla Museum for their encouragement, valuable suggestions and constant inspiration.

I also take this opportunity to express my sincere thanks to Shri Sambhu Das who took all the pains to correct my language and encouraged me at every step.

I am also thankful to Mr. V.D. Bhalothia for his keen interest and immense pains taken in typing the thesis.

It gives me immense pleasure in expressing my sincere gratitudes to my parents, wife and all other family members for their continuous inspiration and support without which it would not have been possible for me to complete my research work.

A.K. Bakshi

CHAPTER 1

INTRODUCTION

The world-famous psychologists like Comenius, Rousseau, Pestalozzi and Piaget have arrived at the conclusion that every child has been endowed with a built-in physiological and neurological mechanism for learning. This mechanism need to be exploited fully through adequate provision of facilities for gaining and learning experiences. Benjamin Bloom has also observed that environment during early years of life plays a very significant role in cognitive development. Therefore, all kinds of facilities should be provided to the child to explore, to enquire, to play and to interact with his peers, parents and teachers for optimum and holistic education.

The primary and pre-school years of a child are thus the most crucial for learning and intellectual development and hence of great potential educational significance. Especially, in view of the inharmonious and uncongenial family conditions and deprived community as well as environmental conditions, pre-school and primary education has assumed more importance. In the context of universalisation of elementary education it has additional significance.

Dr. S.K. Mitra, a psychologist of national repute has pointed out that if children are made to take interest in

learning right from the tender age, then it would appreciably bring down the present high percentage of wastage and stagnation during early years of primary schooling. Education Commission, 1964-65 have also mentioned that the pre-primary and primary schools are required to provide suitable environment to the boys and girls hailing from lower middle class urban families whose small tenements or flats are hardly appropriate for the children's proper growth. These schools also seek to compensate for the unsatisfactory home environment of children from slum areas or poor families. With the use of suitable media and properly designed aids and models developed by modern educational technology, teaching-learning process can be made more interesting and school situation more attractive.

Educational Technology has assumed greater importance for achieving desired goals for universalization of education, for preparation of teachers and for upgrading curricula in all phases of education. The National Policy on Education 1986 has laid special emphasis on the use of educational technology in the field of formal, non-formal and adult education.

Under the present research project, attempt has been made to understand:

(a) the National education policy,

(b) analysis of educational scenario of the country and

nearby schools,

(c) study of the concepts and approach for education, and

(d) educational technology and development of educational materials/aids for pre-primary classes.

A futuristic model of school has also been proposed.

The present study is based on the thoughts, approaches of educationists and research done in this area of Human Resource Development.

The following areas related to pre and primary education have been studied in this research work.

1. **Educational scenario in India.**

2. **Policies**

   i) National Policy on Education (NPE - 1986) with special reference to early childhood care and universalisation of elementary education

   ii) Ministry of Human Resource Development (MHRD) Committee Report on minimum levels of Education at primary stage

3. **Real Situation**

   i) Detailed study of curriculum for pre and primary classes

   ii) Study of teachers training institutes of district Jhunjhunu

iii) Analysis of the Educational facilities and academic environment of some selected schools of Pilani and nearby villages

4. **Concepts of Education**

i) Foundations of education

ii) Aspects of childhood development and pioneers of early childhood education

iii) Teaching versus learning. Mathetics in place of pedagogy.

iv) Interactive learning experience of visitors to the Science Gallery of Birla Museum, Pilani.

5. **Approach for Education.**

i) Effective Learning: child centred approach, playway method of education and play materials for the schools.

6. **Educational Technology**

i) Progress on Educational Technology in India

ii) The development of conceptual approach for designing of educational models/aids

iii) Development of working models for selected subjects of early education

7. **Futuristic Design.**

i) Shape and structure of schools in the 21st century.

CHAPTER 2

METHODOLOGY

Prof. A.K. Sharma (1995) has analysed the problems of teaching and learning. "The challenge in education today is to improve the quality of teaching. Quality of teaching implies learning by all pupils in the classroom, including those with special needs arising from the interactive effects of several factors. The seriousness of the challenge increases further due to the class size, multigrade teaching and heterogeneity in the classroom. The teachers are to provide quality teaching to all children within these constraining factors coupled with the limited physical facilities. The scene is marked by despondency in the whole sector of education and community. Doubts are expressed about teacher's capabilities to provide effective teaching".

The quality of teaching can be ensured within the existing constraints, provided the emphasis is on visualising teaching from the point of learning. Teaching is to be learning and learner oriented. The learner is to be actively involved in the learning process through variety of activities. Effective teaching depends upon providing conducive learning environment, learning material, learning activities and continuous monitoring and management of learning.

In the present topic of research on **CONCEPTUAL DEVELOPMENT OF TEACHING AND LEARNING AIDS FOR EARLY CHILDHOOD AND PRIMARY EDUCATION** an effort has been made to understand the following areas:

i) Government policies

ii) Real situation

iii) Concept of education

iv) Approach to education

v) Educational technology

vi) Futuristic designs.

TEACHERS TRAINING INSTITUTIONS OF DISTRICT JHUNJHUNU

District Jhunjhunu has a number of educational training institutions. For the present study two institutions (1) Anganwari Training under Mandelia Educational Trust and (2) G.P. College of Education, Bagar for B.Ed. were selected. The objective of this study was to understand (a) the methodology followed by these institution for training the would be trainers/teachers (b) Background of the students with reference to the geography/areas from where they are coming, educational background, future ambitions (c) expertise available (d) facilities for training used (e) overall environment and approach used for training etc. These are some of the areas about which information has been collected by personal interaction with the heads of the institutions, instructors and by getting detailed

information about the learners.

EDUCATIONAL FACILITIES AND ACADEMIC ENVIRONMENT OF SOME SELECTED SCHOOLS OF PILANI AND NEARBY VILLAGES

For the study of this topic five schools from Pilani and nearby villages were selected. Two schools, namely upper primary school for boys, Jherli and upper primary school for girls, Jherli are Government schools while Meghraj Mandelia Shishu Niketan, Pilani; Shri Baijnath Sriram Saboo Higher Secondary School, Pilani; and Udairam Padia Senior Higher Secondary School, Pilani are privately sponsored government aided schools under the administrative control of the Director, Birla Education Trust, Pilani. Two schools are for girls and have educational facilities upto middle classes, while three are boys schools with the programme of studies upto Class XII and Class VIII.

As mentioned in the National Educational Policy 1986 and review of Educational Scenario in India, there is high rate of dropouts in school education. For understanding the real situation the analysis of the enrolment of students over the previous five years from 1990-1995 was done. The information has been collected by going through the actual records of the schools. About the facilities, environment and the quality of training, information has been collected by personal interaction and discussions as per Appendix.

SCIENCE GALLERY OF BIRLA MUSEUM, PILANI

Science gallery of Birla Museum, Pilani is popular with the educational institutes of this area. A large number of visitors come to the Birla Museum and many of them come in an organised manner on organised educational tours. Such institutions have been considered important for the informal way of education. A detailed study of the models with reference to the nature, design, objectives and the level has been done by classifying and examining all the models. The correlation study of the visitors with reference to the models, has been done by the analytical study of the data available from the Birla Museum about the visitors from 1989 to 1995 in Chapter 5.4.

For topics Concepts of Education; Approach for education and Educational Technology, appropriate literature has been studied and the analysis of the given situation has been done and for the understanding of the problems the expert opinion on the subject has been studied.

The above in-depth study has helped in the the conceptual development of the methodology for designing educational materials. The dimensions of the topic of research is vast and therefore, an effort has been made to develop the designs of the models and selected educational aids for a few topics of curriculum of selected courses.

Effort has been made to define the objectives of all the models and identifications of overall designing, manipulative, educational and play potential aspects of the model designs. In this thesis only the figures of these models/aids have been shown but in reality the actual prototypes of all the constructed models have been made.

CHAPTER 3

EDUCATIONAL SCENARIO IN INDIA

3.1 INTRODUCTION

Since 1950, determined efforts have been made to achieve the goal of Universalisation of Elementary Education (UEE). During the last four decades the progress of education, especially in terms of number of institutions and teachers, has been spectacular. The numbers of primary and upper primary institutions have increased from 210 and 136 thousand in 19050-51 to 572 thousand respectively in 1992-93 which shows a compounded growth of 2.40 and 0.30 percent respectively. The rate of growth of primary and upper primary institutions during the period 1980-81 to 1992-93 was 1.25 and 2.34 per cent respectively as compared to 1.06 and 2.10 per cent after the National Policy on Education (1986) was announced. Yet, as the Fifth All-India Educational Survey (1986) revealed, about 16.16 (159 thousand) and 26.00 per cent of the total habitations in 1986-87 had no primary and upper primary school facilities within one and three kilometers respectively, as was envisaged. This is also evident from the available information that of those not enrolled in the age group 6-11 years in 1986-87 (NSSO 42nd Round), more than 22.39 and 27.24 per cent children did not attend school either because

of non availability of schooling facilities in the vicinity of their habitation or because of their not being interested in studies and/or further studies respectively. In rural areas about 24.32 percent children could not attend school because of non availability of schooling facilities and 11.67 percent due to inadequate number of teachers and also absence of teaching aids. More than 53 thousand (5.35 percent) habitations did not have primary sections even upto a distance of two kilometers and 10.16 percent habitations without upper primary schooling facilities even upto five kilometers. More than 70 thousand primary schools and about 17 thousand upper primary schools in the year 1986-87 were being run in kachha (make-shift) buildings (NCERT, 1992). The enrollment has increased from 28 thousand in 1950-51 to 174 million children in year 1992-93. The Scheduled Caste and Scheduled Tribes enrollment ratios at the primary level at present in 110.6 percent and 60.0 percent respectively. The number of Non-Formal Education (NFE) centres in the country increased from 126 thousand in 1986 to 238 thousand by March 1993, with centres for girls increasing from 21 thousand to 79 thousand. During the same period enrollment in NFE centres rose from 4 million to 6 million (MHRD, 1993). The number of pre-primary schools has also increased from 303 in 1950-51 to 13,662 in year 1992-93, which shows the sphere of early childhood care and development activities.

Table 3.1

Statewise Enrollment Ratio in Grades I-V and VI-VIII of Schools for General Educaton, 1992-93

State/Union Territory	Grades I-V (6-11 years)			Grades VI-VII (11-14 years)		
	Total	SC	ST	Total	SC	ST
Andhra Pradesh	109.2	146.05	134.12	55.9	62.98	41.80
Arunachal Pradesh	111.5	21.71	111.67	49.7	1.21	43.39
Assam	111.5	227.09	139.49	62.1	136.59	67.19
Bihar	81.4	72.42	86.13	37.1	24.61	30.49
Goa	100.5	118.43	12.12	99.4	69.82	3.62
Gujarat	129.8	178.20	134.41	73.0	94.40	52.52
Haryana	87.0	102.79	0.00	63.0	54.29	0.00
Himachal Pradesh	118.0	122.95	108.20	110.6	83.79	73.62
Jammu & Kashmir	88.7	95.30	0.00	65.1	73.83	0.00
Karnataka	115.0	131.97	124.24	61.0	57.89	49.58
Kerala	97.5	112.22	127.66	105.0	116.58	90.35
Madhya Pradesh	103.2	105.80	76.93	71.9	60.96	30.22
Maharashtra	136.3	284.18	135.62	81.8	154.72	52.27
Manipur	110.5	142.94	142.01	60.9	76.78	49.04
Meghalaya	75.2	254.88	81.26	40.1	186.92	37.33
Mizoram	135.5	0.00	144.47	73.0	0.00	77.67
Nagaland	105.7	0.00	102.41	69.3	0.00	68.89
Orissa	105.4	139.99	98.86	60.2	60.78	34.78
Punjab	100.1	131.88	0.00	74.0	59.15	0.00
Rajasthan	87.1	72.46	74.00	53.3	38.78	36.01
Sikkim	118.0	120.42	108.53	54.1	41.39	50.29
Tamil Nadu	136.5	147.78	118.05	100.0	98.95	64.61
Tripura	131.7	158.70	152.72	84.2	87.99	77.17
Uttar Pradesh	88.6	64.21	79.75	55.6	35.07	40.69
West Bengal	134.1	133.27	134.02	106.9	80.19	86.25
A&N Islands	93.3	0.00	61.61	77.9	0.00	53.68
Chandigarh	59.7	113.68	0.00	57.0	75.40	0.00
Dadra & Nagar Haveli	100.9	88.92	124.26	47.8	69.82	41.55
Daman & Diu	-	0.00	0.00	-	0.00	0.00
Delhi	84.7	106.93	0.00	78.5	68.31	0.00
Lakshadweep	146.2	0.00	159.72	118.4	0.00	127.45
Pondicherry	142.2	182.03	0.00	131.2	167.28	0.00
INDIA	**105.7**	**110.58**	**108.19**	**67.5**	**59.97**	**45.64**

Source : Selected Educational Statistics : 1992-93. MHRD, Government of India, New Delhi, 1993

3.2 GROSS ENROLLMENT RATIO

So far as the gross enrollment ratio at the primary level (Table 3.1) is concerned, it has increased from a mere 19.2 percent in 1950-51 to 105.7 percent in year 1992-93, the corresponding ratios at the upper primary level being 12.9 and 67.5 percent respectively. The share of girls enrollment at primary level has increased from 5.4 percent in 1950-51 to 42.63 percent in 1992-93. This achievement is despite the high fertility and high population growth rates. However, the fertility rate is now declining, which is mainly due to increasing educational level (in term[5] of literacy) of women which has increased from 8.86 percent in 1951 to 39.29 percent in 1991. As a consequence, the primary-school-age population is growing at a slower rate (1.6 percent) than the rest of the population (2.2 percent). The apparent entry rate at present is about 120 percent, but nearly half the children who entered Grade I drop-out before reaching Grade V, and two-thirds of the children drop-out before reaching Grade VIII.

Table 3.2

Public Expenditure on Education as a share of GNP

Year	Total	Primary	Upper Primary	Elementary
1950-51	1.2	0.40	0.08	0.48
1960-61	2.5	0.45	0.31	0.76
1970-71	3.1	0.65	0.47	1.12
1980-81	3.1	0.71	0.48	1.19
1989-90	3.9	-	-	-

Source : National Institute of Educational Planning and Administration (NIEPA) and Department of Education, Education for All by 2000, New Delhi, 1992

Table 3.3

Projected Enrollment for Eighth Plan (1992-97) : Elementary Education

(Figures in Million)

Stage	Population 1987		Population Overage/ Underage Children		Enrollment Achieved up to 1991-92		Additional Population to be Enrolled by 1997	
	Total	Female	Total	Female	Total	Female	Total	Female
Primary	105.30	51.20	121.10	58.90	100.90	42.40	20.20	16.50
Upper Primary	61.10	29.70	70.30	34.10	34.40	13.00	35.90	21.10
Elementary	166.40	80.90	191.40	93.00	135.30	55.40	56.10	37.60

Sources : Eighth Five Year Plan : 1992-97 (Volume II), Sectoral Programme of Development, Planning Commission, Government of India, New Delhi, 1992.

3.3 AVAILABILITY OF SCHOOLS AND TEACHERS

The number of primary teachers has increased from 538 thousand in 1950-51 to 1,682 thousand in 1992-93, showing an annual exponential increase of 2.75 percent compared to 6.35 percent for upper primary level. The percentage of primary schools without a teacher and single teacher primary schools has decreased from 0.62 to 0.43 percent and from 34.75 to 28.91 percent respectively during the period 1978 to 1986, 89 percent primary teachers are trained and female teachers constitute only 29.31 percent of the total primary teachers and 1,52,856 with only one teacher. The same is also evident from the status of Operation Blackboard scheme where in 1992 about 23 percent schools in 16 percent community development blocks and 71 percent municipal areas were not covered under the scheme (NIEPA and DOE, 1992). Only 103 thousand (67.76 percent) teachers could be appointed as against the target of 152 thousand single teacher schools identified for coverage and only 115 thousand (48.12 percent) classroom had been constructed as against the target of 239 thousand. Also, as against the optimum pupil teacher ratio of 1:25, at the national level it was 45 in 1992-93 and teachers salaries alone constitute more than 90 percent of the total recurring expenditure on primary education.

3.4 SHARE OF EDUCATION TO GROSS NATIONAL PRODUCT

So far as the share of education to Gross National

Product (GNP) is concerned, the increase is not as envisaged in the policy document (6 percent). However, it has increased from 1.2 percent (Table 3.2) in 1950-51 to currently 3.7 percent (NIEPA and DOE 1992). Still, it is an issue of debate whether percent share of education to GNP has direct bearing on children coverage and their attainment, as a number of countries with lower percentage share, even lower than 6 percent, have achieved remarkable success in education in terms of children reaching Grade V. Also, unlike other countries, private expenditure on education is not included in this 3.7 percent, which is included, the expenditure on education would be nearly 6 percent. However, recently the Prime Minister has announced that education would get an outlay of six percent of the national income from the Ninth Five-Year Plan onwards which amounted to about Rs. 53,000 crore (To, 1994). Thus, at the current rate of investment, it would be difficult to bring 20.20, 35, 90 and 56.10 million additional children (Table 3.3) under the education fold respectively at primary, upper-primary and elementary levels of education as set-out in the Eighth Plan. Hence specific strategies needs to be adopted to achieve the goals of Education for All (EFA), which are summarised below (MHRD, 1993).

(a) Expansion of early childhood care and development activities.

(b) Universalisation of Elementary Education with the

following programme components.

* access to elementary education for all children upto 14 years of age;

* universal participation till they complete the elementary stage through formal or non-formal stage through formal or non-formal education programmes; and

* universal achievement at least of minimum level of learning.

(c) Drastic reduction in illiteracy rate, especially in the age-group 15-35 years and to bring literacy level in this age-group to at least 80 percent; and

(d) Provision of opportunities to upgrade education, creation of necessary structures and improving the content and process of education to relate it better to environment and working conditions.

3.5 LITERACY RATES

During the last thirty years i.e. 1961-1991, the literacy rate has increased from 28.30 percent to 52.21 percent but at the same time the number of illiterates have also increased from 267.32 million in 1961 to 328.88 million in 1991, which shows a compounded growth rate of 0.69 percent per annum compared to 4.17 percent number of

following programme components.

* access to elementary education for all children upto 14 years of age;

* universal participation till they complete the elementary stage through formal or non-formal stage through formal or non-formal education programmes; and

* universal achievement at least of minimum level of learning.

(c) Drastic reduction in illiteracy rate, especially in the age-group 15-35 years and to bring literacy level in this age-group to at least 80 percent; and

(d) Provision of opportunities to upgrade education, creation of necessary structures and improving the content and process of education to relate it better to environment and working conditions.

3.5 LITERACY RATES

During the last thirty years i.e. 1961-1991, the literacy rate has increased from 28.30 percent to 52.21 percent but at the same time the number of illiterates have also increased from 267.32 million in 1961 to 328.88 million in 1991, which shows a compounded growth rate of 0.69 percent per annum compared to 4.17 percent number of

literates. Number of illiterates today in the country is more than the total population of Japan, Indonesia, Bangaladesh, Pakistan and Brazil. During the last decade, number of literates increased by 56 million compared to 40 million illiterates of which females constitute only 36.11 percent of the total literates. The statewise literacy rates further indicate that most of the educationally backward states have lower literacy rates than the national average. Of the total illiterates in the country, three educationally backward states, namely, Uttar Pradesh (64.77 million), Bihar (42.21 million) and Madhya Pradesh (64.77 million) together constitute more than 47 percent which is more than the population of a number of developing/developed countries of the region. There are 104 districts where female literacy rate was below or equal to 30 percent in 1991, most of which are in Rajasthan, Bihar, Madhya Pradesh and Uttar Pradesh. Barmer (7.69%) and Jalore (7.75%) districts have the lowest female literacy rates in the country. In order to eradicate illiteracy in the country, as many as 264 districts are covered under the total literacy and post-literacy campaigns upto June 1993 with a target population of 53.77 million which is only 16.35 percent of the total illiterates in the country.

Since the National Policy on Education was announced in 1986, in the present chapter, the status of education in

terms of never enrolled children, not currently enrolled children and causes of dropout, availability of free education, mid-day meals etc. have also been analysed at that point. Incidentally, the final official statistics, the Fifth All-India Educational Survey (NCERT) and the NSSO 42nd Round data, are all available latest for the year 1986-87.

PART-I : POLICIES

CHAPTER 4

NATIONAL POLICY ON EDUCATION (1986) WITH SPECIAL REFERENCE TO EARLY CHILDHOOD CARE AND EDUCATION (ECCE) AND UNIVERSALISATION OF ELEMENTARY EDUCATION

4.1 INTRODUCTION

The present research deals with conceptual development of Teaching and Learning Aids for Early Childhood and Primary Education. It was therefore essential to know the Government policy of Education for this age-group.

The information has been collected from the Report of the Committees for Review of National Policy on Education (NPE), 1986, dated 26th December, 1990.

On 7th May, 1990 the Government of India announced the appointment of a committee under the chairmanship of Acharya Ramamurti and sixteen other eminent educationists of India to review the National Policy on Education (NPE, 1986), as per the following resolutions :

"Despite efforts at social and economic development since attainment of Independence a majority of people continue to remain deprived of education.

It is also a matter of great concern that 50% of the world's illiterate live in India and large sections of children have to go without acceptable level of primary

education. Government accords the highest priority to education both as a human right and as a means for bringing about transformation towards a more humane and enlightened society. There is need to make education an effective instrument for securing a status of equality for women and persons belonging to the backward classes and minorities. Moreover, it is essential to give work and employment orientation to education and to exclude from it the elitist aberrations which have become the glaring characteristics of the educational scene. Educational institutions are increasingly being influenced by casteism, communalism and obscurantism and it is necessary to lay special emphasis on struggle against this phenomenon and to move towards a genuinely egalitarian and secular social order. The national policy on education (NPE), 1986, needs to be reviewed to evolve a framework which would enable the country to move towards this perspective of education".

4.2 BASIC CONCERNS

The basic concerns mentioned here are :

1. Provision of education of a minimum quality to all children;

2. Removal of illiteracy;

3. Struggle against petty parochial passions and prejudices;

4. Social transformation towards equality; and

5. Orientation of education towards work and employment.

The information on the various aspects of "Early Childhood Care and Education" and "Universalisation of Elementary Education as recommended by NPE (1986), Review committee, is given below :

EARLY CHILDHOOD CARE AND EDUCATION

4.3 THE RATIONALE

The scope of the constitutional directive (Article 45) for providing, within a specified time-frame, free and compulsory education for all children until they complete the age of fourteen years, should be enlarged to include ECCE.

4.4 OPERATIONAL DESIGN - A FRAGMENTED APPROACH

Since ECCE is a cross-sectorial programme, addressing the inter-secting needs of children, women and girls, ECCE as a component should receive due attention in all dimensions and stages of education, such as women's education, education of Scheduled Castes and Tribes, elementary education, vocational education, content and process, teacher training, higher education etc.

4.5 THE GAP BETWEEN NEED AND PROVISION

ECCE should be included in the Minimum Needs Programme.

in action in all dimensions and stages of education.

4.7 STRATEGIES AND MODELS

i. The principles of diversity, flexibility and decentralized funding and management must be incorporated into the policy framework, with a view to widening the coverage and improving retention, especially with reference to remote habitations and most underprivileged or migrant communities.

ii. These principles must be incorporated into the operational design for developing a country-wide network of ECCE programmes, linking a rich diversity of models and strategies.

iii. Provision should be made for Statutory Creches and Day Care Centres for both the organised and unorganised sectors and for strict implementation of all labour laws dealing with child care services. These laws should also be regularly reviewed to facilitate proper implementation.

iv. Wherever possible, ECCE centres should be linked physically as well as programmatically with the primary school.

4.6 IMPLEMENTATION - DIVIDED RESPONSIBILITY

i. The Department of Women and Child Development in the Ministry of HRD at the Centre (and the Departments of Social Welfare in the States) should be held accountable for the implementation of ECCE in all aspects of its operational design, as recommended in the POA.

ii. This Department must also accept the nodal role of stimulating, co-ordinating and monitoring the ECCE work undertaken by other agencies/departments, such as Labour, Works and Housing, Tribal Welfare, Agriculture, Irrigation, Rural Development, Forests etc.

iii. The Department of Women and Child Development (and its counterparts in the States) should seek the setting up of an inter-ministerial committee (and its equivalents in the states), comprising of representatives of the Departments of Labour, Health and Education to assist it in planning, co-ordinating and monitoring the ECCE programmes.

iv. At the same time, the Department of Education cannot, under Article 45, give up its basic responsibility for the education of children from birth to six years, and must ensure that this continuing concern is reflected

in action in all dimensions and stages of education.

4.7 STRATEGIES AND MODELS

i. The principles of diversity, flexibility and decentralized funding and management must be incorporated into the policy framework, with a view to widening the coverage and improving retention, especially with reference to remote habitations and most underprivileged or migrant communities.

ii. These principles must be incorporated into the operational design for developing a country-wide network of ECCE programmes, linking a rich diversity of models and strategies.

iii. Provision should be made for Statutory Creches and Day Care Centres for both the organised and unorganised sectors and for strict implementation of all labour laws dealing with child care services. These laws should also be regularly reviewed to facilitate proper implementation.

iv. Wherever possible, ECCE centres should be linked physically as well as programmatically with the primary school.

4.8 INTEGRATED CHILD DEVELOPMENT SCHEMES (ICDS) - A MONOLITHIC MODEL

In order to broaden access and improve quality, ICDS should move in the direction of becoming a participatory network of decentralised ECCE centres managed by local groups, preferably poor women's groups, under the umbrella of Panchayti Raj institutions, with the Government providing support through essential funding (may be, on a per child basis), training, monitoring and guidance.

4.9 OTHER MODELS AND STRATEGIES

Concrete provisions should be made in financial and programmatic terms for decentralised and community-based implementation of the various models and strategies mentioned in POA such as :

i. Strengthening and upgrading all existing models;

ii. Promoting innovative and experimental models;

iii. Developing special programmes for specific underprivileged or migrant communities and for remote habitations; and

iv. Developing and promoting media support on a massive scale, as is being done at present for the adult literacy campaign for generating public awareness and understanding regarding issues relating to care and

education of children in the 0-6 age group.

4.10 CONTENT AND QUALITY

i. The basic principles of curriculum and content of ECCE should be translated into localised content.

ii. Effective field strategies, buttressed by a systematic media campaign (as is going on at present for adult literacy), need to be urgently implemented in order to discourage formal teaching methods and early introduction of 3 R's in ECCE programmes, both in the private and the government sectors.

iii. Appropriate and acceptable ratios of adults to children in ECCE programmes for different age-groups and models should be worked out as guidelines for agencies implementing ECCE and adequate provision be made to proportionately augement the staff of the centres.

4.11 PERSONNEL AND TRAINING

i. Recognising the skilled nature of work, ECCE and the links between programme quality on the one hand and wages, job satisfaction, social status and motivation on the other, the policy for remuneration of ECCE worker as spelt out in POA must be implemented with immediate effect.

ii. The overall responsibility for teacher education and

personnel training for ECCE at all levels must be accepted by the Departments of Education, both at the Centre and the States, in close co-ordination with the Department of Women and Child Development at the Centre and its counterparts in the states, while developing mechanisms to respond to the needs and perceptions of the users and programme implementers, such as the Departments of Labour, Forest, Irrigation, Works and Housing, Rural Development etc. as well as the private sector. For the other components of ECCE (health, nutrition etc.) a close co-ordination with the nodal and other related departments/agencies would be necessary.

iii. Working through Educational Complexes (as proposed elsewhere), DIETs should assume responsibility for training in ECCE and establish a field-based networking relationship with ECCE programmes. For the purpose, DIETs should build up their own training capability.

iv. Building up on the base of available training pattern (Table 3), a network of modular training programmes for ECCE must be developed at all levels (grassroots, para-professional, professional and supervisory) through a diversity of models and strategies, with content to meet the holistic goals of ECCE and a participatory methodology using the basic principles of internship with different degrees of field placement.

v. A system of accreditation of training programmes and agencies in ECCE must be developed as indicated in POA (this would also promote diversity and decentralisation).

vi. Action should be taken soon to develop Vocational Education of ECCE at the +2 level in all States/UTs. The feasibility of organising ECCE training following class VIII should be examined on a priority basis with a view to widen the social base and availability of ECCE workers.

4.12 DECENTRALISATION

i. The ICDS and other related Centrally Sponsored Schemes for ECCE may be shifted to the States/UTs following the completion of the present phase. The State/UT plans should then be proportionately augmented with additional funds with conditionality of non-divertibility and accountability.

ii. The management of Anganwadis and other ECCE centres should be fully handed over to voluntary organisations and/or local community groups, preferably poor women's groups, through the Panchayati Raj framework. Village-level and/or mohalla-level committees may be constituted by local bodies, with at least half of the members being poor women and with suitable

representation of Anganwadi workers, for planning, co-ordinating and monitoring of a cluster of community-based centres in a village or a town. Needless to add, the principle of community control over ECCE programme would carry with it the principle of full public accountability to the community.

iii. In order to ensure diversity, flexibility and responsiveness to local needs and socio-cultural conditions, the community groups and/or village or mohalla-level committees would be fully responsible for designing the model and strategy for the local ECCE centre, while being expected to ensure the minimum programme recommended by the State Government. Experimentation and innovation in approach to training, recruitment of personnel and management would be encouraged and be provided for.

iv. The village or mohalla-level committee or the community group responsible for managing the ECCE centre would also be free to mobilise additional resources, in addition to the State resources, while subjecting itself to both financial and social audit.

v. ECCE should be included in the charter of responsibilities of the educational complexes proposed in the school education sector. Women and other

community groups managing ECCE centres and anganwadi workers may be suitably represented on the executive bodies of the complexes.

vi. The role of the Educational complex would be to develop a perspective plan for ECCE for the region covered by it and to assist the local committees and groups by arranging for training (through DIETs), supplying educational and other materials (not locally available), guidance in budgeting, coordination, promoting mutual exchange of information and, most importantly, monitoring.

4.13 RESOURCES

i. A Central Fund for child care services should be set-up at the national level.

ii. The Government should provide a substantially higher, allocation for ECCE, spelling it out as a percentage of GNP, keeping in view the estimated requirements of Rs. 4900 crores per annum even for achieving the POA targets to be reached by the end of Eighth Plan in a phased manner.

iii. A 10-year action and resource allocation plan for building up a national network of child care services be prepared, such that at least 70% of the children below six would be covered by an essential package of

services by 2000 AD, as suggested in POA.

iv. Funds for the national network may be drawn from five sources, as given below :

(a) Government : As per Article 45 of the constitution, the Central and State Governments would have to bear the major responsibility for funding the programme. These funds may be drawn by pooling together the provisions made in the respective budgets of the Departments of Education, Women and Child Development, Health and Labour for this purpose. To facilitate this an inter-ministerial committee may be constituted. The Government Departments which employ labour (e.g. Irrigation, Rural Development, Forest, Works and Housing etc.) should henceforth be required to make a proportionate provision for expenses on child care services and contribute this money to the Central Fund.

4.14 MONITORING AND EVALUATION

i. DIETs and Educational Complexes, rather than any higher level structures, should have a major role in both planning and execution of the system of internal monitoring and evaluation.

ii. The State Government should also organise an

independent system of monitoring and evaluation of the programme at the level of Educational Complexes only (i.e. not at the level of individual centres) and make its reports available for open discussion and public consideration at the District or Block level.

iii. One major objective of these exercises would be to use the findings as a direct input for renewal/strengthening of the programme at the local level. For this, it would be necessary to foster lateral interaction and exchange of findings (complex to complex or centre to centre or centre to complex), rather than the exclusive vertical and upwards flow indicated in the POA. The reports from monitoring and evaluation exercises should also be released for open discussion and interaction at both the formal and informal forawith a view to build up public pressure for ensuring programme efficiency.

iv. The Index of Human Development should be a dynamic concept and be made public as a means of monitoring as well as community intervention in the programmes.

Table 4.1

Schematic Coverage Under Early Childhood Care and Education (ECCE)

1.	Total Population (projected to March, 1990)*	82.2 crores
2.	Percentage of population in 0-6 age group.	17%
3.	Estimated No. of children in 0-6 age group.	14.0 crores
4.	Estimated No. of specially vulnerable children in 0-6 age group (based upon 40% of population being below poverty line)	5.6 crores
5.	Total No. of beneficiary children in the 0-6 age group covered by various ECCE programmes (1989-90)**	1.43 crores
6.	Total coverage under ECCE in 0-6 age group (1989-90)	10.2%
7.	Coverage under ECCE of vulnerable segment in 0-6 age group (1989-90)	25.5%
8.	Eighth Plan target of covering 80% of vulnerable children in 0-6 age group by 1995 (Total population in 1995 - 89.8 crores)*	4.9 crores
9.	POA's target of covering 70% of all children in 0-6 age group by 2000 (Total population in 2000 - 97.2 crores)*	11.6 crores

* Taken from the Report of Expert Committee on Population Projections, Office of the Registrar General, Government of India.

** Source: Department of Education and Department of Women and Child Development, Ministry of HRD (See Table 2 for details).

Table 4.2

Coverage Under Various Early Childhood Education Schemes (1989-90)

Total population in the age group 3-6 years in March 1990 (estimated on the basis of 17% of total population) - 575.4 lakhs

	Programmes	No. of centres	Beneficiaries coverage (in lakhs)	Percentage of population in age-group 3-6)
1.	ICDS (Pre-school education age group 3-6) (2424 sanctioned projects)*	2,03,386	65.78**	11.43
2.	Early childhood education (ECE)	4,365	1,53	0.27
3.	Creches and Day care centres - age group 0-5 (estimated coverage on the basis of 25 children per creche)	12,230	3.06	0.53
4.	Balwadis - age group 3-6 (estimated coverage on the basis of 30 children per Balwadi)	5,641	1.69	0.29
5.	Pre-primary Schools+	14,765	14.40	2.50
	TOTAL	-	86.46	15.02

* Including 188 State Government Projects running on ICDS pattern. Out of the Sanctioned Projects, only 1,940 were reporting to the Ministry in September, 1990.

** An additional 56.06 lakh children in the 0-3 age-group are covered under ICDS.

\+ Selected Educational Statistics, 1988-89, Ministry of HRD (Dept. of Education), Govt. of India.

Note: Data on ICDS, ECE, Creeches and Day Care Centres, and Balwadis were supplied by the Department of Women and Child Development in the Ministry of HRD, Govt. of India. The ICDS data are updated until September 1990.

Table 4.3

Current Status of Training for ECCE

Sl. No.	Name & Nature of Course	Minimum Qualifications for Entry	Duration
1.	Anganwadi workers' training (job training, para-professional)	Varies from State to State Class V-VIII the norm	3 months
2.	Nursery Teachers' Training/Pre-primary Teachers' Training	Class X	One year
3.	Vocational Training in Child Care (+2) of CBSE	Class X	Two years
4.	Balsevika Training of Indian Council for Child Welfare	Class X	11 months
5.	Montessori Training of Association of Montessori International	Class X	One year
6.	Integrated Pre-primary and Primary Teachers' Training (Delhi)	Class XII	Two years
7.	Diploma in Early Childhood Education	Graduate	One year/ distance education
8.	Middle Level Supervisors Training (job training)	Varies - Graduate, post-graduate and promoted	3 months

Source: Department of Pre-school and Elementary Education, NCERT, 1990.

UNIVERSALISATION OF ELEMENTARY EDUCATION

- Regaining School's Credibility

"That does not finish the picture. We have the education of this future state. I say without fear of my figures being challenged successfully, that today India is more illiterate than it was fifty or a hundred years ago, and so is Burma, because the British administrators, when they came to India, instead of taking hold of things as they were, began to root them out. They scratched the soil and began to look at the tree perished. The village schools were not good enough for the British administrator, so he came out with his programme. Every school must have so much paraphernalia, building, and so forth. Well, there were no such schools at all. There are statistics left by a British administrator which show that, in places where they have carried out a survey, ancient schools have gone by the board, because there was no recognition for these schools, and the schools established after the European pattern were too expensive for the people, and therefore they could not possibly overtake the thing. I defy anybody to fulfil a programme of compulsory primary education of these masses inside of a century. This very poor country of mine is ill able to sustain such an expensive method of education. Our state would revive the old village schoolmaster and dot every village with a school both for boys and girls."

- Mahatma Gandhi
At Chatham House, London, October 20, 1931

UNIVERSALISATION OF ELEMENTARY EDUCATION

- Regaining School's Credibility

"That does not finish the picture. We have the education of this future state. I say without fear of my figures being challenged successfully, that today India is more illiterate than it was fifty or a hundred years ago, and so is Burma, because the British administrators, when they came to India, instead of taking hold of things as they were, began to root them out. They scratched the soil and began to look at the tree perished. The village schools were not good enough for the British administrator, so he came out with his programme. Every school must have so much paraphernalia, building, and so forth. Well, there were no such schools at all. There are statistics left by a British administrator which show that, in places where they have carried out a survey, ancient schools have gone by the board, because there was no recognition for these schools, and the schools established after the European pattern were too expensive for the people, and therefore they could not possibly overtake the thing. I defy anybody to fulfil a programme of compulsory primary education of these masses inside of a century. This very poor country of mine is ill able to sustain such an expensive method of education. Our state would revive the old village schoolmaster and dot every village with a school both for boys and girls."

- Mahatma Gandhi
At Chatham House, London, October 20, 1931

4.15 The Elusive Goal

The Constitution has enunciated the following Directive Principle of State Policy regarding Universalisation of Elementary Education (UEE):

> "The State shall endeavour to provide within a period of 10 years from the commencement of the Constitution for free and compulsory education for all children until they complete the age of 14 years." (Article 45).

Universalisation was to have been achieved by 1960. In 1990, we are still nowhere near the goal of Universalisation of Elementary Education (i.e., upto class eighth), or for that matter even primary education (i.e., upto class fifth). According to varying estimates available now, almost one-half of all children and two-thirds of the girls in the age group of 6-14 either do not enter the school at all or drop out at an early stage or, to put it better, are pushed out' of the school system (see Table 4.2).

In contrast, Universal Declaration of Human Rights' declares that all individuals, irrespective of sex, caste and economic status, have the Right to Education'. India rightly subscribed to this famous declaration. Now, time has come to recognise 'Right to Education' as one of the fundamental rights of the Indian citizen for which necessary amendments to the Constitution may have to be made and, more importantly, conditions be created in society such that this right would become available for all children of India.

4.16 PROBLEMS AND ISSUES - AN OVERVIEW

The continued failure since independence to fulfil the constitutional directive of providing education to all children upto the age of 14 years is a teasing reality. Undoubtedly this problem qualifies for being ranked as the most fundamental problem of our educational system. It is only in recent years that the nation has come to acknowledge the magnitude of the problem. More than half of all children (and not one-third, as was often claimed for years) and two-thirds of the girls are outside the ambit of education. Whatever hesitation may still exist must now give way to a frank admission of these facts so that an honest analysis of the causes of the problem may begin. The degree of failure is further accentuated in the case of the children of SC/ST and other educationally backward sections of society. The focus of the various strategies adopted so far to bring all children into schools has been on the factors which lie within the educational system. This is equally true of the NPE/POA. The socio-economic and cultural factors have played

only a marginal role in educational planning. This approach to universalisation ignores the hard social realities. For instance, according to certain estimates, more than 4.5 crores of children, constituting one-fourth of the school going age-group, are engaged in child labour. Many of these children face brutal work conditions in both the organised and unorganised sectors. The issues of social justice with respect to educationally backward sections of society and the gender bias rooted in the patriarchal Indian society are some of the other significant factors that have a major bearing upon participation of children in education. We have also pointed out elsewhere that there is an inseparable link between the development policy and the capability of vast segments of our society to benefit from school education. It is in this perspective that the Committee presents below an overview of the major issues relating to the problem of universalisation - both from within and outside the education sector.

4.17 ENROLMENT

The official statistics on percentage of children enrolled in schools show a phenomenal rise from 42.6% in 1950-51 to 93.6% in 1986 at the primary level, and from 12.9% in 1950-51 to 48.5% in 1986 at the middle school level (See Table 4.4)

only a marginal role in educational planning. This approach to universalisation ignores the hard social realities. For instance, according to certain estimates, more than 4.5 crores of children, constituting one-fourth of the school going age-group, are engaged in child labour. Many of these children face brutal work conditions in both the organised and unorganised sectors. The issues of social justice with respect to educationally backward sections of society and the gender bias rooted in the patriarchal Indian society are some of the other significant factors that have a major bearing upon participation of children in education. We have also pointed out elsewhere that there is an inseparable link between the development policy and the capability of vast segments of our society to benefit from school education. It is in this perspective that the Committee presents below an overview of the major issues relating to the problem of universalisation - both from within and outside the education sector.

4.17 ENROLMENT

The official statistics on percentage of children enrolled in schools show a phenomenal rise from 42.6% in 1950-51 to 93.6% in 1986 at the primary level, and from 12.9% in 1950-51 to 48.5% in 1986 at the middle school level (See Table 4.4)

Table 4.4

GROSS ENROLMENT RATIO AT PRIMARY AND UPPER PRIMARY LEVEL

Year	Primary (I-V) in %age	Upper Primary (VI-VII) in %age
1950-51	42.6	12.9
1955-56	52.8	16.5
1960-61	62.4	22.5
1965-66	76.7	30.9
1970-71	76.4	34.2
1975-76	79.3	35.6
1978	81.7	37.9
1986	93.6	48.5

Source: Report of the Working Group on Early Childhood Education and Elementary Education set up for formulation of 8th Five Year Plant, Govt. of India, Ministry of Human Resource Development, Department of Education, 1989.

These statistics are not normally accepted on their face value. A number of studies have revealed that the actual number of children attending schools even in Classes I and II is far less than what is claimed officially. For instance a recent micro-planning survey in Tikamgarh district, M.P. pointed out that the number of children actually attending schools in the 6-14 years age group in the rural areas was 42.7% of those on the official records. Spor studies in another instance have shown that many

children whose names were enrolled in the school register had in fact not attended school for more than a few days. It was pointed out that since teachers are under pressure to show better enrolment targets, they keep the names of these children alive in their registers. In support of this presented below, are data on proportion of children in different age-groups attending schools.

Table 4.5

PROPORTION OF CHILDREN ATTENDING SCHOOL: 1981

Population	6-11 years	11-14 years	6-14 years
All	47.15	51.96	48.72
Male	54.88	63.81	58.11
Female	38.45	38.67	38.52
Rural	41.27	45.69	42.69
Rural male	50.57	59.52	53.50
Rural female	31.28	30.12	30.93
Urban	68.83	72.93	70.26
Urban male	72.70	78.32	74.66
Urban female	64.71	66.98	65.52

Note: The percentages given above do not correspond to enrolments in grades I to V and VII to VII.

Source: Census of India, 1981, computed and cited in Aggarwal, Y.P., 'Towards Education for All Children - Intent and Reality', J. Educational Planning and Administration, 2 (1&2), 1988.

4.18 Children not attending schools

It can be seen that almost 53% of children in 6-11 year age-group do not attend school and this proportion rises to 62% in the case of girls. This would mean that almost 4.6 crore children in this age group in 1986 were not attending school as opposed to the estimate of less than 60 lakhs based on published statistics. With the claim of Gross Enrolment Ratio in this age-group touching the level of 98% in 1987-88, the gulf between this claim and ground realities widens even further. While, according to estimates based upon Census of India figures, the number of children out of school in the age-group of 6-11 years in 1987-88 would be almost 5 crores, the Ministry's statistics on enrolment would place this number to about 20 lakh only.

4.19 Projected Population

The magnitude of the problem of universalisation can be seen in Table 4.6 where population of children in the two relevant age groups, 6-10 years and 11-14 years, is projected upto the end of the Eighth Five Year Plan period.

Table 4.6

PROJECTED POPULATION

(In crores)

Year	Age Group 6-10 years			Age Group 11-14 years		
	Boys	Girls	Total	Boys	Girls	Total
1989-90	4.999	4.736	9.735	-	-	-
1990-91	-	-	-	3.715	3.528	7.243
1994-95	5.196	4.918	10.114	4.022	3.806	7.828

Source: Report of the Working group on Early Childhood Education and Elementary Education set up for formulation of Eighth Five Year Plan, Govt. of India, Ministry of Human Resource Development, Department of Education, 1989.

4.20 DISPARITIES IN ENROLMENT

Notwithstanding the serious doubts raised above about the validity of the enrolment data, a close examination draws attention to some interesting problems. As Table 4.7 shows, only 41% of the students enrolled in Classes I-V and 35% in Classes VI-VIII were girls. In rural areas, this percentage falls down further.

Table 4.7

PERCENTAGE OF GIRLS' ENROLMENT TO TOTAL ENROLMENT (1986)

	Classes I-V (6-11 years)	Classes VI-VIII (11-14 years)
All India (Total)	41.16%	35.45%
Rural Areas	39.89%	32.05%

Source: Fifth All India Educational Survey (NCERT) 1986.

Although the percentage of SC/ST children among all students enrolled at the primary level represents their respective proportions in the population, their participation at the middle and the high school level falls sharply in comparison to that of the other children.

A districtwise analysis of the enrolment data has demonstrated that wide regional disparities exist in terms of the enrolment at both the primary and middle levels. These disparities are even more pronounced in the case of the enrolment of girls and children of SC/ST communities. The committee have reported elsewhere that 123 districts can be identified which have a gross female primary level enrolment ratio of less than 50% and a rural female literacy rate of less than 10%. Obviously these districts would need to be given priority in resource allocation. The need to conduct a similar analysis at block and sub-block levels can not be over emphasized.

4.21 RETENTION

As Table 4.8 shows, a large percentage of children drop out in the early stages of primary education, with 50% of them dropping out by Class V. At the middle school level, about 70% of the children who began education at Class I drop out before reaching Class VIII. This percentage can be as high as 75% in the case of girls at the middle school level. Similarly, the children of SC/ST communities drop out at a faster rate than those of the non-SC/ST communities. The dimension of regional disparity is also reflected in state-wise analysis of drop out rates at both the primary and middle school levels.

Table 4.8

DROP-OUT RATES AT PRIMARY AND MIDDLE SCHOOLS STAGES

	Classes I-V			Classes VI-VIII		
Year	Boys	Girls	Total	Boys	Girls	Total
1980-81	51.10	57.30	53.50	68.50	77.70	71.10
1982-83	49.40	56.30	52.10	66.04	74.96	69.57
1983-85	47.83	53.96	50.26	66.10	75.27	69.76
1984-85	45.62	51.41	47.93	61.83	70.87	65.39
1985-86	45.84	50.27	47.61	60.70	70.04	64.42

Source: Ministry of Human Resource Development, Department of Education, 1990.

4.22 PHYSICAL ACCESS TO SCHOOL

According to the Fifth All India Educational Survey in 1986, almost 20% of the rural population did not have access to a primary school within the habitation. The percentage of rural population without a Middle School within the habitation was as high as 63%. However, the same survey revealed that about 95% of the rural population had access to a primary school within 1 km. an official norm for walking distance for primary schools. Similarly about 85% of the rural population had access to a middle school within 3 kms. - again, an official norm for walking distance in the case of middle schools. These official norms may not be accepted on their face value as these may not be equivalent to waling distance for different sections of children. For instance, it has been shown in the section on Education and women's equality how these norms may not be applicable in the case of girls who are engaged in work both within and outside the home. In such cases, the distance of 1 km. to the primary school and 3 km. to the middle school may be just beyond the threshold which children can cross.

As shown by Table 4.9, there are almost 49% of the rural habitations with a total population of 11.7 crore which do not have access to a primary school within the habitation. Any strategy towards UEE would have to take into account these hard realities.

Table 4.9

AVAILABILITY OF PRIMARY SCHOOLS IN RURAL AREAS

Year	Total rural pop. (mn.)	Total Habita-tions (000's)	% Habita-tions without a primary school	% population unserved by primary school	Total Rural population unserved (mn.)
1965	396.6	982	62.02	28.52	113
1973	465.4	953	55.67	23.88	111
1978	509.2	965	53.20	21.47	109
1986	594.5	979	48.64	19.66	117

Source: All India Educational Surveys (NCERT), compiled and cited in Jalaluddin, A.K. et al, 'Basic Education and National Development', UNICEF Report, September, 1990.

There is also the issue of regional disparity involved with respect to accessibility of the schools. Table 10 provides State-wise data on this matter. It shows that there is a wide fluctuation with respect to the percentage of rural population having access to a parimary school within habitation. It fluctuates from 51% in Dadra and Nagar Haveli to almost 98% in Mizoram and Delhi.

Table 4.10

RURAL POPULATION WITH AND WITHOUT PRIMARY SCHOOLS/SECTIONS
1986

(Percentage)

	Population Served by Primary Schools/Sections at a distance of			
	Within Habitation	Upto 0.5 Km. but not within habitation	0.6 to 1.0 Km.	Upto 1.0 Km.
Andhra Pradesh	92.72	5.97	0.48	99.17
Assam	81.75	5.40	6.43	93.54
Bihar	78.53	8.99	8.34	95.86
Gujarat	97.83	0.86	0.76	99.45
Haryana	96.68	1.62	1.07	99.37
Himachal Pradesh	46.51	11.39	18.74	76.64
Jammu & Kashmir	78.23	5.42	7.05	90.70
Karnataka	92.50	2.03	2.71	97.24
Kerala	87.67	2.59	4.13	94.39
Madhya Pradesh	81.51	5.26	6.15	92.92
Maharashtra	92.42	3.28	2.25	97.95
Manipur	89.97	3.47	3.95	97.39
Meghalaya	80.87	2.88	5.47	89.22
Nagaland	98.85	0.42	0.18	99.45
Orrisa	77.08	8.82	6.93	92.83
Punjab	96.80	2.09	0.71	99.60
Rajasthan	86.84	1.49	4.57	92.90
Sikkim	72.13	3.80	7.17	83.10
Tamil Nadu	83.92	5.80	6.30	96.02
Tripura	57.04	12.85	14.22	84.11
Uttar Pradesh	55.96	14.05	18.82	88.56
West Bengal	79.71	11.47	6.20	97.38
A & N Islands	68.41	4.35	10.26	83.02
Chandigarh	96.92	2.75	0.00	99.67
Dadra & Nagar Haveli	50.74	14.10	20.35	85.19
Delhi	98.06	1.32	0.62	100.00
Goa Daman & Diu*	57.72	20.23	12.65	90.60
Lakshadweep	100.00	0.00	0.00	100.00
Mizoram	98.05	0.23	0.00	98.28
Pondicherry	88.54	7.92	3.56	99.02
India	80.34	7.04	7.22	94.60

Note: * Relates to Goa only.

Source: Fifth All India Educational Survey (NCERT), 1986.

A similar picture is presented at the district level in the study released recently by Raza et at.

4.23 AVAILABILITY OF SCHOOLS AND TEACHERS

Table 4.11 shows that, inspite of a rise in the total number of schools and teachers between 1965 and 1986, the number of schools and teachers per 10 thousand persons is declining continuously during this period. A comparison of the growth rates of the population with the growth rates respectively for the total number of primary schools and teachers reveals that population rose sharper than the number of both the schools and teachers per 10 thousand persons. This is a clear indication that the availability of the schools and teachers in population would most probably decline, unless measures on war-footing are adopted to reverse the trend.

Table 4.11

EDUCATIONAL DEVELOPMENT: SOME KEY INDICATORS 1965-86

	Population (mn)	Primary schools/ sections (000)	Teachers (000)	Per 10,000 persons	
				Schools	Teacher
1965	495.0	455	1196	9.23	24
1973	580.7	530	1218	9.13	21
1978	635.3	570	1287	8.97	20
1986	784.1	631	1493	8.05	19
Growth Rates					
1965-73	2.02	1.9	0.23		
1973-78	1.81	1.5	1.10		
1978-86	2.66	1.3	1.87		
1965-86	2.21	1.6	1.06		

Source: All India Educational Surveys (NCERT), compiled and cited in Jalaluddin, A.K. et at, 'BAsic Education and National Development', UNICEF Report, September, 1990.

Table 4.12

SCHOOLS BY NO. OF TEACHERS IN POSITION

Reference Year	% of Single-Teacher School		% of Two-Teacher School	
	Rural	Urban	Rural	Urban
1965	40.72	8.37	28.50	11.22
1973	30.76	7.90	27.57	10.84
1978	35.69	5.90	28.24	10.17
1986	31.27	6.29	34.07	11.92

Source: All India Educational Surveys (NCERT), compiled and cited in Jalaluddin, A.K. et at, 'BAsic Education and National Development', UNICEF Report, September, 1990.

Table 4.12 shows that almost one third of the primary schools in the rural areas continue to be single-teacher schools. Another one third of the rural schools have only two teachers each. Given this situation, the schools lack the essential precondition for introducing child-centred approach to education.

A State-wise study of teacher-pupil ratio in primary schools shows that it has infact increased in most States between 1971-72 and 1987-88 (see Table 4.13). The All India figure also shows that the teacher-pupil ratio during this period increased from 39 to 42. If this trend continues, all expectations of moving forwards better quality of elementary education would be belied. Indeed, a high teacher-pupil ratio adversely affects quality of education.

This also results in problems of class room discipline for maintenance of which teachers may feel to take recourse to undesirable practices including corporal punishment.

Table 4.13

TEACHER-PUPIL RATIO AT PRIMARY AND MIDDLE LEVEL OF EDUCATION

	Primary		Middle	
	1971-72	1987-88	1971-72	1987-88
Andhra Pradesh	39	56	30	44
Assam	43	48	24	31
Bihar	38	50	32	31
Gujarat	37	39	36	41
Haryana	39	45	32	37
Himachal Pradesh	27	39	21	18
Jammu & Kashmir	28	30	22	23
Karnataka	39	111	33	21
Kerala	34	33	26	32
Madhya Pradesh	34	45	33	27
Maharashtra	22	39	21	38
Manipur	40	19	17	17
Meghalaya	43	32	39	17
Nagaland	25	24	18	22
Orrisa	31	45	21	23
Punjab	38	40	30	18
Rajasthan	31	45	23	29
Sikkim	*	14	*	15
Tamil Nadu	34	45	32	46
Tripura	37	30	26	25
Uttar Pradesh	51	45	27	31
West Bengal	35	40	28	41
A & N Islands	20	21	19	21
Arunachal Pradesh	25	29	19	24
Chandigarh	29	27	29	20
Dadra & Nagar Haveli	31	41	25	32
Delhi	32	08	20	23
Goa Daman & Diu	34	26	28	25
Lakshadweep	25	23	19	24
Mizoram	46	26	23	11
Pondicherry	35	29	31	28
India	39	42	31	33

Source: Basic Educational Data, NIEPA, New Delhi, January, 1990.

4.24 FACILITIES IN PRIMARY SCHOOLS

As shown by Table 4.14, the primary schools lack even basic infrastructural facilities necessary for better quality of education.

Table 4.14

AN OVERVIEW OF FACILITIES IN PRIMARY SCHOOL SYSTEMS

S.No.	Particulars	% of schools out of the total
1.	Without buildings	13.5
2.	With kuchha buildings (Open spaces tents, kuchha structures)	13.8
3.	With one instructional room	37.8
4.	With usable playground facilities	34.5
5.	With drinking water facilities	46.6
6.	With urinals	15.0
7.	With separate urinals for girls	4.9

Source: Fifth All India Educational Survey (NCERT), 1986.

Table 4.15

DISTRIBUTION OF CHILD WORKERS (0-15 YEARS) : 1981

Industrial Group	Rural			Urban			All		
	Male	Female	All	Male	Female	All	Male	Female	All
Main Workers	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cultivators	61.2	47.3	58.9	10.3	4.6	9.8	55.8	45.1	54.2
Agricultural labourers	26.8	43.0	29.5	13.0	15.1	13.2	25.4	41.6	27.9
Livestock etc.	0.8	0.7	0.8	1.2	0.4	1.2	0.9	0.7	0.8
Mining/ Quarrying	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
House-hold Industries	4.6	4.8	4.6	14.3	46.4	16.9	5.6	6.9	5.8
Non house-hold Industries	3.9	2.3	3.6	29.0	15.9	27.9	6.5	3.0	5.9
Construction	0.3	0.2	0.3	2.4	0.6	2.3	0.5	0.3	0.5
Trade/ Commerce	0.8	0.0	0.7	13.7	3.1	12.9	2.2	0.2	1.8
Transport etc.	0.1	0.0	0.1	2.6	0.6	2.4	0.4	0.0	0.1
Other Services	1.4	1.4	1.4	13.0	13.1	13.0	2.6	2.0	2.5

Source: Census of India, 1981, Computed and Cited in Aggarwal, Y.P., Education and Human Resource Development, Commonwealth Publishers, New Delhi.

Table 4.16 presents data on single year age group-wise rate of workforce participation in both rural and urban areas for out of school children. It is seen that a rate of 66% exists for 14 year old rural male children but it never exceeds 10.5% for out of school rural female children. Further, the workforce participation rate rises sharply as the child attains the age of 10 years. This is presumably due to the child becoming useful at this age for certain types of manual work.

Table 4.16

AGE SPECIFIC WORKFORCE PARTICIPATION RATE OF THE OUT OF SCHOOL CHILDREN: 1981

Age (in completed years)	Rural		Urban	
	Male	Female	Male	Female
6	0.25	0.09	0.16	0.04
7	0.53	0.20	0.39	0.03
8	1.32	0.48	1.15	0.16
9	2.78	1.04	2.43	0.31
10	9.31	2.56	7.15	0.86
11	22.01	4.84	13.42	1.14
12	37.35	7.47	21.64	2.37
13	50.86	9.34	31.49	2.90
14	66.00	10.49	43.85	3.23

Source: Census of India, 1981, computed and cited in Aggarwal, Y.P., Education and Human Resource Development, Commonwealth Publishers, New Delhi.

A study has shown that, between 1971 and 1981 census, there was a higher increase in the number of female working children in comparison to male working children. This trend can be explained on two grounds: (a) migration of the male children to urban areas in search of jobs, (b) the percentage of female working children rising in the villages to fill up the gaps.

The above analysis suggests three categories of child workers as follows:

(a) Out of school children between the age of 6 and 10 years, most of whom are not working on wages.

(b) Out of school children in the 10 to 14 year age group who are in the labour market, and

(c) Out of school children in the 10 to 14 year age group who are not in the labour market.

The strategies for UEE would have to view these three categories separately. The children in the 6 to 10 year age group can be brought into the school system with improvement in the quality of education. For the second group of children, the strategy would have to be based on the principle that the children can not be dissociated from their employment. Therefore, a programme to educationalise the work would have to be devised such that it would promote skill formation, while the content is weaved into the local environment. For the third group of children, the strategy would promote skill formation and also aim at equipping the

child with minimum level of knowledge. UEE would demand that a mix of strategies is implemented.

4.25 OUT OF SCHOOL CHILDREN

There are wide inter-state variations in the proportion of children attending school in different states in the age groups 6-11, 11-14 and 6-14 (See Table 4.17). On the one extreme we have Kerala with universal coverage. On the other extreme there are states such as, Rajasthan, Uttar Pradesh, Madhya Pradesh and Bihar with about only one-third of their children in the 6-14 year age group attending school. The situation in these four states is much worse for the 6-11 year age group. This applies to all four segments of population, i.e. rural male, rural female, urban male and urban female. The position in the urban areas is much better as compared to the rural areas. Here, the male-female disparity is also low. The rural areas suffer not only in comparison to the urban areas but also reflect a pronounced male-female disparity. In Rajasthan, 8 out of 9 rural women are out of school. These disparities are diagrammatically shown in Fig. 4.1.

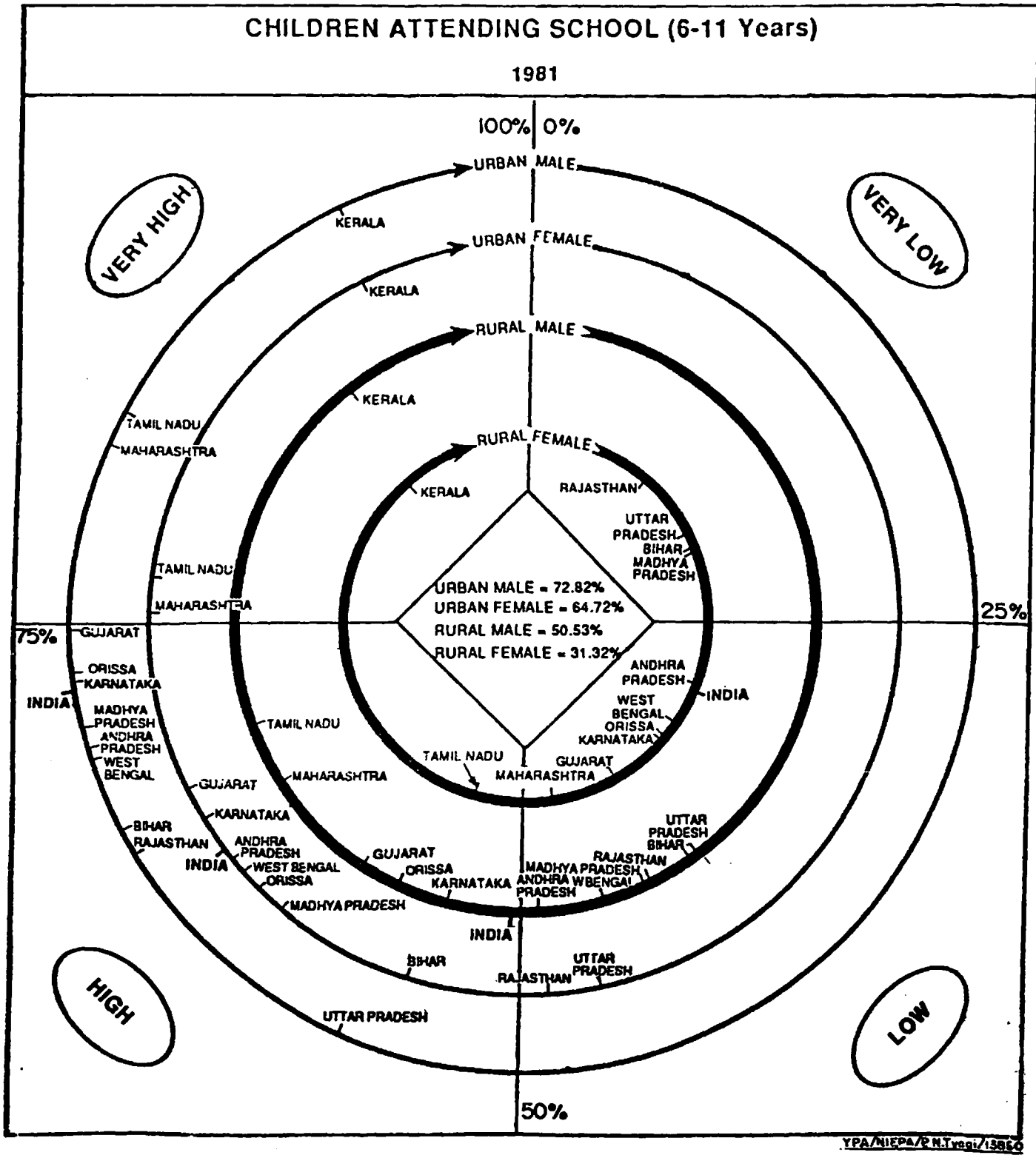


Fig.4-1: Children attending school (6-11 years) - Inter-State Variations

[Source: Aggarwal, Yash, Towards Education for All children - Intent and Reality, J. Educational Planning and Administration, 2(1&2), 1988]

Table 4.17

PROPORTION OF CHILDREN ATTENDING SCHOOL: 1981

	6-11 years			11-14 years			6-14 years		
	Male	Female	All	Male	Female	All	Male	Female	All
Rural									
India	50.53	31.32	41.25	59.52	30.13	45.70	53.48	30.94	42.69
Uttar Pradesh*	41.16	17.53	30.34	59.05	19.12	41.69	46.69	18.18	33.78
Bihar*	40.22	18.54	29.89	54.92	20.04	39.16	44.62	18.96	32.57
Maharashtra	65.76	47.40	56.64	68.17	40.30	54.79	66.61	45.02	56.00
West Bengal*	45.65	34.40	40.10	57.39	39.53	48.66	49.60	36.10	42.96
Andhra Pradesh*	49.23	30.62	39.97	45.33	20.80	33.50	48.00	27.65	39.97
Madhya Pradesh*	42.79	18.62	30.97	50.79	16.30	34.64	45.42	17.90	32.14
Tamil Nadu	69.55	53.89	61.84	59.54	33.34	46.79	65.97	46.67	56.80
Karnataka	54.30	36.39	45.25	53.01	27.86	40.57	53.88	33.67	43.73
Rajasthan*	42.74	11.49	27.83	56.00	10.60	34.79	47.05	11.21	30.06
Gujarat	59.20	41.62	50.73	67.71	42.12	55.76	62.08	41.78	52.40
Orissa*	56.60	36.15	46.32	54.75	27.25	41.46	55.96	33.35	44.67
Kerala	89.55	88.58	89.07	88.62	84.87	86.76	89.18	87.12	88.16
Urban									
India	72.82	64.72	68.90	78.26	67.06	72.94	74.72	65.52	70.29
Uttar Pradesh*	56.71	46.89	52.07	66.90	53.86	60.89	60.08	49.12	54.94
Bihar*	67.37	54.71	61.36	78.39	61.72	70.76	70.97	56.90	64.36
Maharashtra	81.05	74.24	78.21	85.66	76.51	81.31	82.70	75.68	79.30
West Bengal*	70.31	63.40	67.02	78.48	69.93	74.37	73.28	65.81	69.71
Andhra Pradesh*	70.60	64.08	67.37	74.64	60.08	67.57	71.97	62.76	67.44
Madhya Pradesh*	71.38	61.02	66.31	80.36	65.19	73.17	74.57	62.44	68.70
Tamil Nadu	82.87	77.33	80.13	77.63	65.57	71.78	80.09	73.06	77.05
Karnataka	72.85	66.17	69.52	74.43	63.77	69.22	73.40	65.36	69.42
Rajasthan*	66.43	48.98	58.00	77.88	52.30	65.73	70.33	50.08	60.61
Gujarat	74.76	67.65	71.35	82.59	72.56	77.89	77.53	69.34	73.63
Orissa*	73.01	62.47	67.80	74.41	60.22	67.60	73.50	61.71	67.73
Kerala	92.84	92.62	92.73	90.72	89.58	90.16	92.00	91.40	91.71

* : Educationally backward States

Source: Census of India 1981, Computed and cited in Aggarwal Y.P., 'Towards Education for All Children - Intent and Reality', J. Educational Planning and Administration, 2 (1&2), 1988.

As one moves from the outer to the inner tracks, the magnitude of the problem and the drag due to low development of education becomes more and more pronounced. The innermost track represents the core of the problem of educational development. In Table 4.18, data are presented to show the distribution of out of school children in certain selected States. It is seen that almost 55% of the out of school children in the 6 to 11 year age group are in Rajasthan, Uttar Pradesh, Madhya Pradesh and Bihar. This analysis emphasises the need for area-based model of educational planning.

Table 4.18

DISTRIBUTION OF OUT OF SCHOOL CHILDREN : 1981

	6-11 years		11-14 years		6-14 years	
	Male	Female	Male	Female	Male	Female
Rural						
Uttar Pradesh*	23.60	21.57	18.37	18.57	22.21	20.61
Bihar*	15.84	15.17	12.73	12.14	15.06	14.20
Maharashtra	5.32	6.23	6.66	7.54	5.70	6.65
West Bengal*	8.74	7.92	8.68	7.69	8.72	7.85
Andhra Pradesh*	8.05	8.41	9.97	8.77	8.60	8.52
Madhya Pradesh*	9.62	10.11	10.09	9.86	9.76	10.03
Tamil Nadu	3.23	3.67	5.97	6.07	4.02	4.44
Karnataka	4.66	5.12	5.86	5.74	5.00	5.32
Rajasthan*	6.62	7.20	6.12	7.11	7.30	7.17
Gujarat	3.73	3.82	3.77	3.87	3.74	3.84
Orissa*	3.82	4.38	5.19	5.25	4.21	4.66
Kerala	0.66	0.54	1.16	0.98	0.80	0.68
Other States	6.11	5.86	5.43	6.47	4.98	6.03
India	100.00	100.00	100.00	100.00	100.00	100.00

	6-11 years		11-14 years		6-14 years	
	Male	Female	Male	Female	Male	Female
Urban						
Uttar Pradesh*	22.69	20.46	19.94	17.24	21.86	19.42
Bihar*	10.32	5.77	5.79	6.28	8.96	5.93
Maharashtra	9.29	9.52	9.16	9.91	9.66	9.33
West Bengal*	9.05	8.28	8.68	8.27	8.94	8.28
Andhra Pradesh*	8.81	8.68	9.00	9.79	9.32	9.04
Madhya Pradesh*	7.22	7.72	6.35	7.39	6.96	7.61
Tamil Nadu	5.77	6.17	10.45	11.09	7.17	7.76
Karnataka	6.87	6.98	7.96	7.86	7.20	7.27
Rajasthan*	6.22	7.21	4.90	6.98	5.82	7.13
Gujarat	6.11	5.91	5.39	5.45	5.89	5.76
Orissa*	2.04	2.23	2.41	2.52	2.15	2.33
Kerala	0.66	0.54	1.29	1.06	0.85	0.71
Other States	4.95	10.53	8.68	6.16	5.22	9.42
India	100.00	100.00	100.00	100.00	100.00	100.00

* denotes educationally backward states.

Source: Census of India, 1981, computed and cited in Aggarwal, Y.P., 'Towards Education for All Children - Intent and Reality'. J. Educational Planning and Administration, 2, (1&2), 1988.

The prevailing curriculum of elementary education suffers from several lacunae, some of which are enumerated below:

(a) Viewing the curriculum mostly in the cognitive domain and, there too, by and large in recalling facts at the time of examinations;

(b) Inflexible and unresponsive to the local needs and environment;

(c) Devoid of the component of skill formation;

(d) Lacking in social and cultural inputs from the community;

(e) Unrelated to the 'world of work' which exercises a strong pull on the life of a large number of children after the age of 10 years;

(f) Transaction mostly through lectures in a non-participative mode.

(g) Near-absence of activity-based learning; and

(h) Discouraging exploration, inquiry, creativity and initiative on the part of the students.

The above deficiencies of the curriculum and its transaction would have to be removed, if UEE is to be made a reality.

4.26 TEACHER AND ADMINISTRATION

The school teacher is at the bottom of a vast bureaucratic machinery where there is hardly any scope for charting a fresh course of action. Burdened with the inspectorate system and suffering from a low social status, the teacher has, more or less, lost the interest in his/her own profession. Since the teacher himself/herself is a product of a poor school system and unfair examinations, he/she suffers from severe limitations, in terms of knowledge, aptitude for learning and understanding of children. These limitations in turn constrain the development of the next generation of teachers. What

measures do we undertake to break this vicious cycle? In many attempts to train teachers in new ideas and skills, it is observed that no more than 20-25% of them respond enthusiastically. What can we do to unleash the unexpressed human potential of each of our schools teachers? What preconditions would be necessary for beginning this process and later to sustain it? If we can answer these questions in meaningful ways, the first step towards UEE would have been taken. We may as well keep in mind that, at the time of recruitment, the teacher often has to resort to all sorts of unfair and unethical means. He/she has learnt to return this experience in the same coin at the time of examining his/her students. The fate of teachers' postings, transfers and applications for facilities under the service conditions is applications for facilities under the service conditions is determined through political and high-level bureaucratic interventions. There is little reflection in the average teacher of either Gijubhai Badheka or Montessori or Gandhi's villages school master. With this state of affairs, one faces an up-hill task in empowering the school system for the purpose of UEE.

Probing the Policy Framework

There are studies which show that, if the present demographic, investment, enrolment and retention patterns persist, universalisation may continue to be an elusive goal even well into the next century. What can be done to influence these cold projections so that the Constitutional

directive is achieved within this century and equity ensured for all children of India?

It is to answer this question that NPE is reviewed below:

The NPE has correctly emphasised the following two aspects which are to be part of the 'new thrust' in elementary education.

i) universal enrolment and universal retention of children upto 14 years of age, and

ii) a substantial improvement in the quality of education.

The Committee concurs that the issue of enrolment and retention can not be delinked from the issue of quality improvement as far as AUEE is concerned. However, the above list of aspects to be emphasised is incomplete as it does not take into account certain areas of concern which have a critical bearing on the capabilities of the school to attract and retain children. The additional thrust areas proposed by the Committee are:

a) Convergence of services in a habitation/village/mohalla, as has been envisaged, for instance, for ensuring girls' access to school education. In this case, it implies that holistic day care for children in the 0-6 age group and water, fuel and fodder services need coverage in all those habitations or bastis where girls' participation in education is low. Without this

convergence, a significant section of the girls' population may not find it possible to respond to the school at all, no matter how much of any one of these services is provided singly.

b) **Linkage between the school and the community,** as discussed earlier has an organic role in UEE. The school, being a part of a vast Government machinery, stands alienated from the community whose children it attempts to teach. For this reason the school becomes totally dependent on Government financing and infrastructural support. Whatever support the general public was providing to the school at the beginning of this century, or even at the time of independence, has sharply declined.

c) **Decentralised and participative mode of planning and managing school education** are generally talked about but rarely brought into practice. This has unfortunately reduced the status of the teacher, acclaimed as the pivot of our educational system, to the level of, at best, a glorified clerk. Neither the concerned voluntary agencies and community groups nor the general public have any effective say in moulding the course of action in education. The entire initiative and decision-making powers have become increasingly concentrated in fewer and fewer hands over the past few decades. The constitutional amendment of

1976, bringing education into the concurrent list, has further added to this trend, with the initiative as well as accountability fast slipping out of the hands of the State Governments, not to speak of the Panchayati Raj institutions at village, block or district levels.

The policy has certainly done well by emphasising child-centred approach to education and by pointing out that it is the best motivation for the child to attend school and learn (Para 5.6). The Committee's perspective in this regard is presented below:

a) Although implied in the 'warm, welcoming and encouraging approach' mentioned in NPE, it would be better if the policy would explicitly refer to the elements of joy, fun, exploration and play as integral to learning in the early stages of primary education. This explicit mention is required because the prevailing educational practice in the school system not only excludes these elements, but seems to consciously resist their introduction in the learning process.

b) Similarly, the policy statement should emphasise the role of singing, drawing, clay-modelling, games and particularly all forms of folk art and folk lore in enriching the learning process.

c) It is not clear why the benefit of being allowed to set their own pace and be given supplementary remedial instruction is restricted only to the first generation learners. By implication, the policy would deny the other children the advantage of setting their own pace.

d) The policy emphasises the need to increase cognitive learning and the skill component with the growth of the child. In the same spirit, the policy should have emphasised the role of the affective domain and psychomotor skills at the earlier stages.

e) Whereas the Committee endorses the declaration of retaining the policy of non-detention at the primary stage, it is presented in the negative framework of

detention versus non-detention. Instead, a positive concept of continuous, disaggregated and comprehensive evaluation as a means of improving the quality of learning should have been emphasised, with a clear understanding that the concept of a **terminal examination has no place in child-centred education** (the widespread antagonism amongst the teachers to the non-detention policy in vogue in several States probably has its roots in this negative presentation and teachers' lack of appreciation of the tool of continuous evaluation for quality improvement).

f) The policy declares that corporal punishment will be firmly excluded. While welcoming this assertion, it may be noted that corporal punishment is already excluded on paper in most of the States/UTs. Yet it persists in most parts of the country. Therefore, the policy would have done well by emphasising measures to control the socio-cultural, psychological and educational factors that justify corporal punishment in the minds of the teachers.

g) Similarly the policy declaration to adjust school timings as well as vacations to the convenience of children' has been made time and again from several

public fora. The policy should have, instead, spelt out its strategy to mitigate the reasons that have not allowed this to happen so far.

A close reading of the POA reveals that in its view the 'rapid expansion, which was not accompanied by sufficient investment of resources' is responsible for 'a deterioration in academic standards' (Para 1, Chapter II). This seems to be rather over-simplification of a fairly complex situation. Many other factors are acknowledged as determinants of the quality of learning in the schools. The Review Committee regards the teachers, the community and the social environment as the key factors for moving towards child-centred approach and better standards in education. Provision of additional facilities to the schools (e.g. Operation Blackboard) must be made but it should never be construed to imply that this alone would bring about the desired change in the schools.

The POA lays a great deal of emphasis on decentralisation of planning and educational management. It gives a call to political parties and their local level constructive workers to play an important role in bringing

about an upsurge towards UEE (Para 9). It further intends to give an effective voice to women, youth, and the sections of society who have remained deprived of educational opportunities. While these proposals are welcome, they lose their meaning since the policy adopts strategies and measures that concentrate initiative and decision-making in a few hands and discourage participation. The highly centralised conceptualisation, planning and execution of the two focal strategies adopted by NPE for UEE - i.e. Operation Blackboard and Non-Formal Education - are cases in point.

As was shown earlier, the reliability of enrolment data is in question. Depending upon the local variables, it is inflated by a factor of two or more. Yet the POA appears to lay considerable faith in the success of the enrolment drive taken up in the seventies and eighties, as indicated by the Gross Enrolment Ratios rising to the level of almost 98% in 1987-88. Consequently, the POA recommends a 'shift from enrolment to retention' (Para 13, Chapter II). What is required here is not a shift but a continuation of concern for the dismally low rate of 'genuine' enrolment as well as for improving retention.

The POA recommends that an attempt should be made to switch over to 5+3+2 pattern by 1995 so that it coincides

with the target year for UEE. It is not at all clear what relationship between the 5+3+2 pattern and UEE is envisaged by the POA. This is, however, a significant matter. According to the Review Committee, the present mode of curriculum development and content planning in the primary and middle schools is determined by what is planned at the +2 level. This results in unnecessarily burdening the child in the elementary school and, at the same time, in not allowing the growth of a holistic and self-sufficient view of the first five and eight years of schooling respectively. In the present stage of social development in most parts of India, a large majority of children, even with improved strategies of universalisation, would quit schooling after either Class V or Class VIII. It is, therefore, crucial that the curriculum development at these two levels is aimed to provide for a self-sufficient model of knowledge, skills of children can go out into the 'world of work' and continue self-learning throughout life. It is not being suggested that the +2 level is unnecessary for the majority of our children. As education is a sub-system of the social system, the +2 level is to become both accessible and important in the life of the majority of the children, as the country moves into a higher stage of social development. To be sure, this would not come about without a drastic overhaul of the

present development policy and a clear tilt towards equity and social justice in national life. Until this happens the +2 level shall remain outside the purview of universalisation.

Reviewing the Resolve

In Para 5.12, the NPE has stated its 'Resolve' for UEE in the following words:

> "The New Education Policy will give the highest priority to solving the problem of children dropping out of school and will adopt an array of meticulously formulated strategies based on micro-planning, and applied at the grass-roots level all over the country, to ensure children's retention at school. This effort will be fully coordinated with the network of nonformal education. It shall be ensured that all children who attain the age of about 11 years by 1990 will have had five years of schooling, or its equivalent through the non-formal stream. Likewise, by 1995 all children will be provided free and compulsory education upto 14 years of age."

The Committee wishes to offer the following comments on the above statement:

While appreciating the emphasis in 'Resolve' on solving the problem of drop-outs and on ensuring retention, it may be noted that no strategy, howsoever 'meticulously formulated' it may be, can be effective as long as enrolment is not similarly stressed. Under today's conditions, if all of the children attending Class I are retained upto Class VIII, it may still amount to provision of schooling to merely 50% of the children and one-thirds of the girls in the relevant age group. Obviously this was not intended by the policy.

The latter half of the 'Resolve' statement is significant as it makes the following fresh proposals for universalisation for the first time in an official document:

a) It views the goal of UEE in two phases - provision of primary education for all children who attain the age of 11 years by 1990, and of elementary education for all children upto 14 years of age by 1995.

b) It is the first time that a policy admits that the school may not be able to reach all children. The NPE, therefore, envisages a major role for the non-formal stream in moving towards UEE. This is clearly reflected in the reference to 'five years of schooling or its equivalent through the non-formal stream'.

The phasing of UEE into two stages - Universalisation of Primary Education (UPE) in the first phase and UEE in the second phase - has been interpreted by some as a step towards dilution of the nation's commitment to the Constitutional directive. This negative interpretation is mainly because of the continued failure in moving towards universalisation since independence. Here, even the NPE's 'Resolve' does not remedy the situation. It may be noted that the policy formulated as it was around mid-1986 would begin to be implemented only in the academic year of 1987. This left only three years for schooling until 1990 for children who would have by then attained the age of about 11 years. How did then the NPE expect to provide them with 'five years of schooling'? Apparently, NPE was fitted in the time-frame of the Seventh Five Year Plan. In this light, the 'Resolve' to meticulously formulated strategies based on micro-planning seems rather over ambitious.

It could be argued that the intention instead was to achieve the stated goal through the non-formal system which would lead to educational attainments equivalent to those in the primary schools within a period of three years. The Committee has not been able to lead itself to accepting such a line of thinking.

In this context the Committee went into the question whether any reliable data regarding attainments emerging from pre NPE years of implementation of NFE programme was available. Based on interactions with the authorities of the Department as well as others, the Committee came to the finding that no such data were available at the time of formulation of NPE. (The evaluation study conducted by NCERT in 1985-86 on the efficacy of NFE was still in progress at the time of NPE formulation and hence the Policy could not have been informed by this study. The presentation made by the officers of the Department of Education before the Committee was mainly in terms of inputs and without information on attainment outputs). Yet the NPE's 'Resolve' enlarged NFE into a significant parallel sector.

Regarding the new programme of non-formal education (NFE), the following features envisaged by NPE/POA are being highlighted below:

a) NFE shall strive to reach 'school drop-outs, (for children from habitations without schools, working children and girls who cannot attend whole-day schools' (NPE, Para 5.8).

b) The curriculum framework of NFE, though patterned on the lines of the national core curriculum, will be based on the needs of the learners and related to local environment' (NPE, Para 5.10).

c) Learning material of high quality will be developed. (NPE, Para 5.10).

d) The NFE shall promote 'a learner-centred approach', 'emphasis on learning rather than teaching', 'continuous learner evaluation', 'creation of participatory learning environment' and 'joyful extra-curricular activities' (POA, Para 26).

e) The NFE shall organise activities to enable learners to progress at their own pace and to learn from each other. (POA, Para 26).

The above listed highly desirable features of NFE are indeed relevant to formal schools as well and they are also the essence of the child centred approach mentioned by NPE.

The criteria mentioned by POA for selection of NFE instructors being local, being already motivated, acceptable to the community, being preferably from the weaker sections in society, having given some evidence of work in the community - are the criteria relevant to the selection of formal school teachers also. Therefore, it is unclear why the policy has advocated NFE, in effect, as a parallel system.

The NPE has further proposed that all measures will be taken to ensure that 'the quality of non-formal education is comparable with formal education (NPE, Para 5.9). The POA elaborates that the scholastic achievements of NFE would have to be such that learners' entry into formal structures is facilitated. In the ultimate analysis, therefore, the effective difference between NFE and the formal school is reduced to the former being held in the veinings and the latter in the day time. Of course, a number of other secondary differences in terms of managerial system, infrastructure, salaries, etc. exist. It could be noted in this context that the NPE fully allows for 'school timings as well as vacations' to be adjusted to the 'convenience of children' (Para 5.6). Why did the POA, therefore, not propose changing the school timings to suit the needs of these girls and working children who cannot attend the day

school? Is it because the school hours cannot be reduced to two to three hours per day, as has been done in the case of NFE? Is the shortening and staggering of school hours not advisable on academic grounds or are there some extraneous factors? These questions are not answered by NPE/POA.

The above analysis would lend itself to the inference that in POA's perception the formal school is not, in fact, amenable to respond to the needs of the child population outside the school system through change of its timings.

With regard to NFE, the POA makes the following observation:

> "For their healthy development and to ensure that they enjoy conditions of freedom and dignity, the education system will strive to have all children in whole-time schools of good quality, and till that becomes possible they will be provided opportunities of part-time non-formal education". (POA, para 8e).

It is clear that the POA itself places NFE at a level lower than the formal school. A feeling widely persists, legitimately or not, that NFE is some kind of a second-grade education for the poor, while the formal school is meant for

those who are relatively better off. This feeling has grown in the public mind notwithstanding the fact that formal schools themselves are in poor shape and provide, by and large, what can be fairly described as second grade education.

CHAPTER 5

MINISTRY OF HUMAN RESOURCE DEVELOPMENT COMMITTEE REPORT ON MINIMUM LEVELS OF LEARNING AT PRIMARY STAGE

5.1 BACKGROUND

The Department of Education, Ministry of Human Resource Development organized a seminar in December 1989 on the theme, 'Basic Learning Needs and Levels of Attainment'. Various issues related to basic learning needs of the children at the primary stage, the need for specifying minimum levels of learning and creation of appropriate mechanisms for assessment of learner attainment were discussed during the seminar. On the issue of laying down minimum levels of learning the seminar recommended for initiating concrete efforts at the national level.

Against this background, the Department of Education, Ministry of Human Resource Development, Government of India set up the present committee vide order No. 74/3/89-Desk(TE) dated 5 January 1990.

5.2 PROCEDURES FOLLOWED BY THE COMMITTEE

The committee met five times between January and August 1990. The committee decided to follow the following broad parameters for work within the framework provided by the terms of reference:

i) The committee will take an integrated view of primary level education being provided in the country through formal as well as non-formal streams. Accordingly, the minimum levels of learning to be specified by the committee will be applicable to primary level education, both in the formal and the non-formal streams.

ii) The committee recognised that the curriculum prescribed for primary level education consists of a number of subject areas. It was decided that the committee will draw minimum levels of learning only in respect of three subjects, namely, language (mother tongue), mathematics and enviromental studies.

iii) Even though the terms of reference required the specification of Minimum Levels with respect to Classes III and V only, the committee decided to carry out the exercise with respect to all the five classes at the primary stage. This was considered necessary in order to ensure proper progression of competencies within each class as well as across the five classes.

iv) The committee recognized that consideration of non-cognitive aspects of learning is a wide area and demands a separate exercise.

5.3 MINIMUM LEVELS OF LEARNING: SOME IMPORTANT FEATURES

INTRODUCTION

The need to lay down Minimum Levels of Learning (MLL) emerges from the basic concern that irrespective of caste, creed, location or sex, all children must be given access to education of a comparable standard. The major focus of the policy formulation behind the MLL exercise is upon equity and reduction of existing disparities. The effort is to combine quality concerns with concerns for equity keeping in view the developmental needs of children from the disadvantaged and deprived sections of the society, the drop-outs, working children, and girls, who constitute the majority of school-going age population in this country, and to whom, in all likelihood, at least for some time to come, primary education will be the only opportunity for structured learning. This basic concern underscores the approach adopted by the committee in defining the minimum levels of learning.

The present section discusses some of the important operational features which have guided the committee in formulating the MLLs.

Specification of MLL: A Quality Issue

The emphasis on defining precisely what children should have learnt by the end of every stage of education stems principally from three concerns.

Firstly, the minimum levels of learning that all children must achieve at a given stage of education is seen as one of the important prerequisites for infusing a sense of direction to the system and thereby paving the way for improving its accountability.

Secondly, it is expected that MLL will provide an effective tool for programme formulation for school improvement, and

Thirdly, and fundamental to the issue, there is the widely held perception that in a vast majority of government and minicipal schools children can barely read their own textbooks even after spending as many as five years in school. Considering that, to a large number of them, opportunity for education is not likely to be available beyond the primary stage and what they learn here must sustain them throughout their lives, it becomes imperative that the eucational system makes sure that these precious school years of the children are not wasted. That all children, irrespective of the conditions they come from and the condition of the schools they attend, reach a minimum level of learning before they finish primary education that would eventually enable them to understand their world and prepare them to function in it as permanently literate, socially useful and contributing adults.

Specification of MLL: A Curriculum Issue

Every curriculum, as it attempts to modify the cognitive as well as noncognitive domains of development of the learner, lays down specific educational objectives and the corresponding learning outcomes expected on the part of the learners. The MLL exercise should be viewed as part of a larger curriculum reform endeavour attempting to move towards greater relevance and functionality in primary education. The implications of this exercise are:

- lightening the curriculum of its textual load and also the burden of memorizing unnecessary and irrelevant facts;
- leaving room for the teacher to relate textbook information and objective reality into a meaningful process of understanding and application;
- ensuring the acquition of basic competencies and skills to such a level where they are sustainable, and would not easily allow for replase into illiteracy;
- permitting mastery learning not only by the brighter students in the class but also by almost all children, including the first generation learners.

5.4 SOME BASIC FEATURES OF MLL

Specification of MLLs should meet the purpose of increasing learning attainments and serve as performance goals for the teacher and output indicators for the system.

For this, the MLL must have, apart from relevance and functionality, the attributes of achievability, understandability and evaluability.

i) Achievability

A basic characteristic that MLLs must satisfy is that they should correspond to learning objectives that are achievable by all learners. This is so because of certain specific reasons:

i. To seve as performance objectives and goals.

ii. To ensure learning up to mastery level by every child in the class.

iii. In a country in which achievement levels vary widely with regions, districts, school conditions, socio-economic profile and other diverse factors, setting realistic and achievable minimum levels necessarily demands a great deal of flexibility in implementation.

ii) Communicability

It is not enough that MLLs are realistic and achievable. It is equally important to set them in a language and form that are easily understandable to all the teachers, many of whom located in remote rural areas work in isolation without any outside help or guidance. Apart from primary school teachers, the MLLs should also be understandable to the NFE instructor, the parent, and the community.

iii) Evaluability

The statement of MLLs should be such that they serve as an effective blue print for continuous and comprehensive evaluation of learners and thereby streamline the process involved. The Working Group for the Eighth Five Year Plan (1989) has recommended the introduction of a comprehensive evaluation system:

> Students should have a well-defined goal of acquiring a mastery level, particularly in subjects which serve as the basic tools of learning. Parents seem to feel dissatisfied with the levels of learning being achieved in schools and would feel happier with a testing system introduced. Teachers too need to know more clearly about the expected outcomes in the courses they teach. Educational administrators would have in the system of tests of learners, the instrumentality to appraise the performance of institutions and teachers.

iv) Learning Continuum

The endeavour has been to set MLLs in as simple and comprehensible manner as possible, specifying the competencies to be mastered under each learning unit from Class I throughClass V. Learning has been seen as a 'continuum', in whcih the units are sequenced hierarchically so that the clusters of competencies in one unit build as directly as possible on the competencies in the preceding

unit. It is firmly believed that if the children progress systematically through this continuum, mastering the concerned sets of competencies in each unit before they move on to the next, learning each subsequent unit will be more enjoyable and meaningful, and the achievement of minimum levels of learning will be facilitated.

5.5 COGNITIVE AND NON-COGNITIVE AREAS OF LEARNING

According to the terms of reference of the committee, the present exercise of delineating MLLs is confirmed to the curricular areas of

- Language
- Mathematics
- Environmental Studies (including Social Studies and Science)

While these are very crucial subjects for primary education, other subjects such as Physical Education, Work Experience and Music & Art Education should not be excluded from the total curriculum plan. Similarly, the non-cognitive aspects of the curriculum are as important, if not more, as cognitive areas.

5.6 TOWARDS A SCHEME OF LEARNER EVALUATION

MLLs AND EVALUATION

A sound evaluation programme, if carefully designed and effectively implemented as an integral part of an overall educational programme, can be of immense value in

maintaining and enhancing the quality of learning. On the other hand, if learner evaluation is neglected or if a scheme of evaluation is rigid, ritualistic and lopsided it can prove equally harmful and damaging to the very objective of ensuring the quality of education. Under the MLL programme, therefore, it is one of the essential preconditions that a comprehensive, illuminative and improvement-oriented evaluation plan is properly developed and consistently practised.

While developing an effective evaluation system, the following issues, among others, may be paid particular attention:

(a) Prerequisites for following the system of automatic promotion at the initial stage of learning.

(b) The need for emphasizing mastery learning at the basic stage of education - the question of quality coupled with equality.

(c) A balanced view oflearning and evaluation in respect of both cognitive and non-cognitive aspects of development.

(d) Accountability of the education system and its functionaries as reflected in the actual achievement of learners.

The Dilemma of Automatic Promotion

In fact, a continuous and formative evaluation procedure is an essential and unavoidable prerequisite for successful implementation of the policyof automatic promotion.

The Need to Emphasize Mastery Level of Learning

At the primry stage most essential core skills and competencies are included in the curriculum. The MLL approach implies a calculated effort to include those minimum, essential and common competencies that all children must master. But the traditional concept of '35 percent pass' prevalent at the middle and secondary stages of education invariably prevails at the primary stage also which indeed is an impediment in raising the standard oflearning. At least at the primary stage and in the context of MLLs it is absolutely essential that the mastery level of learning is aimed at. Only when almost all children succeed well in achieving the basic skills of reading, writing, computation, etc. as indicated in the MLL statements that one can be sure of substantial improvement in quality without sacrificing equity. The traditional concept of low level of expected achievement by the bulk of children should, therefore, be gradually given up and should be replaced by the concept of mastery as the expected standard of attainment for all children. If minimum essential

facilities and help are given to schools and teachers, and if continuous feedback, academic guidance and remedial work are given to the learners, it should be possible for most children to reach the mastery level of achievement in basic competencies at the primary stage.

Cognitive and Non-cognitive Learning

Primary education should include not only the acquisition of knowledge and mental skills but also health habits, work habits, cleanliness, cooperation and such other personal and social qualities that form character and personality. It is known that the cognitive elements such as knowledge and mental skills are relatively easier to assess and, therefore, the non-cognitive aspects are either altogether excluded from the evaluation process or they are not given adequate attention. This imbalance should be eliminated. Simple and manageable means of assessment of non-cognitive aspects of growth must be included in a comprehensive evaluation scheme. Much of this is based on observation techniques aimed at helping children in acquiring valuable personal and social behaviour and in cultivating healthy habits for their well-being.

Accountability of the Eduational System

The accountability of individual schools, school system and their functionaries should depend on the ultimate criterion of education, namely, student achievement. There is need to

introduce summative evaluation, achievement surveys and other measures as part of an overall, comprehensive scheme of evaluation to determine accountability and efficiency of institutions and their functionaries, and to make other such decisions by administrators, planners and policy-makers based on actual achievement data.

It may be emphasized at this stage that the competencies included in the MLLs become specific educational objectives or minimum expected outcomes of learning in the context of evaluation.

PART-II : REAL SITUATION

CHAPTER 6

DETAILED STUDY OF CURRICULUM FOR PRE AND PRIMARY CLASSES

6.1 INTRODUCTION

Any kind of educational improvement should be preceded by suitable curriculum reforms. Curriculum is the sum total of learning experiences provided by school. It is called the "stuff of education". It is what we teach, what the students learn, what we examine for and what we give degrees or diplomas for when students pass through. But we should make it relevant to and continuous with the changing needs of the present and challenges of the future. It must be defined in terms of what and how we want the students to know, do, think, feel and appreciate when they are ignore outside the school. While determining objectives and defining their respective learning experiences we must keep in mind what kinds of knowledge, skills, thoughts and feelings the children bring with them when they come to the school. We should also consider what kinds of things are happening to them outside the school or inside the society where they are likely to go and what they will probably do after their schooling. Since the present study deals with the CONCEPTUAL DEVELOPMENT OF TEACHING AND LEARNING AIDS FOR EARLY CHILDHOOD AND PRIMARY EDUCATION, it was therefore essential to study and understand the contents of syllabus

for pre and primary classes being followed in various schools of Pilani and near by villages.

6.2 EARLY CHILDHOOD EDUCATION (ECE), CURRICULUM

Early Childhood Education (ECE) has received its due emphasis in the National Policy on Education (1986) as a critical input both for the holistic development of an individual and for its impact on the enrollment and retention of children in the primary grades. Research findings shows that the impact of Early Childhood Education is greater if the curriculum followed is child centered in approach and caters to all round development of the child.

As assessment of the status of ECE in the country has been done by NCERT and it indicates that while the facilities for ECE are gradually expanding, the curriculum being transacted at this level is generally neither child - centred, not does it cater all-round development of the child. ECE is, inprinciple, a process and development oriented system and their ECE programmes should be transacted through the medium of play and activity.

According to Venita Kaul (1991), the existing scenario indicates that, more often than not, it has become a downward extension of primary school, ignoring thereby the basic philosophy and methodology of ECE. Unfortunately this situation is not confined to the urban elite schools but has

also percolated in an aggravated form to the smaller urban and rural schools and anganwadis.

Interactions with administrators, organizers, and teachers/workers of ECE programmes indicate that there are widespread misconceptions regarding the objectives and methodology of ECE. Subsequent to these interactions, a persistent demands is being made for resource and guidance materials in this area. NCERT has prepared the document "Early Childhood Education Programme", specifically to meet this demand. It is intended for teachers as well as organizers, and administrators of ECE programmes. It described a development oriented, age-specific programme for pre-schoolers in terms of specific objectives and related activities.

The programme described in the tables 1 to 6 has evolved from a sound theoretical framework and has been successfully implemented by NCERT over the last several years.

The preparation of this programme owes its origin to a workshop conducted by UNICEF in Agra in 1984 in which several noted experts and practitioners of ECE in the country participated and presented papers on the pre-school curriculum. These papers were handed over to NCERT in 1990 by UNICEF with a request to prepare this document. Most of

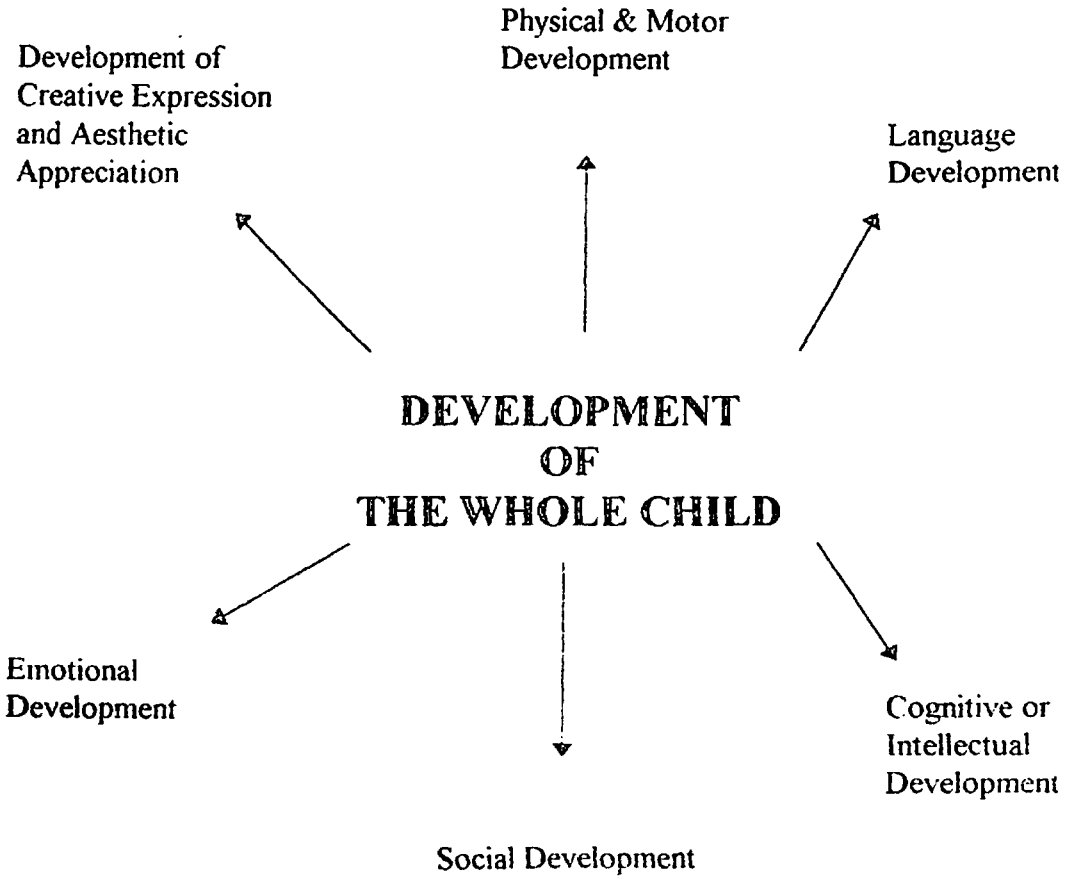
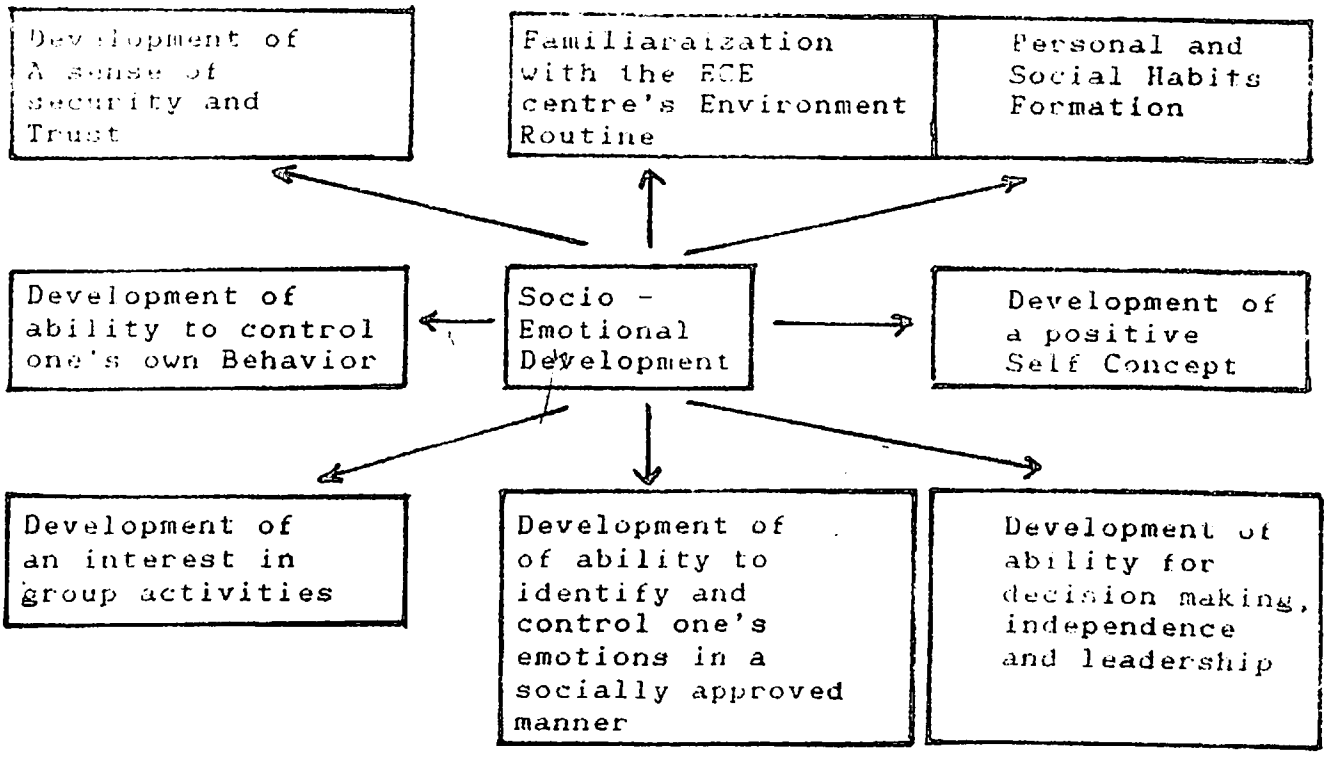

Physical & Motor Development
Development of Creative Expression and Aesthetic Appreciation
Language Development
DEVELOPMENT OF THE WHOLE CHILD
Emotional Development
Cognitive or Intellectual Development
Social Development

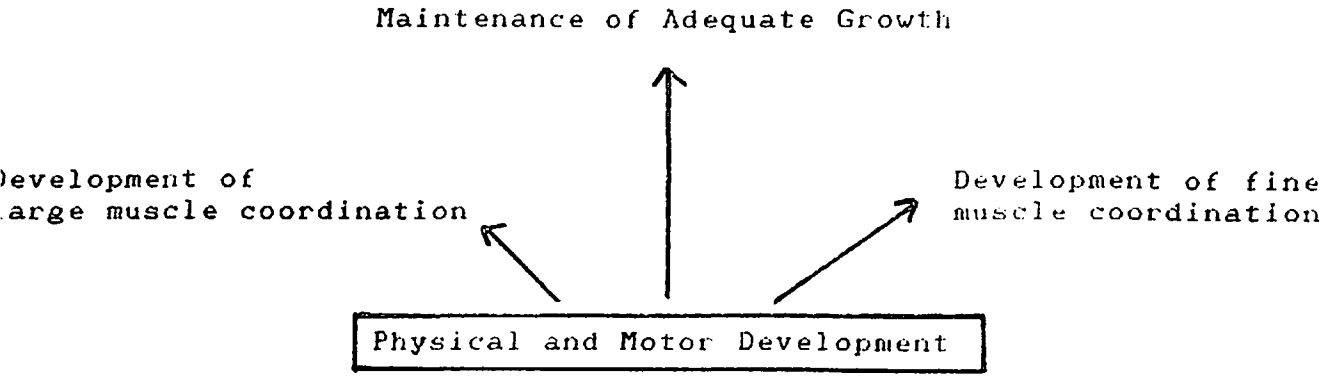
Table - 1



Some Activities

- # Rhymes and songs
- # Free and structured play
- # Activities fostering independence
- # Nature walk
- # Care of pets
- # Dramatisation
- # celebration of festival and birthdays
- # Conversation
- # Gardening
- # Puppet play

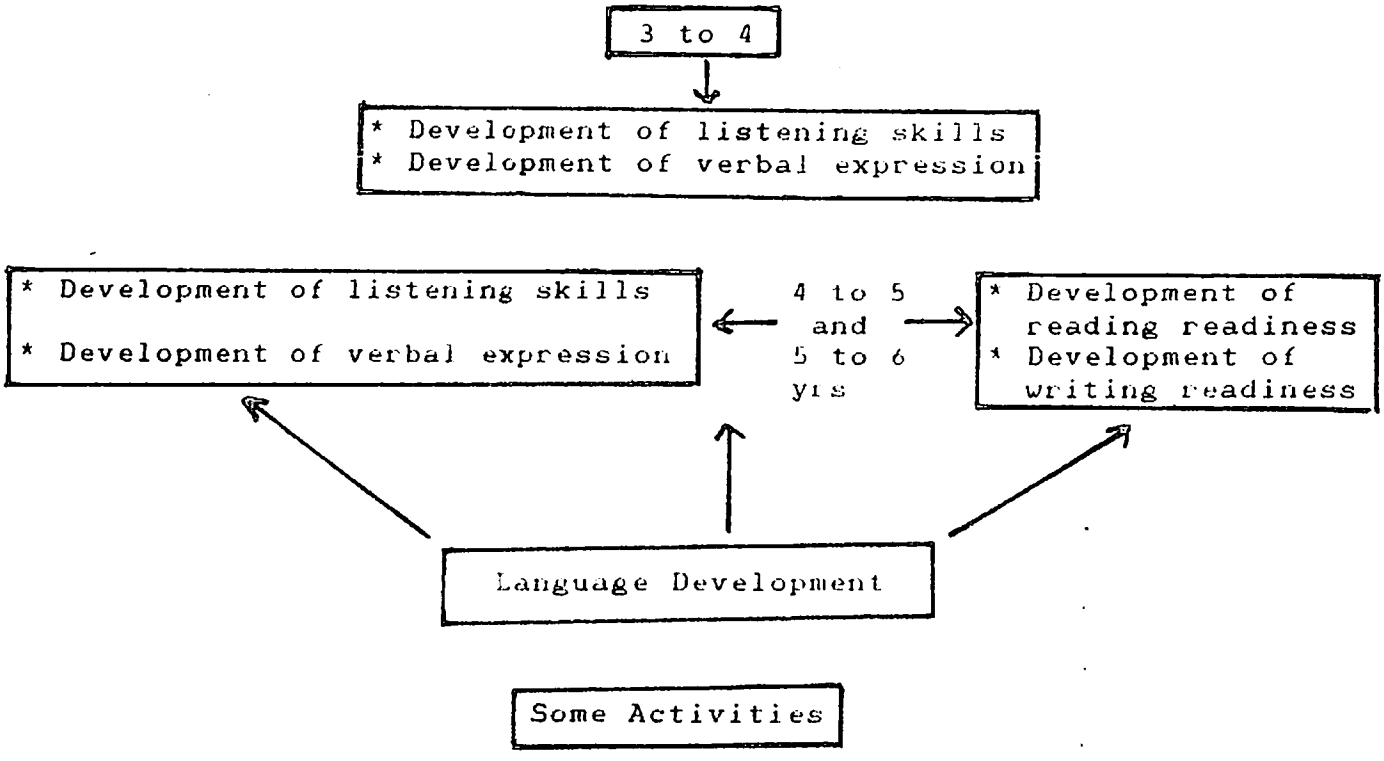
Table - 2



Some Activities

Monthly check-up of height and weight	-	Free and structured play
Provision of supplementary nutrition	-	Drawing and painting
Threading and sewing	-	Sand and water play
Clay work	-	Free play with mainpulative material
Colouring in enclosed spaces	-	Finger rhymes with action

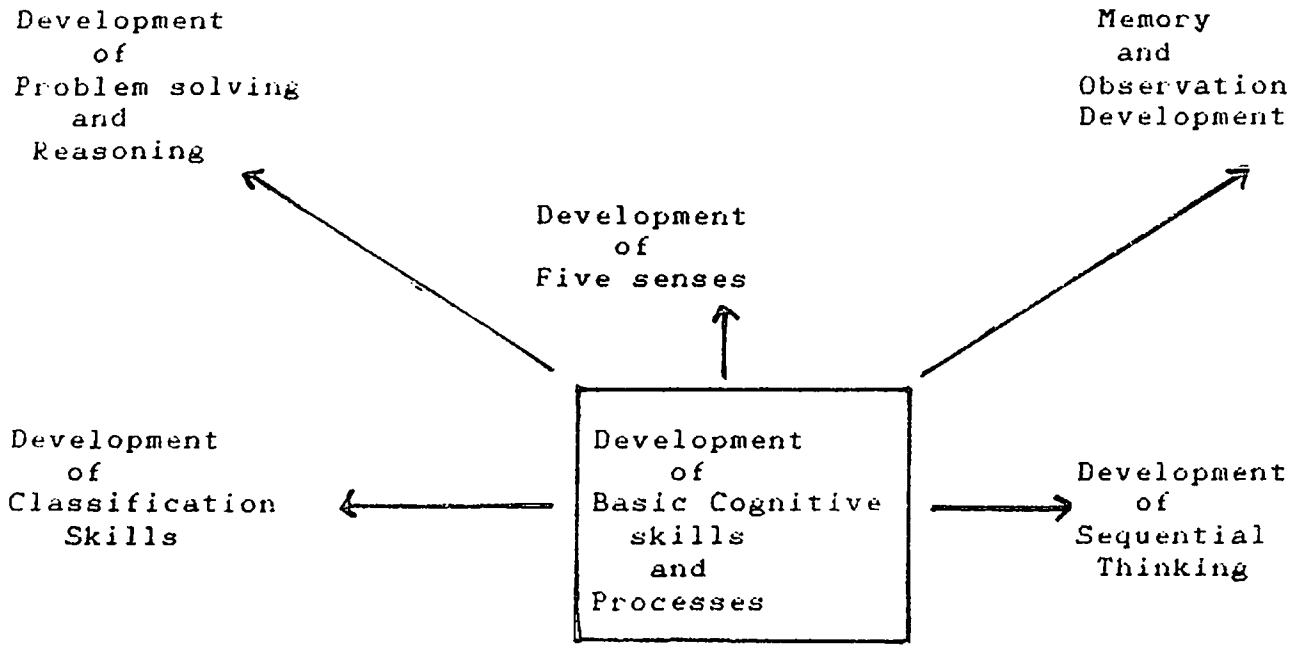
Table - 3



Some Activities

* Free and Structured conversation
* Dramatisation
* Activites and games involving
* Picture word matching
* Tracing
* Riddles
* Puppet Play
* Sound discrimination of words and word-making games
* Joining dots
* Pattern drawing with pencil

Table - 4



Some Activities

1. Games and activities for visual and sound discrimination

2. Activities with touch cards and objects of varying textures available in the environment.

3. Memory games

4. What is missing' activity

5. Activities involving observation and recall of observation

6. Classification activities with objects, picture cards etc.

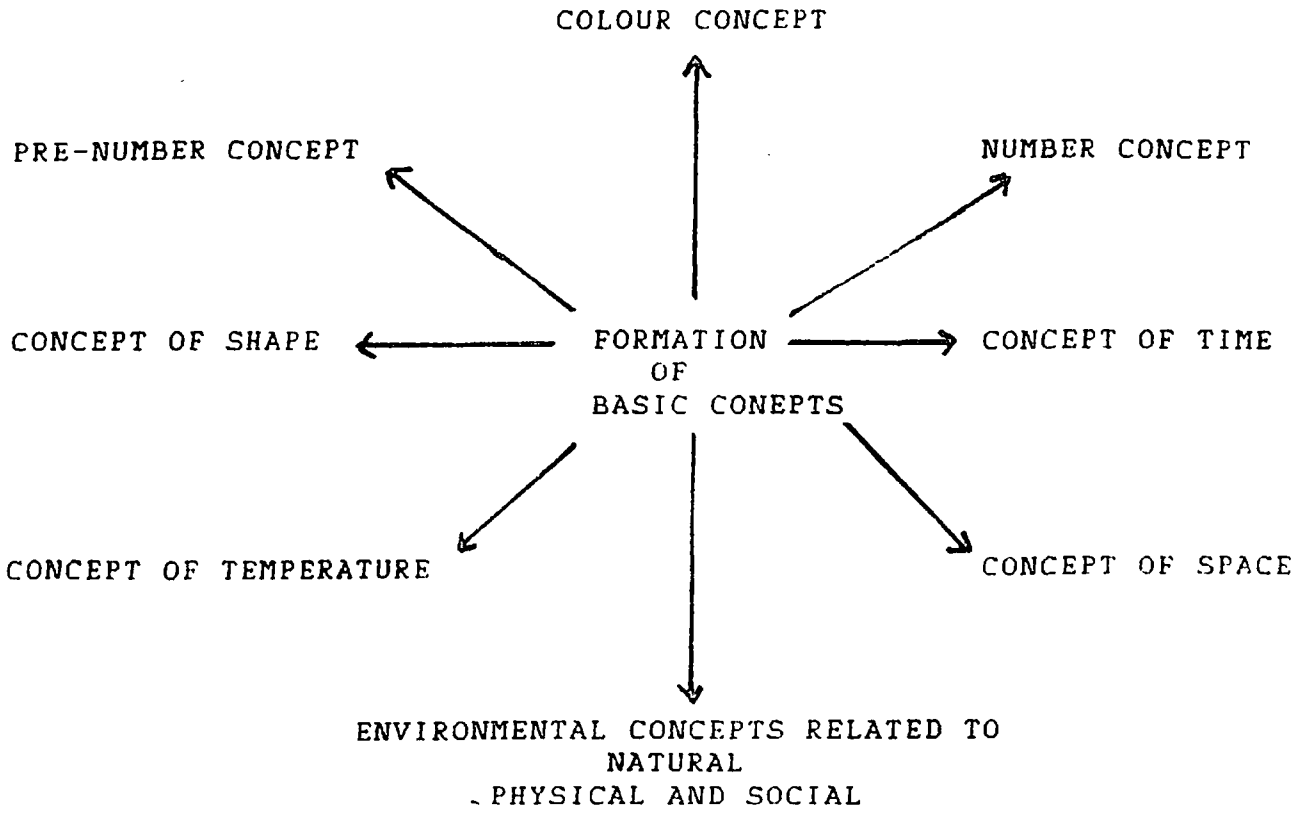
7. Classfication games

8. Games involving sequential thinking

9. Solving puzzles and mazes

10. Activities involving solving of problems, like relationship cards, answering simple questions, etc.

Table - 5



Some Activities

- Conversation and stories
- Water play
- Sand play
- Seriation cards
- Block play
- Structured play and games Dramatization
- Dramatic play e.g. shop-play etc.
- Structured play with objects and later number cards
- Number rhymes
- Number games
- Number puzzles

* Activities with time percepation cards, improvised clock, etc.
* Activities related to recall of daily - routine activities in sequence
* simple experiments
* activities with an improvised thermometer
* Conversation

Table - 6

Development of Creative expression and Aesthetic Appreciation

3 to 6 years	Some Activities
# Development of Creative Expression through art	* Creative Art Activities
# Development of Creative Movement	* Activities involving rhythmic movement and drama
# Development of Creative thinking	* Open ended questions
# Development of sensitivity towards colour and beauty in the environment	* Make-believe play
	* Nature walk
	* Class Displays etc.
	* Creating rhymes and stories

these experts also participated in a workshop organised by NCERT in April 1990 to review the draft manuscript. The designing and development of educational material under this research work is based on this curriculum, or understanding the curriculum from primary education, the document "Minimum levels of learning at primary state" based on the report of the committee of Ministry of Human Resource Development (MHRD, 1989) has been followed.

The detail study of curriculum for (i) language, (ii) mathematics and environmental studies for primary classes has been done.

CHAPTER 7

STUDY OF TWO TEACHERS TRAINING INSTITUTIONS OF DISTRICT JHUNJHUNU

7.1 INTRODUCTION

Large number of pre-primary schools, nursery schools, day care centres, and creches are being run in urban areas by State Government, Municipal Corporations and Commercial agencies and during the year 1975-76, the need was felt to open Anganwadi centres to provide adequate and comparable early childhood care and education to children in rural areas under the centrally sponsored scheme of Integrated Child Development Service (ICDS).

The Education Commission (1964-66), recognised the significance of pre-primary education in child development and of its critical link with enrolment, retention and learning outcome in primary schools. But only years later, presumably as a consequence of the National Policy for Children (1974), the 5th five year plan made a beginning by formulating a comprehensive project in the form of the Integrated Child Development Services (ICDS) for the under-privileged and educationally backward sections of the society.

ICDS programme was started in the year 1975-76 with 33 experimental projects in different parts of the country. The

scheme envisages an integrated delivery of certain services to pre-school children and pregnant and nursing women. Under this scheme, health and nutrition education is to be extended to all women in the age group of 15-45. In addition to improvement in the health and nutrition status of children, the scheme aims at reduction of the incidence of school drop-outs and laying the foundations for proper psychological, physical and social development of the child.

NON-FORMAL PRE-SCHOOL EDUCATION

Non-formal pre-school education has been considered as an important component of the integral package of services which ICDS seeks to deliver to children of 3-5 years age-group in the project areas. The scheme envisages organisation of pre-school education activities in each anganwari centre. This will not only impart formal learning but will also develop in the child desirable attitude, values, and behaviour patterns and aim at providing environment stimulation. Attempt is not made to achieve uniformity in teaching-learning procedures in regard to all children and in regard to play and other activities, flexibility is introduced and the child is encouraged and stimulated to grow at his own pace. It is expected that the Anganwadi would strive to satisfy the curiosity of the child and channel it in a creative direction.

NCERT had been actively involved in the preparation of

the curriculum for training of anganwari workers with a view to ensuring that the pre-school education is delivered to the pre-school child in the desired manner.

7.2 ANGANWADI WORKERS TRAINING CENTRES

In Pilani one anganwari workers training centre was started in Smt. Indramani Grih Vigyan Shiksha Niket in 1989 by the Rajasthan Government under the ICDS scheme. This institution is well equipped with the teaching faculty and other necessary facilities. During the past seven years about 700 (seven hundred) trainees from different parts of Rajasthan i.e. from the districts of Churu, Ganganagar and Jhunjhunu, have acquired training in this centre.

To reinforce the skills and knowledge of anganwadi workers and their helpers in the area of pre-school education as also to replenish their stocks of materials used for pre-school education, a refresher training is being organised by the National Institute of Public Cooperation and Child Development (NIPCCD), New Delhi through selected institutions. The said refresher course was started in Smt. Indramani Grih Vigyan Shiksha Niket in the year 1992 and so far two hundred and fifty three anganwadi workers from different parts of Rajasthan have undergone their refresher training.

Since anganwadis play a crucial role and are considered to be important functionaries in the villages as far as

conducting non-formal pre-school education to the children in the age group of 3-5 years is concerned, the present study aims to understand and assess the following aspects in the Anwanwari workers training centre at Pilani:

1. To understand the contents and mode of training given to the anganwadi trainees in the training centres concerning non-formal pre-school activities.

2. Teaching and learning materials available in the centres.

(a) Contents of Training of Anganwadi Workers

1. Personal Hygiene
2. Child's health and education
3. Pre-primary preparation
4. Diseases and their presentation
5. Acquaintance with environment
6. Family planning
7. Methods of purification of water and surrounding areas.

Apart from giving the trainees the theoretical knowledge, through experts, they are given practical training in the areas of arts and craft, making of soft toys, weaving and knitting skills, uses of rural technology, etc.

The centre has enough teaching and learning materials.

Concerned with pre-school education but most of the materials have been arranged from outside agencies. A few such materials have been developed by the anganwari trainees under the guidance of teacher trainers at the centre. There are sufficient toys/materials which help foster the motor development of a child, but very little is there concerning developing affective and cognitive domains of the child.

Highlights of the analysis of the educational background, marital status, age and socio-economic background of the trainees who had acquired training in this centre during the past two year i.e. during 1994-95 and 1995-96 are as follows:

(A) Educational Status

Total trainees = 288

Level of Education	Number
Primary Education	131 Nos.
Middle level education	88
Matric education	66
Graduates and above	03

(B) Marital Status:

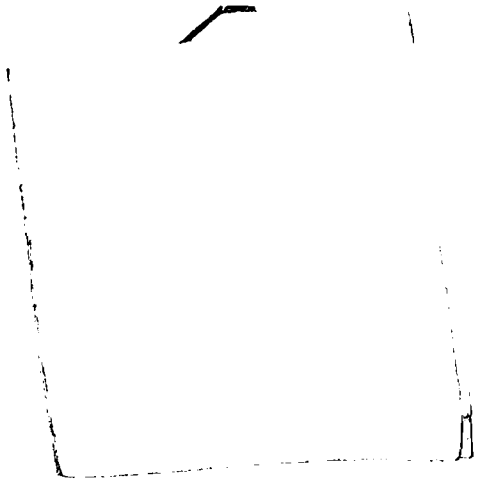
About 84% of the trainees have been found to be married, 5.5% unmarried, 8.3% widow and the rest, about 2%, were divorced women.

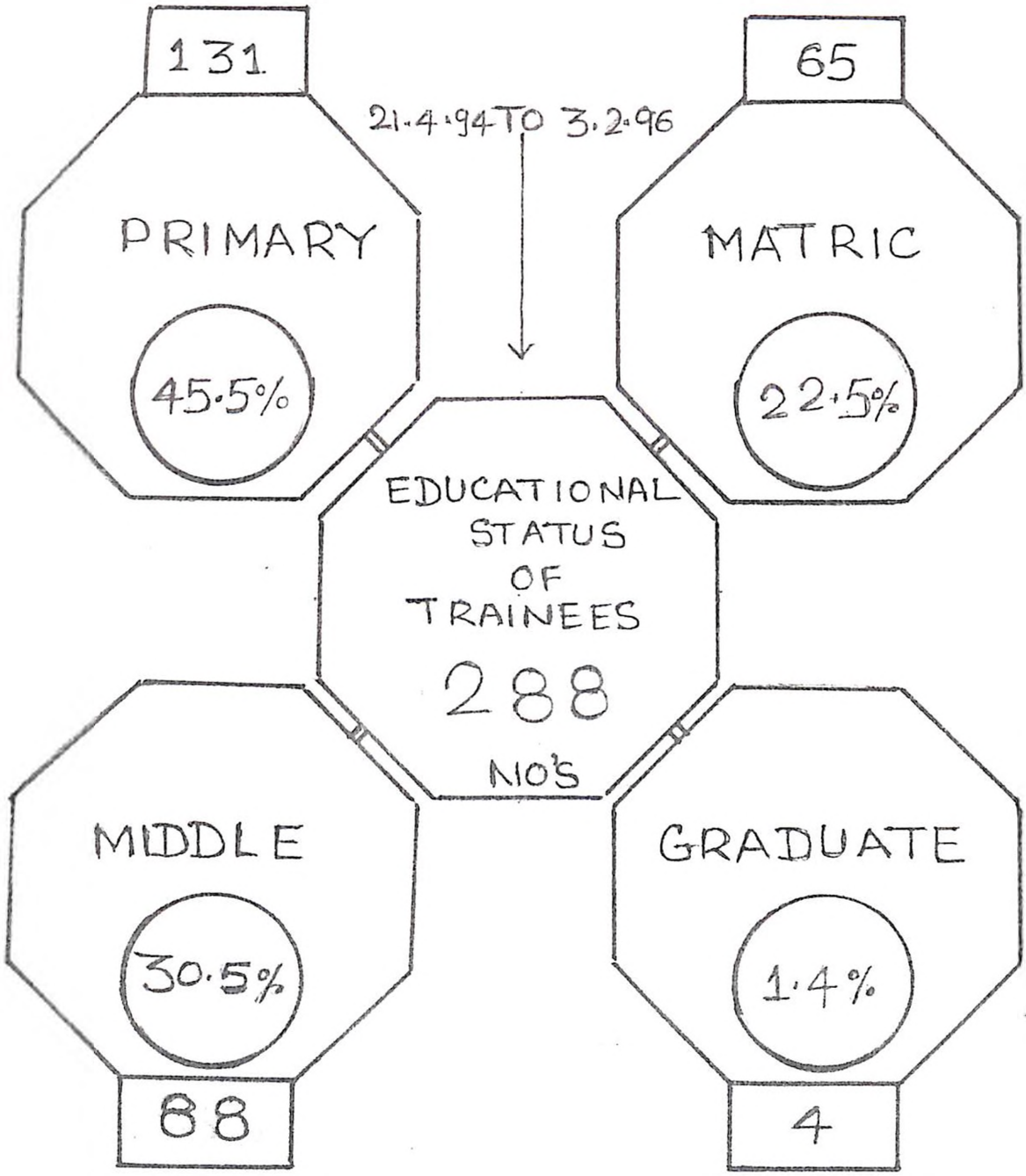
(C) Socio-economic background of the trainees

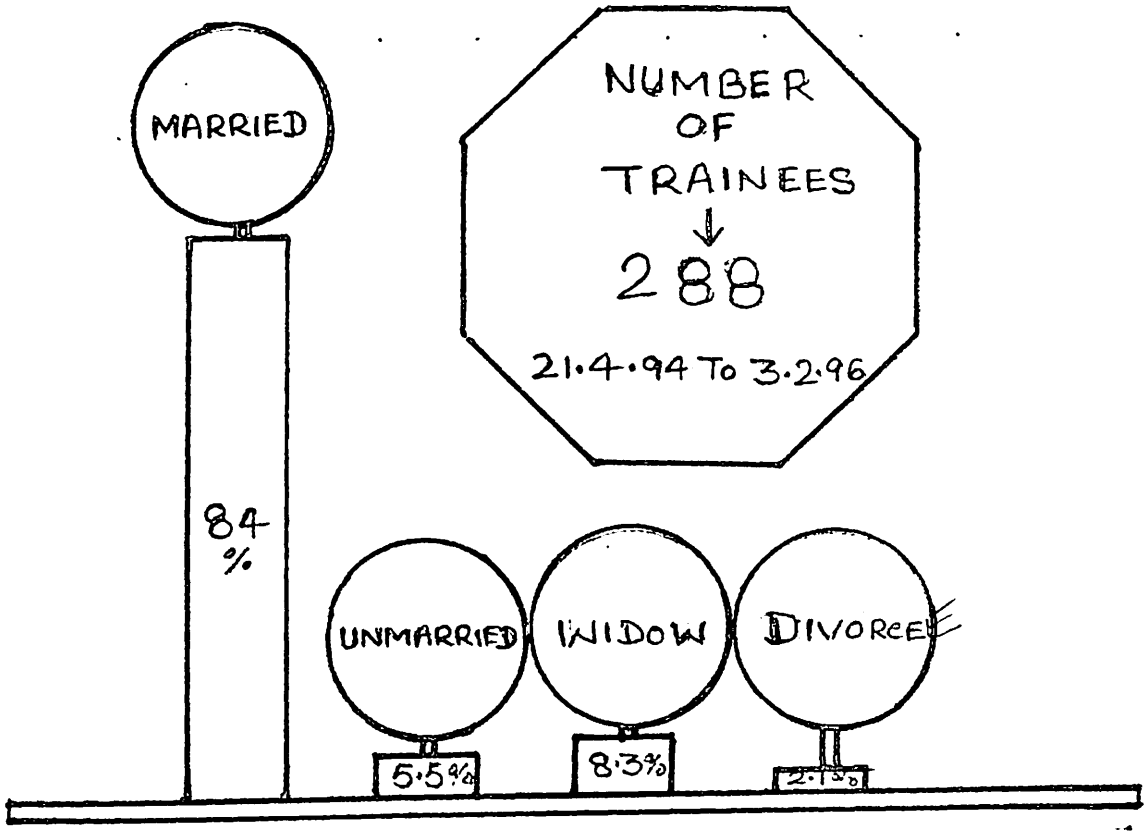
Majority of trainees belong to the places where they have been posted.

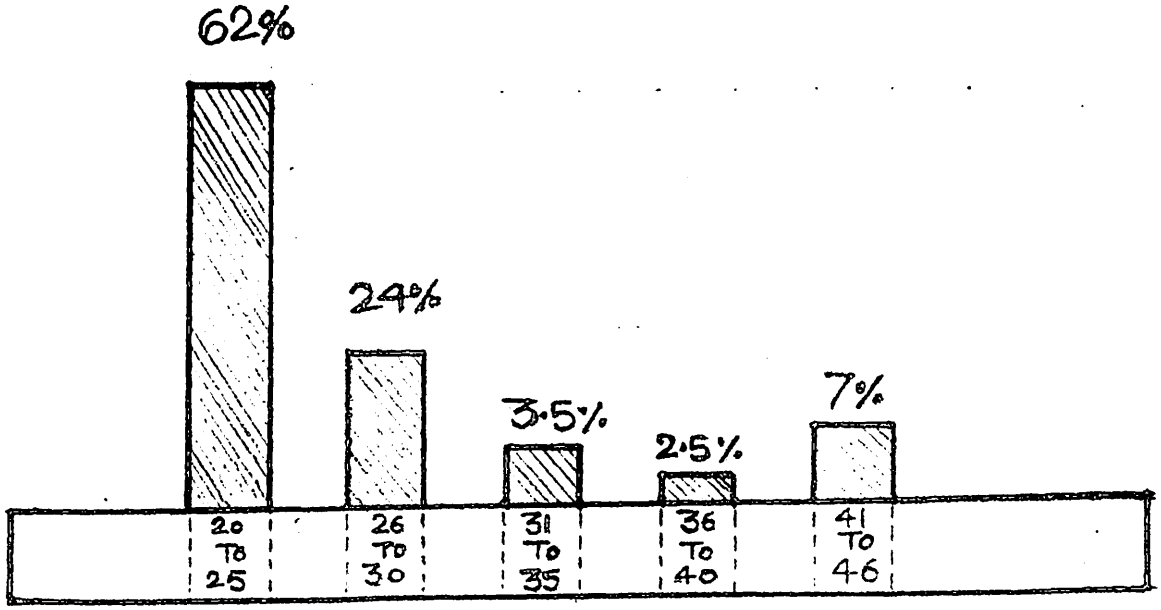
(D) Age:

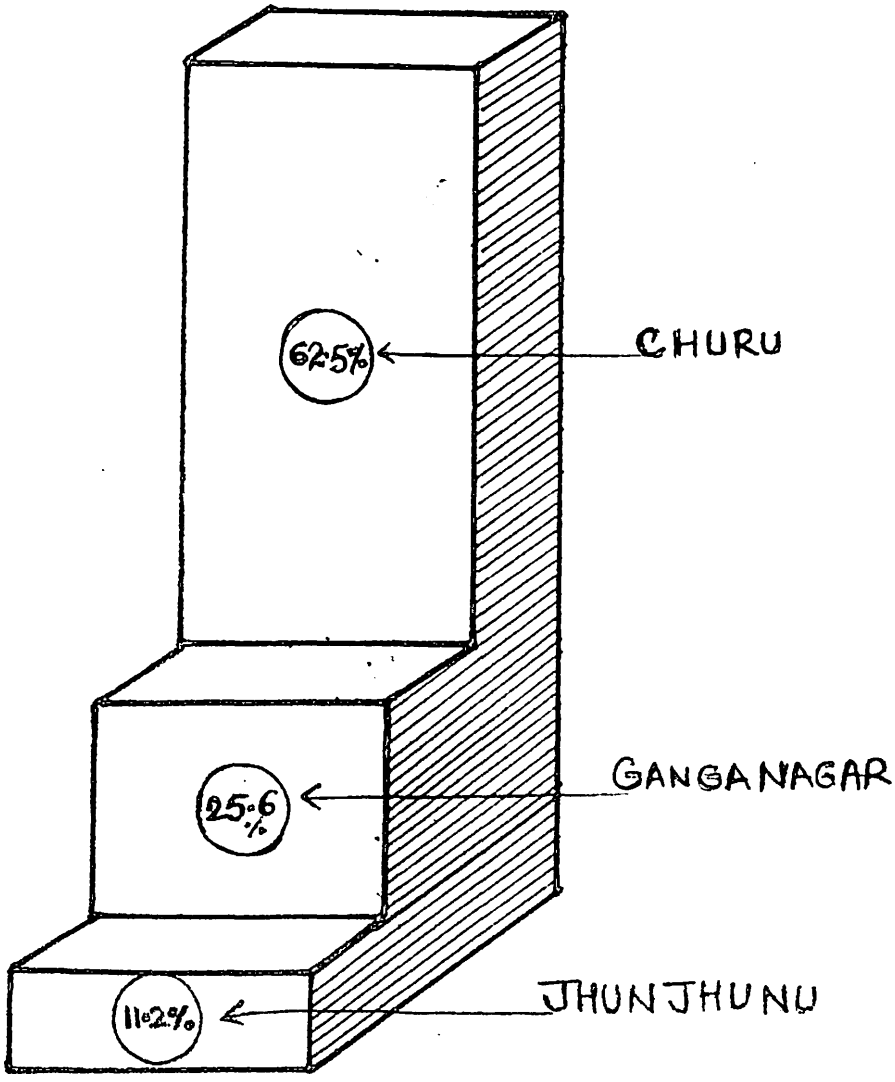
The study of the age level of the 288 trainees show that 62% of the trainees are in the age group of 20-25 years, 24% in the age group of 26 to 30 years, 3.5% in the age group of 31 to 35 years, 25% 36 to 40 years and the rest 7% are in the age group of 41 to 46 years.




131
65
21.4.94 TO 3.2.96
PRIMARY
45.5%
MATRIC
22.5%
EDUCATIONAL STATUS OF TRAINEES
288
NIO'S
MIDDLE
30.5%
GRADUATE
1.4%
88
4


MARRIED
NUMBER OF TRAINEES
288
21.4.94 To 3.2.96
84 %
UNMARRIED
WIDOW
DIVORCEE
5.5%
8.3%
2.1%


62%
24%
3.5%
2.5%
7%
20 TO 25
26 TO 30
31 TO 35
36 TO 40
41 TO 46


62.5%
CHURU
25.6%
GANGANAGAR
11.2%
JHUNJHUNU

7.3 B.Ed. DEGREE PROGRAMMES

INTRODUCTION

Robert F. McNamara, President of the World Bank addressing the Board of Governors in 1968 commented as under on the scope of Educational Technology and its futuristic goals.

"Education, normally one of the largest employers in any country, is one of the industry which has not undergone a technological revolution. We must help to move it out of the handicraft-stage. With the terrible and growing shortage of qualified teachers all over the developing world, we must find ways to make good teachers more productive. This will involve investment in text-books, in audio-visual materials and above all in the use of modern communication techniques."

The Ministry of Education document (1985) "Challenge of Education: A Policy Perspective" has mentioned, "Teacher performance is the most crucial input in the field of education - whatever policies may be laid down by Governments at the national and state levels, in the ultimate analysis, they have to be interpreted and implemented by teachers as much through their personal example as through teaching-learning processes". We have reached the threshold of the development of new technologies which are likely to revolutionaise the class-room teaching.

Unless capable and committed teachers are in service, the education system cannot utilise them for bringing about desired national development. Teachers should be well equipped professionally in order to make education an effective instrument of social change.

Although teachers were held in high esteem in the past, during the British period their position was degraded. The reason for such diminished status of teachers are attributed to deterioration in their service conditions, lowering standard of teacher education, poor impression of the public about sincerity and competence of teachers, unprecedented expansion of education at all levels resulting in the low standards, change in the value-system in the society, etc. The Programme of Action (1986) has rightly pointed out, "The status of teachers has had a direct bearing on the quality of education and many of the ills of the latter can be ascribed to the indifferent manner in which many teachers have performed their functions".

7.4 *TRAINING INSTITUTIONS*

There are at present about 1200 institutions for training of elementary school teachers and about 360 colleges for preparing secondary school teachers. But a large number of these institutions suffer from inadequate facilities - human, physical and academic to provide good professional education. Curricula of teachers education are

also felt to be out-dated and teaching practices are unsuitable as well as undemocratic. Besides improving these facilities, it is necessary to provide modern media, material and methods for accelerating the teaching-learning process and energizing the training practices at various levels.

Since teacher performance is the most crucial input in the field of education, the education system cannot utilise the new technologies developed and being developed to revolutionise the classroom teaching unless capable and committed teachers are in service. The present study is, therefore, an attempt to understand the overall environment in the Teacher's Training institutions with reference to following aspects:

1. To understand/assess academic, physical and human facilities.
2. Curricula of teachers education.
3. Use of audio-visual aids/training given to the teachers for accelerating the teaching-learning process and enerzising the training practices at various levels.

7. G.P. COLLEGE OF EDUCATION, BAGAR

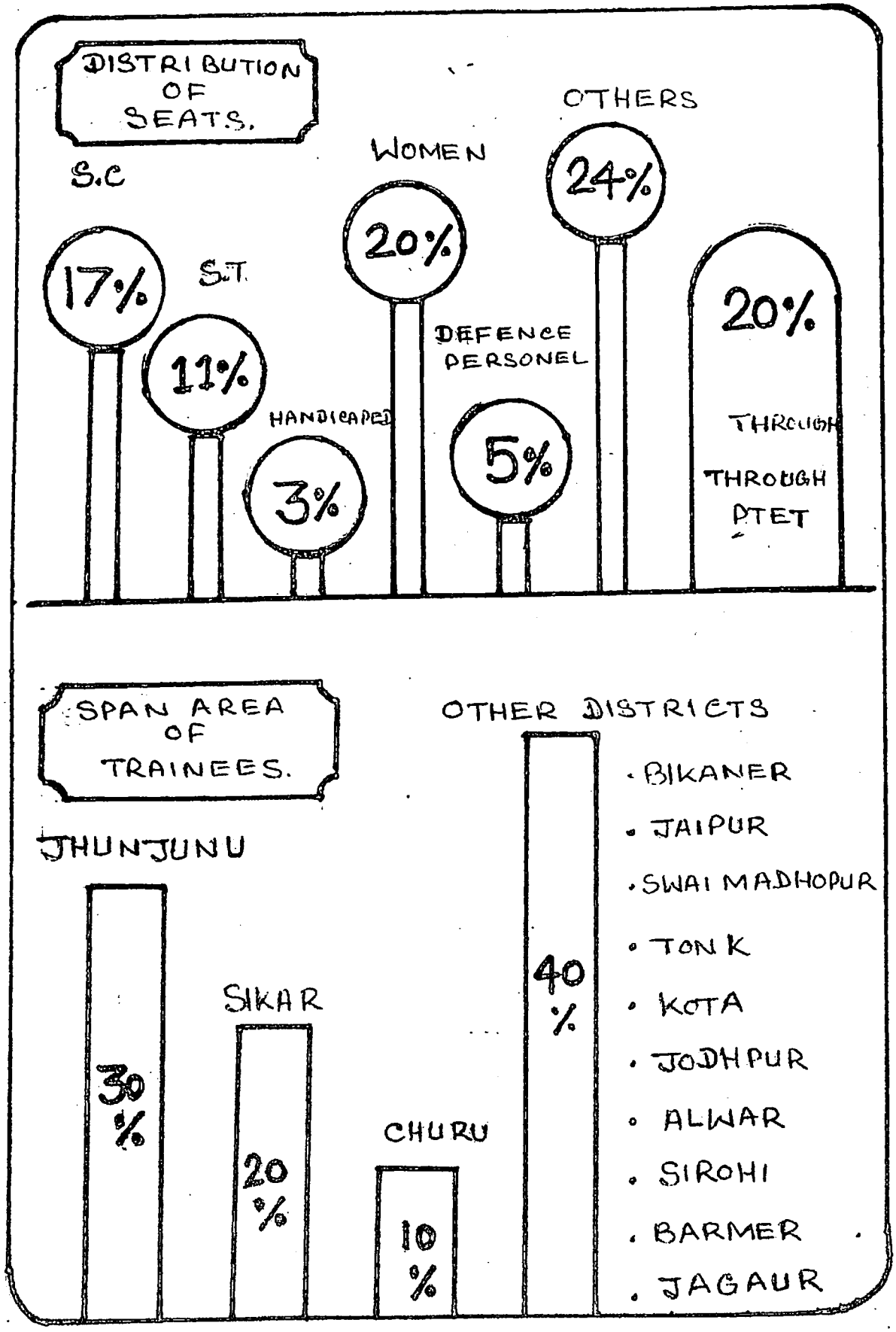
G.P. College of Education, Bagar, about 30 kms. away from Pilani, is one of the oldest teachers training colleges in the district of Jhunjhunu. It was established in the year 1972 with seventy five students. So far during the last 24

years about 3000 students have passed out from this institution.

The existing student population during the year 1995-96 of this institution was one hundred and eighty. 60% of the students were from Jhunjhunu and Churu districts and the remaining 40% were from other parts of Rajasthan. 30% of the total seats are reserved for student teachers belonging to District Jhunjhunu.

Initially when this institution was opened in 1972, students were admitted purely on merit basis i.e. through their performance in the BA/B.Sc. or M.A./M.Sc. examinations. It was only during the year 1988-89 that Rajasthan Government introduced a Pre-teacher Education Test (PTET) for admission to all B.Ed. Colleges of Rajasthan. Candidates with a minimum of 40% marks at their Bachelor's or the Master's degree examination of the Rajasthan universally or of any other recognised university are eligible to apply for admission to B.Ed. course. To qualify in the Pre-teacher Education Test (PET), the candidate is required to secure at least 40% marks in the test.

Analysis of the quality and gradation of input student teachers in the institution shows that about 70% of the student teachers are post-graduates in Arts and Science, 25% are graduates in Arts/Science and the remaining 50% are


DISTRIBUTION OF SEATS.
S.C
17%
S.T.
11%
HANDICAPED
3%
WOMEN
20%
DEFENCE PERSONEL
5%
OTHERS
24%
20%
THROUGH PTET
SPAN AREA OF TRAINEES.
JHUNJUNU
30 %
SIKAR
20 %
CHURU
10 %
OTHER DISTRICTS
40 %
• BIKANER
• JAIPUR
• SWAI MADHOPUR
• TONK
• KOTA
• JODHPUR
• ALWAR
• SIROHI
• BARMER
• JAGAUR

The institute has well qualified and experienced staff equipped with laboratories/audio visual aids and library facilities. It is attached with Peeramal Senior Higher Secondary School, Bagar, where student teachers go and take their teaching practice lectures. Peeramal Senior Higher Secondary School is also well equipped with laboratories, library facilities and all other necessary facilities. Therefore student-teachers remain all the time in touch with the students and understand their problems, requirements easily and more practically.

But overall development of certain practical skills such as:

i) preparing improvised apparatus

ii) preparing teaching aids

has been found to be less than satisfactory. These two aspects are considered to be crucial in Science/ Mathematics teaching/learning process. Therefore if the teacher is not well equipped with these skills, activity-based science teaching/learning shall not be possible in the classroom and the pupil will find learning of science as joyless and meaningless. This teacher training institute lacks modern media and audio-visual aids and above all there is no expert teacher trainer in the institute who can impart this highly specialised training to pupil teachers.

Table No.7

TRAINING COURSES AND DISTRICTWISE REPRESENTATION OF THE TRAINEES

Sr.	Period of Training	Project Area	No.of Trainees	Total No.
1.	17.07.89 to 16.10.89	Surajgarh	20	
		Sujjangarh	18	
		Sardar Shahar	3	
			------	41
2.	16.10.89 to 13.01.90	Sardar Shahar	7	
		Sh.Dungargarh	11	
		Rattangarh	12	
		Sujjangarh	10	
			--------	40
3.	12.02.90 to 12.05.90	Sardar Shahar	15	
		Sh.Dungargarh	14	
		Rattangarh	4	
			--------	35
4.	21.05.90 to 20.08.90	Sardar Shahar	14	
		Rattangarh	7	
		Sujjangarh	10	
			--------	31
5.	01.01.91 to 30.03.91	Surajgarh	14	
		Sardar Shahar	4	
		Sardul Shahar	3	
			--------	21
6.	13.05.91 to 12.08.91	Jhunjhunu	22	
		Neemka Thana	13	
		Surajgarh	5	
			--------	40
7.	19.08.91 to 18.11.91	Jhunjhunu	15	
		Neemka Thana	20	
			--------	35
8.	22.11.91 to 21.02.92	Jhunjhunu	22	
		Sh.Dungargarh	10	
		Rattangarh	4	
			--------	36
9.	15.05.92 to 12.08.92	Rattan Nagar	19	
		Padampur	3	
		Rai Singh Nagar	8	
			--------	30

Sr.	Period of Training	Project Area	No.of Trainees	Total No.
10.	20.08.92 to 17.11.92	Rattan Nagar	12	
		Jhunjhunu	12	
			--------	24
11.	25.11.92 to 22.02.93	Rattan Nagar	14	
		Sardar Shahar	16	
			--------	30
12.	07.04.93 to 05.07.93	Rajgarh Churu	18	
		Sh.Dungargarh	7	
		Rattan Nagar	10	
		Sardar Shahar	7	
			--------	42
13.	15.07.93 to 12.10.93	Jhunjhunu	17	
		Rajgarh Churu	20	
		Rattangarh	4	
			--------	41
14.	22.11.93 to 19.02.94	Rajgarh Churu	9	
		Rai Singh Nagar	4	
		Padampur	7	
		Sh. Karanpur	9	
		Sardul Shahar	9	
			--------	38
15.	21.04.94 to 19.07.94	Annopgarh	20	
		Rattangarh	9	
		Sujjangarh	7	
		Sh.Dungargarh	3	
			--------	39
16.	23.08.94 to 20.11.94	Anoopgarh	31	
		Rahgarh Churu	9	
			--------	40
17.	26.12.94 to 25.03.95	Sh.Ganga Nagar	19	
		Rajgarh Churu	10	
		Rattangarh	1	
		Sh.Dungargarh	4	
			--------	34

Sr.	Period of Training	Project Area	No.of Trainees	Total No.
18.	20.04.95 to 18.07.95	Sujjangarh	10	
		Rattan Nagar	9	
		Sardul Shahar	5	
		Rai Singh Nagar	3	
		Sh. Karanpur	7	
			---	36
19.	20.07.95 to 17.10.95	Sh.Ganga Nagar	10	
		Sardar Shahar	8	
		Rattangarh	8	
		Anoopgarh	8	
			---	34
20.	06.11.95 to 03.02.96	Jhunjhunu	18	
		Surajgarh	9	
		Rattan Nagar	2	
			---	29

				696

DETAILS OF ANGANWARI (Refresher Courses) HELP FROM JANUNARY 1992 TO FEBRUARY 1996

Sr.	Period of Training	Project Area	No.of Trainees	Total No.
1.	09.03.92 to 26.03.92	Rattangarh	15	
		Surajgarh	18	
			---	33
2.	26.10.92 to 06.11.93	Sardar Shahar	20	
		Sh.Dungargarh	19	
			---	39
3.	25.02.94 to 07.03.94	Rattangarh	14	
		Rattan Nagar	18	
		Surajgarh	20	
			---	52
4.	20.07.94 to 02.08.94	Sujjangarh	20	
		Sardar Shahar	14	
		Sh.Dungargarh	18	
			---	52
5.	24.11.94 to 07.12.94	Rattangarh	10	
		Rattan Nagar	11	
			---	21
6.	10.02.96 to 22.02.96	Sujjangarh	10	
		Sh.Dungargarh	7	
		Rattangarh	4	
		Sardar Shahar	23	
		Rattan Nagar	7	
		Surajgarh	5	
			---	56

				253

Detailed inforamtion of Anganwadi Workers/Trainees in the Smt. I.M. GVS Niket, Pilani during the period 06.11.95 to 03.02.96.

Name of Trainees (Anganwadi Workers)	Age	Quali.	Marital status	Angan-wadi centre	Exper-ience	Proj-ect	Trg. center
1.Shushila Devi W/o Satish Kulhar Devroad, Jhunjhunu	30yrs	8th	Married	Suraj-garh	2 yrs.	Suraj garh	Smt.IM GVS Niket Pilani
2.Mrs. Anil Devi w/o Hawa Singh Kothari Ghandawa,Jhunjhunu	23yrs	12th	Married	Ghand-awa	4 yrs.	Suraj garh	Smt.IM GVS Niket Pilani
3.Mrs.Madhu Sharma W/o Shankar Lal Dudwa Khara, Churu	26yrs	8th	Married	Dudwa-khara	5 yrs.	Ratan Nagar	Smt.IM GVS Niket Pilani
4.Ms Manju Devi W/o Hari Ram Dipalwash,Jhunjhunu	21yrs	8th	Married	Dipal-wash	5 yrs.	JJN	Smt.IM GVS Niket Pilani
5.Mrs.Santosh W/o Umed Singh Dadodia Ki Dhani Udawash - Jhunjhunu	22yrs	B.A. Part II	Married	Uda-wash	4 yrs.	JJN	Smt.IM GVS Niket Pilani
6.Ms. Sajana W/o Mamraj Hamirwash, Jhunjhunu	32yrs	8th	Married	Hamir-wash	2.5 yrs.	JJN	Smt.IM GVS Niket Pilani
7.Mrs. Kamala W/o Narendra Singh Bakara, Jhunjhunu	25yrs	8th	Married	Bakara	3 yrs.	JJN	Smt.IM GVS Niket Pilani

Name of Trainees (Anganwadi Workers)	Age	Quali.	Marital status	Angan-wadi centre	Exper-ience	Proj-ect	Trg. center
8. Mrs. Ratna W/o Vijay Singh Ladsar, Jhunjhunu	26yrs	5th	Married	Ladsar	2 yrs.	JJN	Smt. IM GVS Niket Pilani
9. Mrs. Manju W/o Ishwar Singh Babasar, Jhunjhunu	20yrs	8th	Married	Biba-sar	6 months	JJN	Smt. IM GVS Niket Pilani
10. Mrs. Santara W/o Mahesh Kumar Ranjeet pur Jhunjhunu	30yrs	5th	Married	Ranje-etpura	3.5 yrs.	JJN	Smt. IM GVS Niket Pilani
11. Mrs. Sarita C/o Mahipal Singh Patusari, Jhunjhunu	21yrs	11th	Married	Patu-sari	2 yrs.	JJN	Smt. IM GVS Niket Pilani
12. Mrs. Shivratni W/o Hari Singh Togara Kjhurd Jhunjhunu	23yrs	8th	Married	Togra Khurd	2 yrs.	JJN	Smt. IM GVS Niket Pilani
13. Mrs. Shakuntala W/o Sanwar Mal Budana, Jhunjhunu	30yrs	10th	Married	Budana	1 yrs.	JJN	Smt. IM GVS Niket Pilani
14. Mrs. Manish W/o Mahesh Kumar Meethwash Jhunjhunu	22yrs	10th	Married	Meeth-wash	2.5 yrs.	JJN	Smt. IM GVS Niket Pilani
15. Mrs. Sita W/o Bhawar Lal Salampur Jhunjhunu	22yrs	8th	Married	Salam-pur	4 yrs.	JJN	Smt. IM GVS Niket Pilani

Name of Trainees (Anganwadi Workers)	Age	Quali.	Marital status	Angan-wadi centre	Exper-ience	Proj-ect	Trg. center
16. Mrs. Krishna C/o Sajjan Singh Murot Ka Bas Jhunjhunu	24yrs	9th	Married	Murot-Ka Bas	1.5 yrs.	JJN	Smt.IM GVS Niket Pilani
17. Mrs. Daya Kaur W/o Dileep Kumar Bharunda Khurd Jhunjhunu	23yrs	11th	Married	Bharun da Khurd	2 yrs.	JJN	Smt.IM GVS Niket Pilani
18.Mrs. Pushoa Kanwar W/o Nand Singh Nua Jhunjhunu	30yrs	11th	Married	Nua	4.5 yrs.	JJN	Smt.IM GVS Niket Pilani
19. Ms Manju Sharma D/o Ramkumar Kumawash, Jhunjhunu	20yrs	8th	Un-Married	Luma-wash	3 yrs.	JJN	Smt.IM GVS Niket Pilani
20. Mrs. Kamala W/o Daya Ram Hanumanpura Jhunjhunu	27yrs	9th	Married	Tetra	2.5 yrs.	JJN	Smt.IM GVS Niket Pilani
21. Mrs. Usha Rani W/o Kharag Singh Hanumanpura Jhunjhunu	46yrs	10th	Married	Hanum-anpura Khurd	5.5 yrs.	JJN	Smt.IM GVS Niket Pilani
22.Mrs.Sheshani W/o Tara Chand Mehpalwash Jhunjhunu	22yrs	12th	Married	Sardar pura	4 yrs.	Suraj garh	Smt.IM GVS Niket Pilani
23. Mrs. Sarita W/o Sajjan Singh Urika Jhunjhunu	21yrs	10th	Married	Urika	4.4 yrs.	Suraj garh	Smt.IM GVS Niket Pilani

Name of Trainees (Anganwadi Workers)	Age	Quali.	Marital status	Angan-wadi centre	Exper-ience	Proj-ect	Trg. center
24. Mrs. Sunhari W/o Jagdish Sardar Pura Jhunjhunu	23yrs	8th	Married	Baloda	4 yrs.	Surajgarh	Smt.IM GVS Niket Pilani
25. Mrs. Sarda W/o Ramprakash Sardar Pura Jhunjhunu	21yrs	8th	Married	Baloda	5 yrs.	Surajgarh	Smt.IM GVS Niket Pilani
26.Mrs. Sumitra W/o Sanwar Meghwal Ghantel Jhunjhunu	21yrs	5th	Married	Ghan-tel	4.5 yrs.	Ratan Nagar	Smt.IM GVS Niket Pilani
27. MMrs. Kamla W/o Bhagwan Singh Khedra Ki Dhani Jhunjhunu	40yrs	10th	Married	Khedra Ka Bas	9 months	Surajgarh	Smt.IM GVS Niket Pilani
28. Mrs. Sushila W/o Vinod Kumar Dhandhar Jhunjhunu	20yrs	10th	Married	Dhan-dhar	2.5 yrs.	Surajgarh	Smt.IM GVS Niket Pilani
29. Mrs. Kamla Shekhawat W/o Samudra Singh Bijoli, Jhunjhunu	28yrs	8th	Married	Bijoli Ka Bas	3 yrs.	Surajgarh	Smt.IM GVS Niket Pilani

CHAPTER 8

ANALYSIS OF THE EDUCATIONAL FACILITIES AND ACADEMIC ENVIRONMENT OF SOME SELECTED SCHOOLS OF PILANI AND NEAR BY VILLABE

8.1 INTRODUCTION

Despite spectacular improvement in the educational facilities in the country, the achievement of goal of Universalisation of Elementary Education (UEE) still remains elusive. Target dates to achieve the goal have been shifted a number of times, but the goal of universal enrollment is still far out of the sight. According to Arun C. Mehta (1995) the gross enrollment ratio of 106 percent does not present real picture because of over-age and under-age children in Indian schools and at the same time the achievement of the goal of universal primary education by the year 2001 depends on the provision of proper school buildings, teachers and instructional materials for an additional 20 million school age pupils upto the end of Eighth Plan. It has also been estimated that at least part of this additional accommodation already exists, but it is being used to a large extent by the millions of over-age and under-age pupils. 82 million boys and girls of primary school age had to share scarce school resources with some 23 million pupils who were outside the official school age. The estimate of over-age and under-age children thus plays an

important role to fix future targets. Similarly, future enrollment in primary schools depends upon a number of variables, such as entry rate, promotion rate, repetition rate, drop-out rate, and transition rate.

It has also been observed that drop-out rate is generally considered as an indicator of efficiency of the education system, but it explains only part of the total wastage. Hence more reliable indicators of efficiency need to be identified.

Age specific population and single age population of 6 years play an important role in any exercise of educational planing. Therefore an attempt has been made to study the differences in population inputs in the following selected schools of Pilani and nearby village Jherli.

S.No.	Name of the School	Academic Status
1	UDAIRAM PADIA SENIOR GIRLS HIGHER SECONDARY SCHOOL, PILANI	XIIth
2	SHRI RAM BAIJNATH SABOO SENIOR HIGHER SECONDARY SCHOOL FOR BOYS, PILANI	XIIth
3	MEGHRAJ MUNDRA SHISHU NIKETAN, PILANI	VIIIth
4	GOVERNMENT UPPER PRIMARY SCHOOL FOR BOYS, JHERLI	VIIIth
5	GOVERNMENT UPPER PRIMARY SCHOOL FOR GIRLS, JHERLI	VIIIth

The understanding about the facilities and environment in the pre and primary schools in this area, a comprehensive study of the educational system in the district and detail study of the educational facilities and environment in selected schools of Pilani and nearby village was done.

District Jhunjhunu has 987 primary schools. Each village has an anganwari for pre-school education. The study shows hat inspite of anganwari training centre at Pilani the anganwari centers in the nearby villages don't have the trained workers due to the political interference, in the selection of the workers. Anganwari centers have no play materials and a few charts which are available were found on the walls and were used as calendars and were not used to the motivation of the young children.

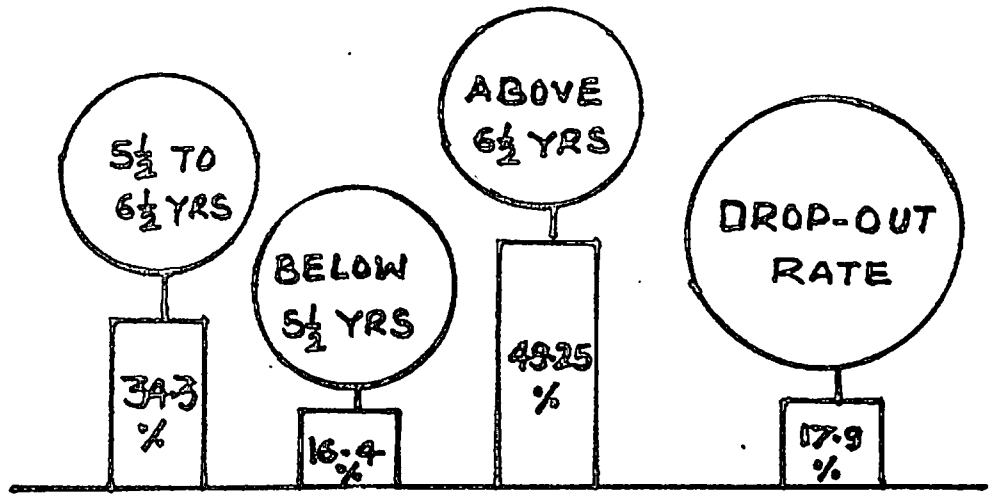
Three schools of Pilani and two schools from the nearby village were selected for the study of the building of the school, facilities in the class room, age at the time of enrollment in the school, teachers qualification and other aspects of educational environment in the educational institution.

The following tables and figures give the analysis of the above aspects of this study.

Academic environment and educational facilities in various schools studied are as follows:

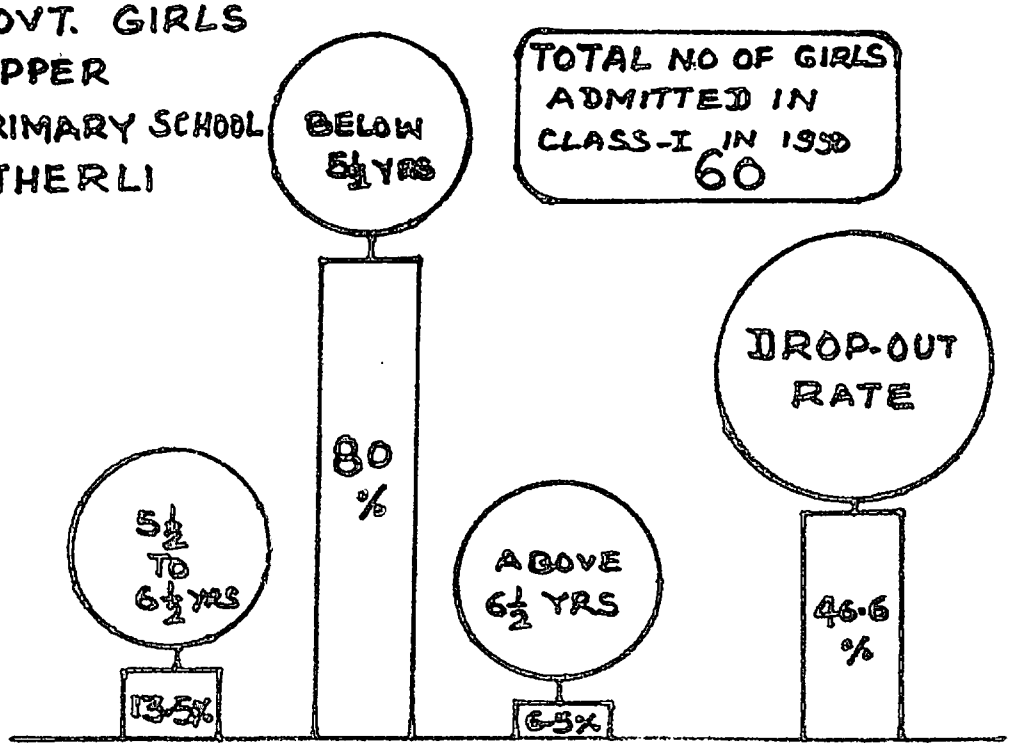
PADIA GIRLS
SCHOOL
PILANI

TOTAL NO OF GIRLS ADMITTED IN CLASS-I IN 1990
67



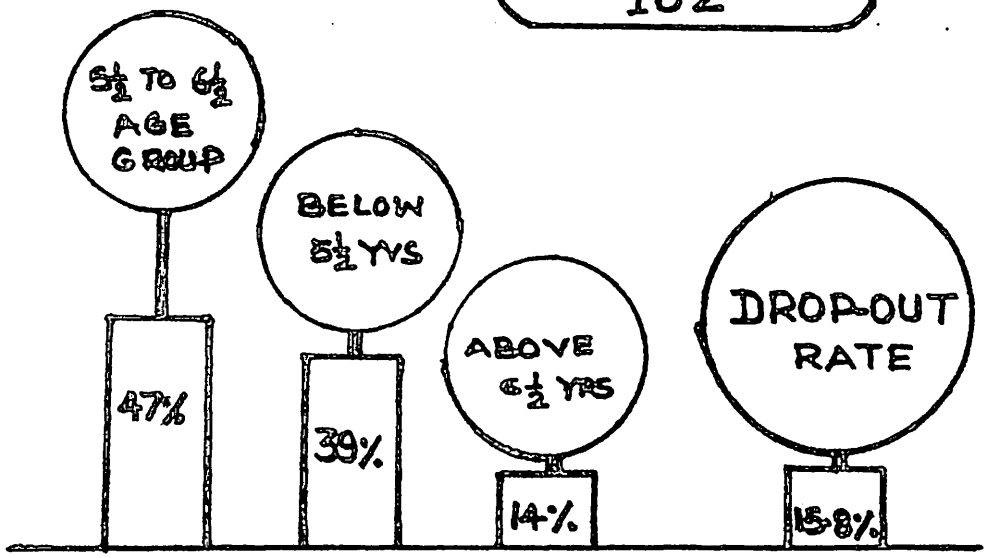
GOVT. GIRLS
UPPER
PRIMARY SCHOOL
JHERLI

TOTAL NO OF GIRLS ADMITTED IN CLASS-I IN 1990
60



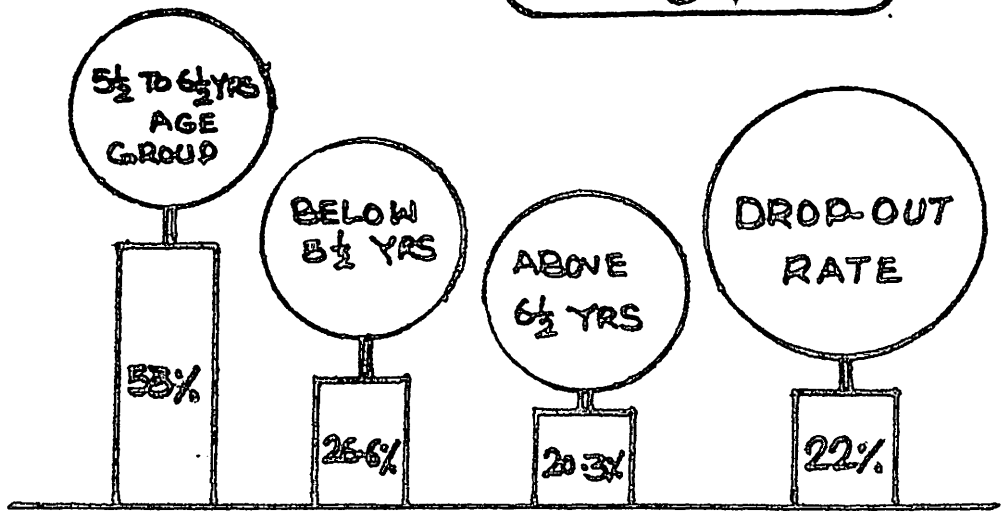
MUNDRA SCHOOL
PILANI

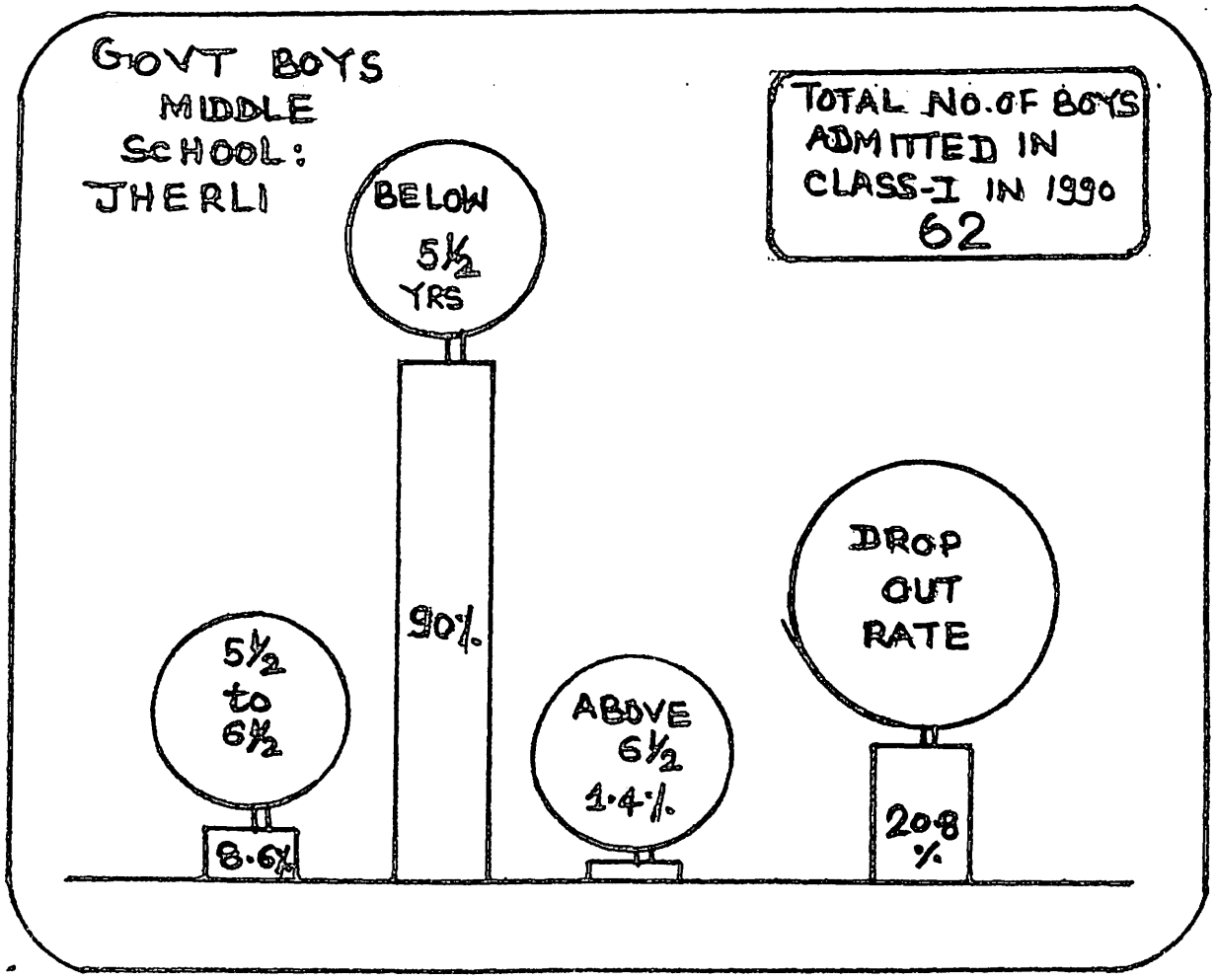
TOTAL NO BOYS ADMITTED IN CLASS-I IN 1990
102



SABOO SCHOOL
PILANI

TOTAL NO OF BOYS ADMITTED IN CLASS-I IN 1990
64




GOVT BOYS
MIDDLE
SCHOOL:
JHERLI
TOTAL NO. OF BOYS
ADMITTED IN
CLASS-I IN 1990
62
BELOW
5½
YRS
90%
5½
to
6½
8.6%
ABOVE
6½
1.4%
DROP
OUT
RATE
20.8
%

MEGH RAJ MUNDRA SHISHU NIKETAN, PILANI

Shri Meghraj Mundra Shishu Niketan was founded in the year 1961 as Birla Shishu Niketan. It was opened by the then Secretary of Birla Education Trust, Shri Shuk Devji Pande as an evening school. The main objective in opening this evening school was to create awareness towards education among the Harijan community. With continuous efforts of Birla Education Trust management and the dedication of the staff it has grown into a well established school. Apart from Harijan students, more and more students belonging to other communities from nearby villages have also started joining the school.

In the year 1984 the school was raised to the middle level. This school is now an government aided institution. Sixty percent of the grant comes from Rajasthan Government and is managed by the Birla Education Trust under its Director.

An average of about 650 students receive education in this school under the guidance of well qualified and experienced teachers and has it all necessary facilities required for the overall development of the students.

The school being situated in the Harijan colony itself has its own importance.

Government Upper Primary School for Girls, Jherli

This school is in the village of Jherli, about 4 km. from Pilani and was established in the year 1985 for girls upto primary stage. This was raised to the middle level in 1989. Though the school was opened by the Government to impart atleast primary education to the local girls and girls from nearby villages, yet the enrolment of girls in this school is quite low. Only two hundred and fifty seven girls are receiving education in this school.

The teacher pupil ratio is quite satisfactory i.e. there are 7 teachers, all well qualified, with a student-teacher ratio of 25:1. The enrolment is very poor particularly in class VIII - it has only 14 students. It has poor classroom and other physical facilities. Classrooms are not sufficient and some of the classes are arranged outside in the open kucha ground. During rainy season or at the time of acute summer, classes are arranged inside the varandas of rooms.

Government Upper Primary School for Boys - Jherli

This school was established by Birla Education Trust in 1952 with a view to uplift disadvantaged and deprived children of the villages particularly from communities belonging to scheduled caste/scheduled tribes. Later on the school was handed over to the Government of Rajasthan and is now affiliated to Rajasthan Board of Primary and Middle

Education. This school was raised to middle level in the year 1973. The overall strength of boys and teachers in this Hindi medium school during the session 1995-96 was 297 and 7 respectively.

Baij Nath Sriram Saboo Higher Secondary School, Pilani

Established in the year 1937, as a primary school by late Shri Baij Nath Saboo, it has now grown into a big school attracting not only local students but also students from nearby villages. It was raised to upper primary level (middle) in the year 1961, upto matric in 1979, as higher secondary in 1981 and then very soon it was raised to senior higher secondary school for boys. Only arts and commerce subjects are being taught in this school and the medium of instruction is Hindi.

At present it has a strength of about 250 students in the primary section. This school is one of the very old schools in Pilani. Apart from the local 60 % students the remaining 40% students are from nearby villages. Majority of students in this school is from middle class families or from families with low socio-economic status.

The school has affiliation with Rajasthan Board of education and there are separate buildings for students of class I to V and VI to XII.

Udai Ram Padia Senior Higher Secondary School for Girls: Pilani

Established as Padia Vidya Mandir in 1951 at primary stage for girls only. It was raised to middle level in the year 1961. In the year 1980 it was granted recognition upto matric. After a gap of about 9 years it was finally raised to Senior Higher Secondary level.

This Hindi medium school is affiliated to Rajasthan Board of education and is government aided institution managed by the Director, Birla Education Trust, Pilani.

It has an elegant, spacious and well ventilated and illuminated classrooms. Full opportunities are given to the girls in extra-curricular activities apart from their routine academic activities, for their overall development. Only arts subjects are taught to the girls including some Home Science subjects.

Majority of girls in this school belong to the local middle class community. The total average strength of this school was 1150 during the session 1995-96. Though in some classes they have more than 60 girls, yet due to spacious rooms the teacher is able to manage. Almost in every classroom there are some charts both subjective as well as general which arouse children's interest and create a stimulating environment in the classroom for children.

PART-III : CONCEPTS OF EDUCATION

CHAPTER 9

FOUNDATIONS OF EDUCATION

The driving force behind the development of the theoretical base of the ECE programme emerged from a synthesis of the principles and ideologies of some of the prominent pioneers of early childhood education as well as some leading developmental psychologists. Each of them placed a great deal of emphasis on children's interaction with the environment through active experience. Development-oriented and child-centered approach has been adopted in structuring the theoretical framework of ECE programme.

The significant contributions and influences of some of these pioneers of child education which led to the development of theoretical base of ECE programme are highlighted below :

A. Friedrich Froebel (1782-1852)

Froebel, the originator of the "Kindergarden", strongly believed that the pre-school stage was an essential step in the ladder of educational experience. Froebel stressed that :

1. Education should aim at fostering the natural development of children. The curriculum for the early

childhood education should, therefore, be based on the nature and interests of children and it should be child-centered in approach.

2. The individuality of each child must be respected. The curriculum, therefore, should be designed and organised systematically so as to ensure step-by-step growth of the child.

3. The ECE programme must maintain a balance between freedom and structure. That is, the designed environment should be such that each child has an opportunity and freedom to grow in his own individual way and is also able to learn the necessary skills, knowledge and values through a structured programme.

4. The medium for imparting early childhood education should be through play which is a child's natural tendency. Therefore, curriculum must provide some free play and some guided play activities to the child during his stay in the school.

B. Maria Montessori (1870-1952)

Montessori advocated a system of education which would help every child grow at his own pace. Through a specifically designed environment for the said purpose, some of the major views of Montessori regarding the said system

of education for ECE were :

1. Child's inherent potentialities to learn and to acquire knowledge should be unfolded by providing him the necessary environment.

2. Classroom environment should provide experiences which are conducive to the growth of individual interests of the child. That is, it should be based upon the desire of the individual child to learn spontaneously.

3. The learning environment should be created in a structured, organised way with appropriate materials which are preferably self-corrective and which enable the child to get immediate feedback on his performance. The teacher's task should be to keep herself in the background and only guide the child whenever she feels necessary.

4. Sensory experiences form the bases of knowledge. Training of each of the five senses is therefore essential for children. Materials designed specifically for intensive stimulation of each of the five senses should be provided to the child.

5. Exercises in practical life aimed at helping the child become self-reliant and efficient should form an essential part of pre-school programme. To provide a sound foundation for later schooling of the child,

activities which inculcate interest for reading, writing and number work must also be included in the ECE programme.

C. Rachel and Margaret McMillan (1860-1931)

The first nursery school was started in London in 1911 by the McMillan sisters. The main aspects of their nursery school programme were :

1. Creativity and play should be stressed in the nursery programme. Providing facilities for children's expressive activities : play, art, and movement in the nursery school, help in fostering their creativity and overall growth.

2. They also stressed the development of self-caring skills, perceptual motor learnings as well as activities for academic readiness.

D. Arnold Gesel (1880-1961)

He emphasized that maturation plays a crucial role in the development of motor behaviour, language, visual capacities, adaptive behaviour and personal and social relations in children in the early stages of education. The major implication of his studies in early childhood education was the need to consider the "maturational

readiness" of the child while planning and designing any educational programme.

E. Jean Piaget

Piaget has been a major influence in curriculum planning for early childhood education. Piaget's theory of cognitive development has the following major aspects :

1. The learning process of young children is qualitatively different from older children and adults. Young children learn best when they interact with the environment directly rather than through formal education, which involves abstract and symbolic rules and principles.

2. Children go through a series of stages in cognitive development. At the preoperational stage (3 to 6 years) children do not develop the ability to think logically or in an abstract way about the world around them.

   Their thinking is intuitive and guided by their perceptions. They are able to focus on only one attribute of an object at a time. Thus their understanding is limited. Therefore, a major objective of ECE should be to help children form basic concepts which would lead them towards logical reasoning.

3. Play and activity should be the media of early childhood education. Children should have as many firsthand experiences with objects as possible. They should be encouraged to observe, describe, manipulate and experiment with the objects in order to acquire clear understanding of concepts.

4. In order to develop a child's understanding of the environment and equip him better for logical thinking, a wide variety of experiences and interactions with the environment should be provided.

5. Interaction with other children should also be encouraged to foster the learning process.

6. Piaget believed that the four major areas in which cognitive experiences should be organised for children are :

   i. Physical knowledge
   ii. Logico mathematical knowledge
   iii. Social knowledge
   iv. Representation.

The early childhood education curriculum must incorporate these four areas of experiences.

Physical Knowledge

The child should be given opportunities to manipulate, experiment with and observe the properties of objects and physical phenomenon. This would help the child discover for himself the physical properties of objects in the environment.

Logico-Mathematical Knowledge

This involves :

i. Development of the ability in children to find similarities and differences among objects. This enables them to learn classification skills.

ii. Development of the ability to seriate objects in order along any dimension, for example from heaviest to lightest.

iii. Development of Concept of Numbers and Quantity.

Social Knowledge

This type of knowledge refers to the development of knowledge of social expectations, behaviour and roles. Habit formation and pro-social behaviour development is also included in this type of knowledge.

Representation

Children should get opportunities to express their

ideas or experiences through dramatization, creative movement, creative art activities and verbal communication.

F. M.K. Gandhi (1869-1948)

In Gandhiji's opinion, the education of the child should be child-oriented. Gandhiji said "by education I mean all- round drawing out of the best in the child in his body, mind and spirit". He suggested that the childrens' creative urge should be channelized and manifested through creative and productive activities. Gandhiji emphasized learning by doing and laid stress on education through some constructive and useful activities :

Gandhiji emphasized the need for close parent-school contact since he believed that the home is the first centre of a child's education and learning. Therefore, there should be no contradiction between home influence and school because it creates a conflict in child's mind and may adversely affect his growth.

9.1 THE PROGRESSIVE EDUCATION

9.1.1 INTRODUCTION

The progressive education may be regarded as a direct outcome of the influences of pragmatism in education. The principles underlying progressive education have influenced the modern educational theories and practices to a very

great extent all over the world. So it is in the fitness of things that we consider them here.

The term Progressive Education was first used in 1919 while founding the Progressive Education Association in Washington, D.C. Being predominantly child-centered, this Association (PEA) embraced the following principles :

1. *freedom to develop naturally*
2. Interest, the motive of work
3. The teacher a guide, not a task-master
4. Scientific study of pupil development
5. Greater attention to all that affects the child's physical development
6. Co-operation between school and home to meet the needs of child-life
7. The Progressive School a leader in educational movement

The progressive education is chiefly based on the above seven principles. It has come as a protest against the formalism of the day in the educational field. Some hold that the Progressive Education Movement is more of a philosophizing about education than a philosophy of

education. The progressive education may be regarded both as a protest as well as a vision. In the beginning it started as a protest against the standardization in education, regimentation of minds, mass methods of instruction and determinism and mechanism of educational science. As stated above, this movement has influenced education throughout the whole world. It has helped the school to concentrate its attention mainly on the development of the whole child both as an individual and a member of the society. Kilpatrick has been one of its most influential advocates. He has helped greatly in formulating its philosophy and developing its practices. He has been successful in popularizing the movement both amongst classroom teachers and educational leaders.

9.1.2 AIMS OF EDUCATION

The progressive education, although child-centered, is quite alive to the problem of social implications of education, because it was greatly influenced by Dewey's social philosophy. The main aim of this movement is the development of significant human personalities as an end through the means of social democracy. It emphasizes the importance of human personality. Therefore, nothing should be done which in any way mars its development. Another aim of this movement is co-operative social participation. The movement believes that these two aims are mutually

inclusive, because respecting human personality will necessarily demand the organisation of a co-operative social participation. Progressive educators stand for a personalistic philosophy of education which implies that education cannot be effective unless it facilitates the growth of the pupils' lives. Thus the aim of education according to progressive education is to work for an all-round development of the child. The advocates of progressive education do not rely much on intellect as an instrument for solving the complexities of modern industrial civilization. They stand for the education of the whole man or whole personality which includes all the physical, emotional, social and intellectual aspects of the individual. Thus the aim of this type of education leaves nothing that pertains to the sound development of personality in any way.

9.1.3 TYPES OF EDUCATION

Progressive education recognizes the child as a complete, dynamic and living organism. Therefore, every type of education is a continual necessity. The progressives believe that the healthy growth of personality results in looking after all the aspects of the child. They also pay regard to the part that culture plays in the development of the individual. Therefore, education should be so organised as to cater to the needs of all the phases of growth and to utilize all the aspects of growth inducing experience of the

dynamic culture in which the individual lives.

The progressive education stands for an education of emotions and feeling which to them are no less important than the education of the intellect. Progressives regard emotions as aspects of the various biochemical and biophysical processes of the organism. Therefore, education of emotion is not different from mental and physical education. In fact, all the three are inter-dependent.

The importance of social education is also recognized by the progressive educators, because to them the individual cannot escape the influence of culture. Therefore, an attempt has to be made to enable the individual to derive the best from the culture and also to contribute his share towards its enrichment.

In their zeal for developing integrated whole personalities the progressives do not like to neglect any type of education. They stand for the acquisition of skills on the part of the child both for money earning and non-money-earning pursuits of life. Training for recreation and leisure activities, and development of hobbies and abiding aesthetic interests are considered very important. Hence activities pertaining to all these aspects form a very important part of education.

Progressivism in education stands for functional

activity rather than for passive receptivity. It does not aim to give to the students only objective information. It also aims at providing opportunities for every type of experience to them.

9.1.4 CONTENT OF EDUCATION

The progressive curriculum consists of life experiences and not only teachers' lectures on prescribed subject. Learning takes place when any part or phase of experience, once it has been lived, stays on to effect pertinent further experience; we learn what we live and in the degree that we live it.

The progressives are against bookish curriculum which is fixed in advance. They are against the arrangement of subject matter into water-tight compartments. In fact, they want a curriculum which has experiences of actual living. There will be no ready-made curriculum to be given to the teacher and pupils. The curriculum will cover all the aspects of daily living practical, social, moral, vocational, aesthetic, and intellectual. Thus, it will be made up of the sum total of the child's experiences. Its purpose is to integrate the experiences of the child in such a way as to turn him into an integrated personality which has developed such modes of behaviour which are individually satisfying and socially desirable.

The progressives believe that children are expanding, differentiating individuals, i.e., the children expand their experiences, they are able to differentiate between their varying experiences and pick up the desirable ones from here and there, and then, they try to integrate the same towards a meaningful goal. According to the progressives this kind of integration of experiences is the only true learning. They hold that the older curriculum disintegrates the individual, because it insists mainly on subject-matter learning. Therefore, the progressive education would like to have a curriculum which consists of experiences of actual living in various circumstances.

9.1.5 AGENCIES OF EDUCATION

Progressive educators think that school alone will not be able to develop integrated personalities. They believe that other social agencies must co-operate with the efforts of the schools in educating children. In these social agencies may be included any institution that is in any way interested in the healthy growth of the children and the community. For example, Y.M.C.A., Y.W.C.A., SEWA SAMITI. BALCHAR SAMITI and BALKANJI KI BARI, etc. may be mentioned as the agencies in our country which may co-operate with the efforts of the school in educating children.

The leaders of progressive education have great faith

in the teacher, as the most important agency of education. Therefore, they would like to acquaint the teacher with the progressive philosophy and the techniques of significant personality development. With this end in view the teacher training institutions in U.S.A. have been restructured and reorganized, and social sciences have been given more prominent place in the courses in education so that the teachers may see the relationship between education and the existing social order. The progressives believe that teachers themselves must be integrated personalities in order to develop children into integrated personalities. Therefore, they lay great emphasis on the necessity of reconstruction of the whole programme of teacher education. In this reconstruction special attention should be paid to constracts with various community undertakings and opportunities for contacts with children so that the teachers may understand the principles of human growth and development. The teacher should acquire the ethics of professional behaviour as a part of his nature, and should be skilled in democratic procedures.

9.1.6 ORGANISATION OF EDUCATION

The progressive education does not encourage the organization of the school into distinctly separate classes, because it believes in the growth of the individual from his

prenatal stage to maturity as an integrated human personality. Some kind of organisation of administrative conveniences may be permitted, but too many mechanics of school organization may mar the very purpose and function of the school. Therefore, the progressive education would not encourage the division of education into pre-school, early elementary, later elementary, junior high and senior high and intermediate college levels. The only division that it will anyhow tolerate is between elementary, secondary and higher education. Even in these three major stages of education the progressives stand for greater articulation in order to bridge the gap in the continuous development of the pupil.

The progressive education wants that the whole community should be so organized that every individual in the community secures the necessary help and guidance for building up his health, getting a satisfying job, enjoying leisure, taking part in the affairs of the world intelligently, and growing into an integrated personality.

9.1.7 THE METHODS OF TEACHING

Progressive education believes in group activities to which each member of the group contributes his share. But these activities are to be so organized that by participation in them each member grows personally and

socially. Hence all the activities in the classroom are centered around the individual as an organized personality. The methods of the class-room are socialized and each individual is trained into collective procedures which are considered as the truly democratic method of protecting individual interests. Therefore, conference, consultation, planning, and participation are emphasized as teaching procedures which stimulate maximum learning.

Thus progressive education follows an experiential and social methodology. The pupils are given ample opportunities to experience things and situations of emotional, social, aesthetic and practical nature. They are encouraged to express themselves in verbally. All these experiences should be within their reach. The principle underlying the progressive method is that active participation in various life activities can develop an integrated personality.

The progressive education regards learning as an organically whole experience, a single thing that branches and grows. Hence the wholeness of method is the basis of progressive learning.

The progressive educators accept the principle of motivation and appreciation but they would like to understand them in their own way. Kilpatrick says that the presence of interest or purpose constitutes a favourable condition for learning. Interest and felt purpose mean that

the learner faces a situation in which he is concerned. The purpose as aim guides his thought and effort and he gets more wholeheartedly into action.

Progressivism demands that the teacher must know his pupils fully well in order to guide their self-directed learning processes, i.e. he must know the values that the pupils are seeking, he must know the problems that they are confronting and the driving interests that propel them to action at times. The teacher should try to create situations through which the pupils may learn to gain control of themselves and of the problems that confront them.

The critics of progressive methods of teaching say that the pupils of the progressive classroom lack in discipline. This criticism may be justified in those cases where teachers allow license instead of freedom, and whims and caprices of students are encouraged instead of their positive pursuits and interests. A school where children are guided to indulge in self-directed activities and are encouraged to develop into integrated personalities can be nothing but a well disciplined school. This discipline will be of a positive type and it will always be beneficial to the pupils.

CHAPTER 10

ASPECTS OF CHILD DEVELOPMENT AND PIONEERS IN EARLY CHILDHOOD EDUCATION

10.1 THE EARLY CHILDHOOD YEARS

Theresa and Frank Caplan (1983) in their book "The early childhood years - the 2 to 6 year old" have considered the different aspects of child development in the early years. They considered the childhood development as physical, social, intellectual and medical.

10.2 LANDMARKS IN PHYSICA, PSYCHOLOGICAL, AND SOCIAL DEVELOPMENT

Developmental functioning can be divided into four categories: motor behaviour, adaptive behaviour, language behaviour, and personal-social behaviour. Motor behaviour typical of the newborn to six-year-old involves the maturation of skills that permit the control of the body (pushing up his chest to rest on his arms; the ability to turn his head; eye-muscle coordination at six weeks that allows the baby to focus on and recognize distant objects and familiar faces).

Adaptive behaviour implies adjusting to different environments - learning to overcome the limitations of the crib or carriage by pushing or peering out, for instance.

Once the baby has mastered this, she may vocalize and establish social contact with a nearby person. A child's adaptive behaviour is dependent upon large and fine muscle control as well as intellectual endowment and suitable stimulation. The child puts all these skills to use in solving the practical problems presented by her surroundings. From her early successes, she gains confidence in her ability to cope with the things and people around her, and she works diligently to practice her new skills.

10.3 CRITICAL PERIODS

One of the prime reasons for observing human growth is in order to attain an awareness of critical periods. A critical period is that span of time during which new behaviours appear most easily or optimally with regard to the very young child's learning readiness. With the utmost energy expended by the child and the least amount by the parents, and minimal distraction from other learning processes, the child will more easily master the particular skills of that period. Teaching and learning are more difficult before or after each critical period. It appears, too, that the probability of change in most areas is smaller with each successive year.

10.4 MATURATION

Maturation is the unfolding of inborn patterns of physical and other behaviours in ordered sequence. For

example, walking and talking are innate capacities; they do not depend upon training. Of course, babies need opportunities for practice in these areas, but the seeds for these abilities are already there at birth. Developing any dexterity is dependent upon when a child's nervous system is biologically ready to perform a particular task. For this reason, it is important not to try to teach your child to do something if she is not ready because this will only frustrate her - and you.

There is some disagreement as to when parents should promote their child's exercise of his budding abilities. Child psychologist Myrtle McGraw thinks that a child can and should be encouraged at the first sign of any new capacity. Other child development authorities maintain that parents should permit each maturing process to unfold naturally without any intervention.

10.5 MATURATION AND THE ENVIRONMENT

Although no one can force growth, since that comes from within each child, parents can provide a setting that is congenial to it. When a child is physically ready to walk, it is much easier if there is adequate space in which to walk. When he starts to talk, he will learn faster if he is spoken to. (In fact, he should be spoken to right at birth). Opportunity, encouragement, and practice will determine whether a child will be good at something. Many

psychologists believe that the environment determines which of the child's potentialities are developed or exaggerated.

For example, an aggressive tendency can be developed into an overaggressive personality. By the same token, a child who is innately aggressive may actually become a very disciplined person due to severe discipline imposed by the parents. The direction of one's proficiency is thus affected by one's environment. Indeed, many authorities believe that environmental influence is so strong that it may even modify hereditary factors.

A parent can manipulate the limbs of a new born infant. Even though they are not initiated by the infant, if repeated sufficiently, these induced movements (head balancing, sitting up, grasping) will lead to that infant attaining these skills ahead of an infant who is not stimulated in this way.

A child's temperament results from the influence of her body on her mind; it is completely physiological. Crawling, walking, and talking depend upon physiological development. Thus, when the system for walking matures, the child will begin to walk; when the bladder matures, she will begin to learn to control it. Her body cannot perform these tasks before it is ready. This is why it is important not to force walking, talking, toilet learning, etc. until the child

indicates that she is ready.

Growth and development impinge upon a foundation of a child's actual body movement, making sensory contact with the world of things and processes. It requires coordination of the child's muscular system with his sensory system and the general brain processes. Any bodily involvement brings about a patterning in the child's brain concerning that movement and all the sensory information related to it.

In Magical Child: Rediscovering nature's Plan for Our Children (New York: E.P. Dutton, 1977), Joseph Chilton Pearce writes, "Intellectual growth is an increase in the ability to interact physically and mentally with the experience at hand... and with new phenomena. Intelligence can only grow by moving from that which is known into that which is not yet known... When the physical environment is unvaried... when there is no bodily contact with a stable caretaker (for example, verbal approval for each achievement), a child does not grow intellectually".

The first six years of life provide time for interaction physically, mentally, and verbally with a wide range of experiences, from each of which a child abstracts some aspect which eventually becomes a concept.

10.6 GROWTH

We are not merely concerned with physical exploits.

Equally important are the infant's own sense of accomplishment and his interactions with the adults who understand him. When the two-year-old gains confidence in handling his body, it is reasonable to assume that his confidence will subsequently generalize to other areas. However, growth is not a straight onward and upward line of development. It is a jagged process of spurts forward and some regressions. "Older" is not necessarily more advanced. Behaviours need not occur at a specific month. Sometimes advancement in one area can interfere with growth in another.

Although all children grow and develop according to the same general pattern, there are normally great differences in the rate of their growth and development and in the age at which they are capable of doing certain things.

To be a sensitive communicator with very young children, parents need to be concerned not only with the attainment of an ability but also with signals of an emerging aptitude. As skills become manifest - walking, talking, socializing, playing - parents can provide enrichment materials that spark and enhance them. Aware of the child's desire to practice what he has just learned, the parent can supply the optimal stimulation and atmosphere for the use of these newfound powers. Since many of the young child's developing abilities are nonverbal, parents need to

learn to recognize the various maturing skills and be prepared to offer suitable help. Of course, all this requires an understanding of what happens to a child as he is growing; how he changes in size and shape; how he uses his unfolding powers; and how he adapts to his environment at each age level. It also means exposing parents to the different child development theories and their impact on child-rearing practices; helping them arrive at their own child-rearing judgements in the light of these assumptions; and encouraging them to observe childhood development by studying their own children.

10.7 MAJOR THEORISTS

A number of outstanding pediatricians, educators, psycho-analysts, psychologists, and researchers have been of great help to parents and professionals alike by tracing child growth and development through the distinct ages and stages during which major changes occur. Each stage covers activities which the child concentrates on during that particular period.

Psychoanalysts, such as Erik Erikson, Margaret Mahler, Sigmund Freud, and others, have identified periods of great social, emotional, psychological, and personality change. The late Swiss psychologist and educator, Jean Piaget, researched and defined intellectual accomplishments and play by chronological age. Pediatricians such as Arnold Gesell

and the late Frances Lig recorded bodily growth, and carefully spelled out the ages and stages of physical growth and motor accomplishments. While these stages are not chronologically exact, they do indicate the general beginnings and endings of such periods. As a result, one can see the close relationships between patterns of behaviour, motor accomplishments, and intellectual landmarks. In fact, a specific social behaviour may be the result of reaching a particular physical milestone.

In the accompanying chart, we have presented only highlights from several carefully selected authorities who are most frequently mentioned in the professional literature dealing with early childhood. Since we are profoundly interested in these years, it is logical that we present in greater detail those authorities who believe that the most rapid and significant changes in growth and development occur during the early years.

10.8 HOW TO USE THE MAJOR THEORIES

As you follow the development of your child, you can mark off a one-year segment on the chart by a dotted line. As you read down the Gesell column and come to the section covering the two to three year age level, you will find that three of the most pronounced achievements in the normally developing two-year-old are the beginning of the ability to talk in an adult manner and even to start to run; beginning

of control of bowel and urine elimination; and, assuming normal development and adequate language models (parents, care givers, etc.) beginning to express thoughts in sentences.

Gesell's major contribution to growth and development theory was his accurate month-by-month reporting of the physical-motor development of babies and young children. His early research revealed how the newborn gains control over his body, and the fact that there is a predictable, orderly, head-to-toe sequence of physical development (influenced by the maturing sections of the brain during the first two years of life). The control of arm motion and muscles comes before leg control; finger control follows after arm control; grasping comes after head balance; standing follows sitting, etc.

With the maturation of physical and sensory powers, the infant gains control of her body and movement in space. She discovers objects of seeing, grasping, fingering. By interaction with her environment, she gains a feeling of mastery and of the power of self, which results in a sense of autonomy.

Erik Erikson addresses the intricacies of childhood growth from a psychosocial point of view. In his "Eight Stages of Man," he ascribes to the infancy period (newborn

to twenty-four months) the time for building a sense of trust, thus laying the groundwork for a feeling of security throughout life. Affection and consistent caregiving provide infants with confidence that they will be fed, kept dry, and stimulated when bored. From this trust, they learn that the mother or other constant caregiver can be counted on to be there when called; that she is around even though she cannot be seen; that she will come back again and again.

During the early childhood years, Erikson continues, the child passes through the period of autonomy (twenty-four to thirty-six months), when he differentiates self from non-self; moves from dependence on parents and caregivers to separation and independence; experiences the power of bodily image and control that comes with the practice of walking, running, climbing, jumping; and discovers the power of communication and control that results from the acquisition of language. Self-esteem and ego are nourished and firmly established as part of the personality in this period.

The period of initiative and imagination (thirty-six to seventy-two months) follows, when the child explores the exciting range of people and things, re-enacting the varied roles and activities in the here-and-how world. This is the critical period of play and learning in which parental encouragement can have considerable influence on drive and creativity. During this time span, a rudimentary conscience

develops, regulating initiative and imagination. The child internalizes the dictates of his parents, spelling out what he may or may not do. When thoughts and wishes run counter to the commands of his conscience, he resorts to fantasy and his imagination to play out his guilt or shame.

Freud offered a psychosexual theory of child development placing considerable emphasis on the child's (and caregiver's early preoccupation with the mouth and love relations in feeding. Later on, in the second year of life, Erikson's period of "autonomy" is likened by Freud to the "anal" stage in psycho-analytic theory: the "opening and shutting off" inherent in early sphincter control of the bowels and bladder. Freud the orized that the pleasure and pain from these sensory actions influence a child's personality, making for self-confidence or uncertainty, generosity or stinginess, autonomy or inadequacy, courage or fearfulness, etc.

It was Margaret Mahler, renowned child psychoanalyst and educator, who first described the psychological states in a child's development leading to the acquisition of the sense of self. In her study of psychotic children (those suffering from ...tics, etc.), she uncovered a parallel set of conflicts in normal children as well as psychotic patients.

In the first three months of life, Mahler observed ,

normal children establish a sense of oneness with the mother, although they do not yet achieve the sense of self she terms "psychological birth". Psychotic children remain in a "twilight state of existence," where they do not seem to know where they begin and where "the other" leaves off. To portray the normal state of oneness of a child with her mother. Mahler borrowed the biology term "symbiosis", and used the term "symbiotic psychosis" for children who cannot establish oneness with their mothers".

In Mahler's words, "normally during the first five to eight months, an infant learns to use mother as a 'beacon of orientation'. The mother's presence is a fixed light which gives the child the security to move out safely to explore the world and then return safely to harbor." As the child separates from his mother, he continues to have an inner experience of a mothering presence which orients him in the world.

Inasmuch as normal children possess a reliable inner mother, they do not fear that being a separate self will cast them adrift in an alien world. The psychotic child, on the other hand, is not able to make effective use of her mother as a beacon of orientation, and those fragments of the mother that she carries within her are unreliable. Therefore, she is afraid to move ahead toward separate selfhood.

The symbiotic-psychotic child eventually comes to dread oneness as much as separateness. Rather than continue the struggle, he regresses in his development to the stage that precedes oneness - the autistic stage, in which he totally rejects human contact. His only relationship then is with an inanimate, nonhuman environment.

Mahler's research in child-rearing in the earliest months has led her to write in the aforementioned book, "When the process goes wrong, a human being will have difficulties loving others, nurturing the young, taming his own aggression, and caring about the welfare and destiny of the human species."

What Gesell did for the physically growing and developing baby, Freud for the affective domain, and Erikson and Mahler for the social domain, the Swiss psychologist Jean Piaget did for the intellectual, cognitive area of child development. It was Piaget who described in great detail the important period (the first eighteen months of life) when an infant practices the expanding sensory powers of seeing, hearing, touching, tasting, and smelling - relating one with another. The infant incorporates all his motor learning patterns into the data bank of memory in his brain. With these, he can deal more effectively with the world of people, things, self, language, and thought.

Piaget's careful studies of the day-by-day maturation of his own three children led him to develop a schema of how intellect unfolds and how cognition develops. He found that the child from two to three is still in the sensorimotor stage of development, acquiring information by acting on the environment, and laying the foundation for the evolution of the abstract thought processes of preadolescence. He documented the child's use of primitive labels and words (spoken and non-verbal) to identify ideas and objects in her environment and to define the relationships between these objects, thus gaining intellectual comprehension of complex thought processes in science, math, and in her play and fantasy life.

In addition to these theoreticians who have endeavoured to explain childhood development and behaviour, there are "test makers" who have attempted to quantify the degree to which a child is progressing in mastering selected developmental tasks that are considered important for competency at an adult level. They include Robert J. Havighurst, Alfred Binet, Lewis N. Terman, Raymond B. Cattell, Nancy Bayley, and Florence L. Goodenough. Some studied social development and human intellect; others measured a child's awareness of himself and his environment by evaluating his drawings of a person rather than assaying his verbal communication abilities.

Havighurst conceptualized and organized a series of developmental tasks that he believed to be most easily learned at certain "readiness" ages (or "teachable" moments), somewhat like the "critical periods" theory advanced by Myrtle McGraw and others. Havighurst considered the period beginning at two years as early childhood, and suggested that this is a crucial time for children to learn to interact with other individuals. Directly related to this in our highly verbal society is the ability of children to express themselves through spoken language.

"The ability to accumulate, understand, and use vocabulary to express ideas and perhaps to think about the real world is in part a function of the richness of the verbal environment, and is an index to the quality and quantity of language spoken by caretaking adults".

10.9 GROWTH FACTS

The following growth facts form the basis for Havighurst's test to determine competency of two to five-year olds in the developmental tasks of early childhood:

* The child has developed freedom of locomotion in his environment.

* He has gained reasonable control over his larger muscles and to some extent over his smaller muscles.

* He has learned to communicate verbally with adults, although he often misunderstands the words they use.

* His increased freedom and control over himself and his environment lead to conflict and havoc in an adult-ordered world.

* His ability to classify and differentiate is improving.

Havighurst sees further developmental tasks to be completed as follows:

* The child begins the process of learning to give as well as to receive affection.
* He develops rules of conduct and learns to meet adult expectations.
* He becomes more self-sufficient in dressing, eating, and play activities.
* He improves communication through the use of words and numbers.
* He explores various appropriate roles for gaining a place in the family and among playmates.

* He identifies with adults: parents, teachers, etc.

Failure to achieve those tasks may result in feelings of insecurity and frustration in the child, and the continuation of such negative behaviours as thumb-sucking and temper tantrums beyond the time these normally disappear; seeking adult help in doing things the child

should be able to do for herself; withdrawal from the family or paymate group because of difficulty in working out an appropriate role to play; refusal to communicate or ineffective communication.

Florence Goodenough developed a technique for estimating a child's attention to and memory of detail, size, shape relationships, perspective, and related features of the human body as another way of gauging the child's abillty to accurately perceive, retrieve, and express a given schema in two-dimensional representations. Although there is controversy as to the accuracy of her Draw-a-Man Test in measuring intelligence or learning with children three to four years of age (and older), some believe that as the child matures, and there are more items to be scored, this nonverbal estimate of awareness and intelligence might be useful.

In these days of startling electronic advances, much new information about how children develop has been forthcoming. Yet the plethora of books published in the last ten years covering every aspect of child-rearing has created a false notion about the possibility of bringing up children easily and smoothly. Parents soon discover that there is no royal road or right way to nurture children. All parents need to take into account factors beyond their control, including each child's inherited genes; the conflict between

each child's needs and family and societal expectations and demands; the shortcomings of the well-intentioned parents themselves; and the reality of the generation gap. Writes Maria W. Piers in Growing Up with Children (Chicago: Quadrangle Books, 1966), "We ourselves were brought up with values and standards to fit the world of today, but our children have to be prepared for the world of tomorrow. And today and tomorrow differ much more widely than in all previous centuries."

10.10 PIONEERS IN EARLY CHILDHOOD EDUCATION

Concern for the care and education of children under the age of six did not develop overnight. Actually it has evolved over the centuries. The premise that a child's beginning years are the most crucial has been expressed countless times in various ways in different cultures.

The ancient Greeks were the first advocates of play in education. Plato urged state legislation in regard to the games of children, and offered practical advice on play. He encouraged "those natural modes of amusement which children find out for themselves when they meet". In the following quotation from one of Plato's books, The Laws, he appears to have recommended the setting up of nursery schools: "At the stage reached by the age of three, and after the ages of four, five, and six, play will be necessary. There are games which nature herself suggests at that age. Children readily

invent these for themselves when left in one another's company. All children of three to six should first be collected at the local sanctuary, all the children of each village thus assembled at the same place."

The teachings of Plato, Socrates, and Aristotle greatly influenced later educational theorists. Marcus Fabius Quintilian, outstanding teacher during the Chiristian era in Rome, had high regard for the inherent powers of children. He believed that children who could not learn were rare, and that children's play should be so arranged as to develop their intellects. Johann Amos Comenius, the last bishop of the ohemian Brothers in Moravia in 1592, thought that all children should be taught in school. According to Comenius, first the senses, then memory, and finally understanding and judgement were to be developed. He considered playgrounds to be essential for children's schools, and established a system of educational institutions that included a preschool and went as far as an academy. The "maternal school" was under the mother's direction, and lasted through the first six years of the child's life. Comenius encouraged the play interests of children in his lower schools by using objects, pictures, and puzzles.

The writings of French philosopher Jean Jacques Rouseau greatly affected the world's thinking on freedom and progress. he believed that the ultimate objective of

education is to teach one to live. While many eschewed his visionary ideas, one Swiss educator, Johann Heinrich Pestalozzi, was not only receptive to Rousseau's exhortations, but also articulated the educational principles associated with contemporary progressive education. Pestalozzi wrote, "The ultimate end of education is not perfection in the accomplishments of the school, bug fitness for life; not the acquirement of blind obedience and prescribed diligence, but a preparation for independent action".

Pestalozzi tries to investigate the early history of the child who was to be taught, back to its very beginning, and was soon convinced that "the first hour of its teaching is the hour of birth. From the moment in which his mind can receive impressions from nature, nature teaches him."

He decided to put aside the first plague of youth, "the miserable letters" that were being taught at home and in schools for young children, and enlisted the services of the child's first teachers - the parents, the mothers - "the most powerful ally of our cause."

In 1803, Pestalozzi wrote a Book for Mothers and How Gertrude Teaches Her Children. In 1826, he published his autobiography in which he tries to express all his ideas on education. He sought to help the lower classes improve their

way of life by having them use their minds; by having them learn about the life around them in the here-and-now. He was against rote memorization. Pestalozzi believed in the need to train the senses, in children's self-activity, and in their close contact with nature. Although all of his school enterprises failed (farm school, institute, etc.), he freed education from dogmatic limitations, and kindled in others an enthusiasm for universal education.

Friedrich Froebel, a student of Pestalozzi's, was the founder of the kindergarten movement. He was responsible for many of the advances in early childhood education. Foroebel carried on Rousseau's theory of natural unfolding, emphasizing the importance of family and peer group companionship in play, work, and self-activity. He valued play very highly: "Play is the purest, most spiritual activity of man at this stage of childhood.... It gives joy, freedom, and contentment... It holds the source of all that is good."

Froebel became a student of the relationship between mother and child, and in his zeal to share his insights, he wrote the following: "The destiny of nations lies far more in the hands of women - the mothers - than in the possession of power, or of those innovators who do not understand themselves. We must cultivate women, who are educators of the human race, else the new generation cannot accomplish

its task." He also advocated comprehensive education for women.

Whereas many previous pioneers in educational theory concentrated on interpreting their philosophy through books, Froebel accomplished his educational goals through practical teacher education programs and designing simple manipulative materials. In 1816, he founded a Universal Education Institute at Griesheim, Germany, to which teachers came to study his methods. Froebel asserted (like Pestalozzi before him) that children are attracted most by living things and by movable objects. These observations led him to create several playthings - which he called "gifts" - balls, cylinders, variously dissected cubes, quadrilateral and triangular tablets, sticks, and mats for weaving. According to Froebel, by playing with these, the child gained notions of color, shape, size, number, etc. He looked upon play as the cornerstone of his system, and planned his materials for the "self-employment" of little children. he believed that simple manipulative materials, games, stories, songs, group activities, and pleasant surroundings helped young children develop application and cooperation.

In 1826, Froebel wrote his most important book, The Education of Man, which was translated into English in 1885. It pointed the way to independent, productive, and creative activity in early childhood. He opened his first

kindergarten in Bad Blankenburg in 1837. As originator of the kindergarten ("garden of children"), he aroused widespread interest in child play and learning. He fostered the development of vigorous gymnastics, language power through spirited conversation and song, and cultivated the social nature of the child without crushing individuality. In 1844, Froebel wrote Mother Play, which Susan Blow, an American, translated into English. In it he advocated self-activity on the part of the learner, and the principle of learning to do by doing.

Sometime after his death in 1852, his ideas began to spread throughout Europe and the United States. Froebel was also responsible for the eventual employment of female teachers in kindergartens and elementary schools. The original interest of Froebel and his followers in play, self-expression, and creativity as a basis for education was, however, forgotten until the 1890s by the reconstructive movement in kindergarten education in Europe, and especially in the U.S.

During that period, such philosophers and educators as William James, Susan Blow, John Dewey, and his colleagues William Heard Kilpatrick lectured, taught, and translated and expanded the ideas laid down by Pestalozzi and Froebel. They also wrote many books. An interesting quotation from a work by William James reads as follows:

"Your pupils... are ... little pieces of associating machinery. Their education consists in the organizing within them of determinate tendencies to associate one thing with another... The more copious the associative systems, the complete the individual's adaptations to the world... You may take a child to the schoolroom, but you cannot make him learn the new things you wish to impart, except by soliciting him in the first instance by something which natively makes him react. he must take the first step himself... During the first seven or eight years of childhood, the mind is most interested in the sensible properties of material things... The more different kinds of things a child gets to know by treating and handling them, the more confident grows his sense of kinship with the world in which he lives."

Dewey and Kilpatrick, his associate at Teacher's College, Columbia University, believed that children learn best when the material meets a recognized need, not by memorization of extraneous information; that children require contact with people, places, and things. Both educators maintained that traditional schooling allowed too little leeway to initiative. They believed that education must be interwoven with practical experience. The best known of Dewey's ideas is his "principle of learning by doing." Kilpatrick expanded it further by saying that "in the degree

that a child lives (experiences) what he learns, so will he learn it."

Such innovative educators as Maria Montessori and Caroline Pratt furthered the cause of voluntarism in education by setting up model schools for young children. They designed their own programs, equipment, and play and learning materials.

Growth Chart - 25th Through 30th Month

MOTOR DEVELOPMENT

Gross Motor

Walking pattern not smooth; foot and leg move as one.

Stand on right foot alone.

Monitor walk and placement of feet in order to deal with obstacles in path.

Like to walk unaided.

Dislike being carried or pushed in a stroller

Walk up and down stairs alone, both feet on each steep

Walk backwards for 10 feet.

Walk a few steps on tiptoes.

Move around the house with ease; no longer bump into bric-a-brac.

Running still stiff and awakward.

Cannot turn sharp corners, or come to a quick stop.

Jump in place, both feet off floor simultaneously.

Climb with a purpose - to see better or reach for something.

Climb to top of gym; can't climb down again.

Delight in rough-and-tumble play with father and peers.

Throw and retrieve all kinds of objects.

Action toys (tricycle, swing, climber) used to work off boundless energy.

Difficulty mastering simple space relationships (getting in and out of chair, using tricycle pedals, etc.)

Vulnerable to frustrations and accidents.

Fine Motor

Can turn doorknob to enter or leave room.

Many hold a pencil or crayon with adult grip.

Able to take lids off jars.

Things still slip out of fingers.

Can draw vertical line.

Build a tower of five cubes

Can visually distinguish small objects at a distance.

Can discriminate between small print letters.

LANGUAGE ACQUISITION

Vocabulary of more than 3 but less than 50 words; some have vocabulary of 200 to 300 words.

Growth Chart - 25th Through 30th Month

Join words together into two-word phrases (telegraphic language).

Pay more attention to what people say.

Understand longer sentences.

Still rely on facial expressions, gestures, body movement for communication.

Call themselves by own name; i.e., "Mary wants apple."

Also say, "I want."

Enjoy books; point to and name objects; turn pages.

Learn sounding of words.

Can sing phrases of songs (often not on pitch).

Imitate parents tone of voice.

Time Tables for Speech

Many children have quite intelligible speech without having mastered all the 23 consonant sounds.

By age	Sound Mastered
3.5 yrs.	b,p,m,w,h
4.5 yrs.	d,t,n,g,k,ng,y
5.5 yrs.	f
6.5 yrs	v,th(as in that), z (as in azure), sdh, l
7.5 yrs.	s,z,r,th (as in thin), wh

SENSORY POWERS/LEARNING

Understand simple cause-and-effect relationships; i.e. "Turn switch, light comes on".

Thinking starting to replace acting on objects (cognition)

Sense oneness vs. many.

Can distinguish one and two units, but can't go beyond (unless given special training).

Minimal understanding of time. Will respond to such phrases as "in a minute". "today", "pretty soon," but there is no concept of "yesterday".

Vague awareness of relationship between things; their number, quantity, weight, size.

Discriminate vertical from horizontal lines.

Attention span lengthening somewhat.

Can concentrate better on manipulative and fitting toys; puzzles, nesting buckets or eggs, stacking disk toys, etc.

Learn by imitation of parents and peers.

Play with attributes of things: texture, shape, size, color, function.

Locate most parts of the body; emphasis then changes to naming.

Growth Chart - 25th Through 30th Month

Memory span improving.

Perceptual behaviours show finer discrimination.

SOCIAL DEVELOPMENT

Parents still on top of social ladder.

Imitate mannerisms of parents or primary caretaker.

Strong attachment to mothers. Will help mother put away groceries, do house cleaning, etc.

Increasing sense of independence.

Beginning to explore potential for influencing other people, especially parents.

Mainly interested in themselves (egocentric). Not apt to share or play with agemates.

Ready for participation in informal or formal playgroup.

Initial concept of a "friend" as a familiar peer.

Stare at others; like being looked at.

Call all other children "baby"

Call all women "Mommy" and all men "Daddy."

PLAY AND PLAYTHINGS

Play with patterns, sequence, order of magnitude (color cone, nesting toys, etc.)

"Parallel play" - two children playing near each other, but not together.

Mid-Twos able to play together.

Some Twos able to handle brush and poster paints to paint on paper.

Like to scribble with large crayons.

Enjoy repetition of familiar songs.

Run, gallop, swing to music.

Respond to musical rhythms by swinging arms, swaying head, tapping feet.

PERSONALITY/PSYCHOLOGICAL

Fears and anxiety about separation from mother erupt.

Fears of short duration; strange objects, darkness, vacuum, cleaner noise, bathtub, drain, high places, wild animals, going to sleep, broken things (intactness), monsters, etc.

Fears learned from parents; mice, snakes, thunderstorms.

Growth Chart - 25th Through 30th Month

Memory span improving.

Perceptual behaviours show finer discrimination.

SOCIAL DEVELOPMENT

Parents still on top of social ladder.

Imitate mannerisms of parents or primary caretaker.

Strong attachment to mothers. Will help mother put away groceries, do house cleaning, etc.

Increasing sense of independence.

Beginning to explore potential for influencing other people, especially parents.

Mainly interested in themselves (egocentric). Not apt to share or play with agemates.

Ready for participation in informal or formal playgroup.

Initial concept of a "friend" as a familiar peer.

Stare at others; like being looked at.

Call all other children "baby"

Call all women "Mommy" and all men "Daddy."

PLAY AND PLAYTHINGS

Play with patterns, sequence, order of magnitude (color cone, nesting toys, etc.)

"Parallel play" - two children playing near each other, but not together.

Mid-Twos able to play together.

Some Twos able to handle brush and poster paints to paint on paper.

Like to scribble with large crayons.

Enjoy repetition of familiar songs.

Run, gallop, swing to music.

Respond to musical rhythms by swinging arms, swaying head, tapping feet.

PERSONALITY/PSYCHOLOGICAL

Fears and anxiety about separation from mother erupt.

Fears of short duration; strange objects, darkness, vacuum, cleaner noise, bathtub, drain, high places, wild animals, going to sleep, broken things (intactness), monsters, etc.

Fears learned from parents; mice, snakes, thunderstorms.

Growth Chart - 25th Through 30th Month

Experiment with negativism ("No, no, no!") by being assertive, demanding, and strongly independent ("I do it myself!").

Intent on doing things their way.

Onset of contrariness (a healthy sign of growth; a sort of declaration of independence).

Learning self-identity vs. social conformity.

Awareness of self as a person with separate identity.

Self-concept enhanced when people react with approval and praise their accomplishments.

Consolidate sense of self by hoarding processions.

Learn that parents who are absent at the moment still exist and will return.

HEALTH, SELF-HELP, AND ROUTINES

Routines and rituals important. (There are bath routines, sleep routines, good-night routines, that must be strictly followed.)

Ask to go to toilet.

At 25 months can hold urine 1.5 to 2 hours.

Enjoy bath.

Like to wash hands, but never their faces.

Ready for lessions in brushing teeth and rinsing the mouth.

Weight and height gains reach a plateau.

Appetites are smaller; less interest in eating; do not need as much food.

Dawdle at dinner table, in bath, while dressing (a form of negativism)

Help dress and undress themselves (learn to pull off pants and socks); some interest in buttoning and unbuttoning.

Sleep requirements vary between 8 and 17 hours a night for 2.5 year olds.

Growth Chart - 31st Through 36th Month

MOTOR DEVELOPMENT

Gross Motor

Stand on one foot for about 2 seconds.

Walk on 2" line for 10 feet.

Run well, but unable to start and stop quickly.

Jump up in air with both feet; jump from chair to floor.

Hop on one foot for 2 or more hops.

Jump over string 8" high.

Master small tricycle.

Jump from second stair step to the floor.

Walk upstairs alternating forward foot.

Walk downstairs alone with both feet on each step.

Anal sphincter muscles in control.

Fine Motor

Good hand and finger coordination.

Can move digits independently.

Build tower of 8 cubes.

LANGUAGE ACQUISITION

Rapid increase in vocabulary; average 50 new words a month. (Most reach 900 words between 2nd and 3rd birthdays.)

Use "I" instead of proper name when referring to themselves; employ pronouns "I", "me", "you" in speech.

Use three - or four-word sentences; sentences have characteristic children's grammar.

Can give first and last name when asked.

Ask questions that begin with "what," "why," "where".

Make confused distinctions between yes and no, come and go, give and take, push and pull.

Frustrated if not understood by adults.

Enjoy picture books with 2 or 3 sentences on page. Can name items in pictures (dog, book, apple).

Interested in how words sound.

Enjoy rhyming words.
Begin to understand that words have a beginning, middle, and end sound.

Telescoping of words continues.

Growth Chart - 31st Through 36th Month

SENSORY POWERS/LEARNING

Eager to learn; ask questions endlessly.

Understand concept of one.

Can match some colors - red.

Learning to concentrate.

Ongoing interest in exploring the world of objects.

Can remember 3 directions at a time without having them repeated ("Shut the door, get your cap, and sit down").

Sense of space more precise (here or there, under or over); can give fair answers to "where the birds and fishes are?.

SOCIAL DEVELOPMENT

Discovering satisfaction from doing things for others.

Enjoy helping with household chores.

Revive their babyhood verbally (may even want to be a baby).

Call women "lady" and men "man" as distinguished from mommies and daddies.

Love to give orders.

Experience difficulty with siblings.

Social contacts fleeting due to short attention span.

PERSONALITY/PSYCHOLOGICAL

Tend to be rigid and inflexible in their wants.

Cannot make up their minds.

Can be onnoxious in their demands, rebellious, violent in their emotions.

Frequent mood swings.

Conscious of own sex organs; beginning interest in physiological differences between males and females.

Can locate and name body parts and their functions (gender identity).

Know they are a boy like father and are different from girls, or vice versa.

Interest in watching others in bathroom or when undressed.

Greatly improved self-control.

Must be watched constantly due to unpredictable behaviour.

Love and affection get mixed up with "pushes and pinches".

PLAY AND PLAYTHINGS

Beginning to play with other children.

Group play without adult supervision quickly deteriorates.

Unable to resolve altercations with agemates without adult help.

Enjoy use of telephone, but unable to sustain long talk.

Can put together 6 to 12 piece puzzles.

Beginning of fantasy and pretend play.

Like to finger-paint and model with clay; also to easel-paint.

HEALTH, SELF-HELP, AND ROUTINES

Most Toodler-Twos achieve a measure of daytime bowel and bladder control. (Complete nighttime control seldom achieved before 3).

Can feed themselves, at least part of meal, without too much spilling; may require help as they tire.

Can manage spoon and cup, with some spilling.

Can take off and put on their own shoes; cannot tie shoelaces.

Will cooperate while being dressed.

Can undress themselves completely at 2.5 years.

Begin to be able to select and put on their own clothes at 3 years.

Average amount of sleep required by 21.5 is 13 hours.

Growth Chart - 37th Through 42nd Month

MOTOR DEVELOPMENT

Most can stand on one foot, with momentary balance; also on toes.

Can climb up an inclined board.

Like to climb on a jungle sym.

Can walk a straight line or curbstone; walk backwards.

Run, jump, and climb with finer coordination.

Swing arms feely while walking or running.

Walk well, without close visual inspection of moving feet.

Get up from a squatting position without help.

Can catch a large ball with their arms extended forward; throw without losing balance.

Can kick a ball.

Use pedals riding a tricycle; can steer to avoid obstacles.

Enjoy sliding down a not-too-steep slide.

Gallop, jump, walk, run to music with abandon.

Alternate feet when going upstairs; not necessarily when going down (2 feet per step).

Jump from a bottom stair to floor.

Shoulders held more erect.

Protruding abdomen much reduced.

Fine Motor

Increasing control of fingers.

Adept at picking up small objects.

Can handle scissors to a degree.

Can copy a circle from adrawing of a circle; reproduce a cross if shown how.

Control of a pencil improving.

Can place round, square, triangular blocks in formboard.

Can build a tower of 9 small blocks.

LANGUAGE ACQUISITION

Enjoy new and unfamiliar words.

Average vocabulary 900 words.

Can repeat three numerical didgits.

Most are good talkers.

Use language to get what they want.

Growth Chart - 37th Through 42nd Month

Most starting to ask "how", "what,", "why", "when" questions.

Respond to simple directions; i.e., to put a ball on or under a chair.

name pictures of familiar things in picture books; can tell what the people or things are doing.

Interested in animal stories, alphabet books, here-and-now stories.

Love to play with words (as in silly rhyming). Know a few rhymes.

Remember words of many songs.

Final consonants appear more regularly.

Voice is generally well controlled.

By 42 months, verbal respondes are comprehensible.

Use plurals in speech; use personal pronouns "I", "me", "mine".

Still use their own rather than accepted adult grammar.

SENSORY POWERS/LEARNING

Sort objects by color and size.

Eyes coordinate well.

Show facility in moving their eyes.

Can follow a moving target without losing attention.

Can talk about what they see in books.

Can differentiate a boy from a girl.

First interest in TV viewing (commercials, cartoons, "Seasame Street").

Growing understanding of time intervals: yesterday, today and tomorrow.

Count by rote up to 10 but no awareness of quantity beyond 2 or 3.

SOCIAL DEVELOPMENT

Value mother most of all; love to do things with her.

More orderly.

Some begin to share their toys.

Averate are friendly and agreeable.

Will cooperate in putting toys away.

Can deal with and benefit from a playgroup or nursery school.

Enjoy being with peers; mutual responsiveness; beginning to learn to take turns.

Growth Chart - 37th Through 42nd Month

PERSONALITY/PSYCHOLOGICAL

Interest in different postures for urinating of boys and girls; girls try to urinate standing up.

Interest in babies; may want family to have one.

Subject to fits of anger or jealousy.

May have bad dreams but are easily quieted.

PLAY AND PLAYTHINTS

Sustained attention up to 20 minutes.

Enjoy block play; may combine blocks with toys to create roadways, garages, etc.

Fascination with sand and water play continues.

Like blowing soap bubbles; "painting" with water; washing clothes; sailing boats, etc.

String large wooden beads on a tipped lace.

Like to do jigsaw puzzles.

Doll play, hospital play, community play more imaginative.

Easel painting, finger painting, crayoning enjoyed.

Match 2 and 3 primary colors; confuse blue with green.

Enjoy manipulating clay or Play-Doh.

Noticeable musical advance in use of voice.

HEALTH, SELF-HELP AND ROUTINES

More susceptible to the common cold; other communicable diseases.

Appetite fairly good.

Self-feeding with little spilling.

Using both hands, can pour water, juice, or milk from a pitcher into a glass or cup with little spilling.

Most fairly skillful in handling feeding untensils.

Cup now held by handle in adult fashion.

Wash hands; require supervision for drying.

Better at undressing than dressing.

Can put on own shoes, slacks, underpants or take them off.

Need help with hard to reach buttons, zippers, and tying sashes or shoelaces.

Growth Chart - 37th Through 42nd Month

Many sleep through the night.

Generally, afternoon nap is a quiet play time or rest period.

Control bowels and bladder during daytime.

Growth Chart -- 43rd Through 48th Month

MOTOR DEVELOPMENT

Gross Motor

Run smoothly.

Can tiptoe for a distance of 10 feet.

Can balance on a walking board.

Can hop 1 to 3 steps on preferred feet; hop in place on both feet.

Stumbling and alling due to lack of coordination of flexor and extensor muscles.

Can jump rather high.

Like to try catch-and-throw ball games.

Can ride tricycle without bumping into things.

May seek support of a holding hand ascending and descending stairs.

Fine Motor

Hand tremors of many 3.5 year-olds.

Temporary lack of coordination.

Use thin, uncertain lines in their drawings.

Eye blinking and poor visual coordination part of growth changes.

Can trace diamond on large piece of paper.

Can cut with scissors.

LANGUAGE ACQUISITION

Love to play with language and make up new words.

May stutter and stammer due to temporary incoordination.

Sentences grow longer.

Use 4 to 5 words to express thoughts.

Beginning of correct grammatical usage.

Average vocabulary at 3.5 is 1,000 words: grows to 1,500 words at 4.

Follow directions with two prepositions; i.e., on top of; under, etc.

Beginning to use auxiliary verbs:
"would", "could", "be", "have", "can"

Use negatives effectively: "I don't want to go."

Create own grammar: rided for rode, wented for went, etc.

Begin to talk about imaginary conditions "Suppose that.."

Growth Chart -- 43rd Through 48th Month

Enjoy listening to stories for as long as 20 minutes or more.

Adore silly rhyming.

SENSORY POWERS/LEARNING

Able to count to 3.

Develop perfect size perception.

Begin to match pictures in simple lotto games.

Can point correctly to 6 common geometric shapes.

Memory improves.

Can recall events in recent past.

beginning to think problems through with ideas in their minds.

Understand heaviest, longest.

SOCIAL DEVELOPMENT

Use words to get other children to play with them; also use words to exclude other children.

Exclusion is enforced verbally, for the most part.

Beginning to grasp concept of sharing.

Temporary attachment to one playmate often of the opposite sex (girls may be the initiators).

Demonstrate affection for other children and adults.

PERSONALITY/PSYCHOLOGICAL

Learning to cope with anger and fear, phobias, nightmares, excessive thumb-sucking.

Sibling rivalry (competitiveness among brothers and sisters) appears and needs parental intervention.

Sexually show-offs about organs which distinguish boys from girls.

Are developing self-resistant and self-control.

PLAY AND PLAYTHINGS

Active jungle gym and ladder climbers.

Enjoy using a slide; welcome a helping hand at bottom of high slide.

Like to toss bean bags into holes in target.

Capable of cooperative play; may need adult help in interactions with peers.

Can put together large and simple jigsaw puzzles.

Advancing toward make-believe play.

May ha e difficulty distinguishing fantasy from reality.

Ready for simple cooking and baking experiences.

Enjoy painting with large brushes; cover entire paper; name pictures when finished.

Enjoy manipulating clay.

Can carry a tune and move to its rhythm.

Enjoy playing "What floats?" with sponge, soap, plastic cup, wooden spoons, etc.

HEALTH, SELF-HELP AND ROUTINES

Eager to help with real family chores (water plants, wipe table, etc.)

Will help with housecleaning and keeping things neat.

Can go to toilet unassisted.

Able to use fork and spoon.

Able to put shoe on correct foot.

Growth Chart -- 49th Through 60th Month

MOTOR DEVELOPMENT

Gross Motor

Most can hop on one foot from 4 to 6 steps.

43% of 4-year-olds accomplish rudimentary galloping (skipping on one foot, walking on another).

Locomote skillfully; turn sharp corners.

Run, roll, climb ladders and trees.

Sit with knees crossed.

Motor driven; take pleasure swirling, swinging, somersaulting.

Can jump down from a two-foot height with feet together.

Use hands more than arm in catching a small ball.

Ride tricycle and manipulate U-turns efficiently.

Walk up and downstairs one foot to a step.

Fine Motor

Can use blunt-nosed scissors well.

Can cut on a line with scissors.

At 4, draw picture of human figure with head, body, arms, legs.

At 4.5, add eyes, hair, ears, hands, feet to drawing of human figure.

Can copy following capital letters and forms: O,V,H,T,+

Thread small beads to create necklace; can't thread needle.

LANGUAGE ACQUISITION

Talking vocabulary reaches 1,550 by 4 years; 1,900 words by 4.5 years.

Can name a penny, nickel, or dime as they point to them.

Can say "hello," "goodbye", "Thank you", "please".

Increasing interest in TV.

Able to clearly say first and last names.

Know own sex.

Use sentences of 5 to 6 words.

Love to play with words.

Still have difficulty adding correct endings to words.

Begin to learn the rules for making plurals (one gird, two birds).

Growth Chart -- 49th Through 60th Month

Ask, why, when, how questions and word meanings constantly.

Can argue with words as well as fists.

Still use forbidden words learned from peers: "dirty pee pee," "poopie pants."

Can be violent in their storytelling: stress death, killing, objects that crash, fall down or break, etc.

Confuse fact with fiction in children's books.

Can identify 10 objects from a picture.

Enjoy jokes, silly or funny books, silly language.

SENSORY POWERS/LEARNING

Can count 3 objects with correct pointing.

Can count to 30 by rote memory.

Can develop the order of magnitude of heaviest to lightest of five blocks.

Can demonstrate biggest and longest of three things.

Beginning to grasp a sense of the seasons and activities related to each season.

Can name and match 4 primary colors.

Distinguish between lateral, vertical, and horizontal lines.

Mastering use of space words (back and front, under and over, in, on, up, etc.).

Developing a sense of time (as expressed in the words days, months, minutes, time to go to bed, etc.)

SOCIAL DEVELOPMENT

Strong feeling for family and home.

Concern for younger children in distress or baby sibling.

Can be aggressive with older sibling.

A glimmer of cooperation.

Understand need to share and take turns.

Respond to verbal and physical limitations: "As far as the corner." "It's a rule that we do not hit other children."

Interested in and ready for group activity.

Play groups become larger; competition emerges between groups.

Love to whisper and have secrets.

Prefer companionship of children to adults.

Growth Chart -- 49th Through 60th Month

Play with imaginary playmates.

Tendency in play groups for a division along sex lines: boys play with boys, girls with girls.

PERSONALITY, PSYCHOLOGICAL

Sensitive to praise and blame.

Tend to go "out of bounds"; tell tall tales.

Are very noisy.

May take objects that are not their own.

May still suck thumb on going to bed.

Boys may clutch their genitals when overanxious.

Interest in marriage and marrying; purpose of opposite-sex parent.

Cling to notion that babies are purchased.

Questions about how babies get out of mother's stomach.

Extremely conscious of navel; think babies are born through navel.

Brag, boast, exaggerate (expanding sense of self).

Beginning awareness of "good" and "bad".

Exhibit some self-criticism.

PLAY AND PLAYTHINGS

Enjoy active outdoor play.

Enjoy water and sand play in and out of doors.

Can play outdoors without too much supervision.

Enjoy construction toys; Lego, Tinkertoys, miniature blocks, etc.

Like to do jigsaw puzzles.

Enjoy performing arts projects: finger puppets, shadow plays.

Enjoy sewing cards; "sewing" on cloth with long needle.

Like to dress up in adult clothing and role play.

Dramatic play themes may continue for 20 minutes or more.

Active doll and homemaking play.

Painting, drawing, coloring more successful.

Enjoy finger painting, clay modelling.

Interested in snakes, frogs, and especially turtles, that can be cared for in a terrarium.

Growth Chart -- 49th Through 60th Month

HEALTH, SELF-HELP AND ROUTINES

Seem to have colds all winter, aggravated by nursery school attendance.

Wash hands, face; brush teeth (need some supervision).

Verbal play about elimination, such as "you old bowel movement."

Interested in other people's bathrooms; demand privacy for themselves; curious about bathroom activity of others.

Most dry during the day, but accidents occur.

Majority dry all night if awakened at mid-night.

One bowel movement after breakfast or lunch common.

Appetite at 4.5 years to 5 years increases.

Handle fork and spoon skillfully, but not a knife.

Can pour milk from a pitcher without spilling.

Dress and undress if supervised.

Some lace their shoes.

Sleep 11 hours or longer.

Most have play-nap or no nap at all.

Night walking and wandering disappear.

At 4.5 years, troubled by bad dreams (wolves, etc.).

The brain, spinal cord, nerves reach almost full adult size by 4 to 6 years, with little growth thereafter.

Genital tissue does not grow rapidly in early years.

Respond well to "E" eye test.

Growth Chart -- 61st Through 72nd Month

MOTOR DEVELOPMENT

Gross Motor

Can stamnd on either foot up to 10 seconds; hop distance of 50 feet in 11 seconds.

Can walk a straight line without steeping off for a distance of 10 feet; stand and run on tiptoe for several seconds.

Skip alternately.

Skillful in climbing, sliding, swinging; smooth bodily control.

Bend and touch toes without bending knees.

Can broad-jump from 2 to 3 feet, using 2-foot takeoff.

Attempt all kinds of physical feats.

Learning to throw, kick, catch a ball; understand rules and scoring in game.

Skillful on tricycle; ready to learn to ride small bicycle. (By sixth birthday, will have mastered getting on, starting, balancing, stopping a two-wheeler).

Descend stairs, alternating feet.

Move rhythmically to music; keep time when they dance.

Fine Motor

Handedness well established.

Able to distinguish right from left hand in themselves, but not in others.

Hold pencil, brush, or crayon in adult grasp between thumb and first finger.

Draw a recognizable human figure with head, arms, legs, trunk.

Drawing of house has door, windows, chimney, roof. Say what they are going to draw before they begin.

Can copy a circle, cross, square; by by 5.5 years, a triangle in recognizable form.

Can copy capital letters V,T,H,O,X,L,Y,U,C,A.

Can thread large needle.

Can "sew" wool in tipped laces through holes in a card.

LANGUAGE ACQUISITION

Speech is fluent and grammatically correct, expect for some mispronunciations: s,v,f,th.

Define concrete nouns by their uses.

Growth Chart -- 61st Through 72nd Month

Interested in new words; constantly seeking their meaning.

Average vocabulary of 2,200 words.

Language facility can hide immaturity.

Use plurals, pronouns, fenses correctly in well-constructed sentences.

Can give full name, age, address when asked; may know birthday.

Love to be read to; memorize favborite stories; may act them out with fiends or alone.

Recite or sing rhymes, jingles, or TV commercials.

SENSORY POWERS/LEARNING

Like to practice intellectual abilities; show parents how they can print their names, write numbers up to 5, spell words from favourite books.

Can correctly count fingers of one hand with index finger of the other and tell how many.

Can match numeral with quantity of objects.

Some comprehension of size and quantity words half-whole; big-little; more-less; tallest-shortest.

Begin to see relationship between capacity of different shaped containers.

Learn relationship between written and spoken numbers.

Can copy capital letters of given name.

Can sort objects by size, color, shape, and what goes with what.

Enjoy picture lotto games, picture dominoes, and other association group games.

Sort and match objects by texture (feel of things), smell, taste, etc.

Match 10 colors; name at least 4 primary colors.

Vocational interest may be envisioned and discussed ("I want to be a doctor").

SOCIAL DEVELOPMENT

Intent on pleasing parents and other adults in family group.

Lump all adults as "grown-ups" who are set apart from agemates

Relationship with father smooth; many obey father better than mother.

Like to please mother; take punishment better from mother than father.

Growth Chart -- 61st Through 72nd Month

Boys talk of "marrying mother."

Protective towards younger siblings and playmates.

Great drive to make friends.

Learning to share leadership, ideas, materials, and companions.

Can assume social amenities when necessary.

Acquiring social skills of giving, receiving, sharing.

Mastering techniques for expressing interest, friendship, feelings; for including others in play.

Like to impress their companions.

Learning concept of fair play.

Less time spent with family; more in play with agemates.

More independent behaviour.

Growing revolt against parental control.

Demonstrate sense of humor.

PERSONALITY/PSYCHOLOGICAL

Can experience fears (heights, dogs, death, etc.)

Better able to put fears and anxieties into words; may tell spontaneously what is troubling them.

Push for autonomy; want to be treated as adults.

Like to finish what they start, whether in play or assigned task.

Show greater intent and decisiveness.

Less dawdling.

Can accept fair punishment.

Contradictory behaviour commonplace.

Can wail when frustrated or disappointed.

Impulsive behaviour on occasion

Cannot resist taking things that belong to others; may hide or destroy a stolen object.

When tense pick nose, bite nails, twitch nose, blink eyes, shake head, clear throat, etc.

May suck thumb before sleep or when tired.

Tension in kindergarten may result in pulling at clothes, scratching arm or leg, nasal discharge.

Curious about birth, marriage, death.

Growth Chart -- 61st Through 72nd Month

PLAY AND PLAYTHINGS

Highly imaginative, creative players.

Expert builders with building blocks; know in advance what they plan to construct.

Girls build houses for dolls.

Boys build skyscrapers, airports, garages, etc.

Can play alone, or with one to three companions, from 15 minutes to an hour daily.

Can solve most Montessori geometric color and size relation formboards.

Can complete 26-piece jigsaw puzzle.

More interested in "here-and-now" themes than fairy tales or frightening fantasy.

Recreate roles of "doers" in pretend play; train engineer, doctor, boat captain, astronaut, etc.

Impersonation play accompanied by much talking to help clarify ideas.

Enjoy easel painting; pre-plan drawings and painting; mix colors with greater sureness.

Choose materials for collage work thoughtfully; balance one shape with another.

Can make mobiles and stabiles, incorporating original designs.

Use scissors more skillfully.

Strive for realism in their drawings; copy what they see; some children stop drawing.

Accompany music with bodily movements; slow, heavy, soft; walk like a bear, an old person, etc.

Interested in science and nature materials.

HEALTH, SELF-HELP AND ROUTINES

May have one or two colds all winter; beginning to build immunity.

Occasional headache or earache.

Occasional stomachaches related to school adjustment or disliked food.

Increase in shooping cough, measles, chicken pox.

Wash themselves completely.

Attend to own toilet needs.

Oversensitivity to face, neck, and hair washing.

Definite likes and dislikes in foods.

Self-feeding with little mess.

Growth Chart -- 61st Through 72nd Month

Skillful with fork and spoon; may use knife for spreading, not cutting.

Can manage most dressing procedures (lace shoes, fasten large visible buttons, etc.).

Cannot tie shoelaces or bows well, or get into snowsuit.

Small buttons or fastenings in hidden places a problem.

Quite independent in daily routines.

Most have bad dreams or nightmares (wild animals, monsters, etc.)

CHAPTER 11

TEACHING VERSUS LEARNING : MATHETICS IN PLACE OF PEDAGOGY

11.1 WHAT IS TEACHING?

Henry Von Dyke has beautifully posed as well as given replies to the questions relating to the importance and meaning of teaching. He has said "And what is teaching? Ah! there you have the worst paid and the best rewarded of all vocations. Dare not to enter it unless you love it. For the vast majority of men and women it has no promise of wealth and fame, but they to whom it is dear for its own sake are among the nobility of mankind. I sing the praise of the unknown teacher, King of himself and leader of the mankind". This, we may say, is the philosophical meaning of teaching but it is very relevant and meaningful to a teacher.

Of course, we should measure the significance of teaching not by mercenary standards, but in terms of emotional and psychological satisfaction. Teaching is not a mechanical process of transmitting knowledge and information from the teacher to the student. It is not a monologue but a dialogue. In the dialogue one may be vocal and another not so vocal, but the latter can give vent to his feelings in the form of queries through expressions and some sounds of exclamation or imitation.

Teaching is regarded as an art. Like a piece of music or painting, it touches the heart, brightens the mind and gives pleasure to everybody. It has to inspire and motivate the learner to go ahead on the road of exploration and discovery, to open new vistas and to reach new horizons. But traditionally, teaching is equated with telling. The old concept of teaching as giving of information has been discarded by psychologists. Now the educationists feel that teaching is to motivate the student to learn and acquire the desired knowledge, skills and also desirable ways of living in the society. The main objective of teaching is to enable the pupil to respond to his environment effectively.

According to Burton, "Teaching is the stimulation, guidance direction and encouragement of learning". This comprehensive meaning of teaching says that learning should be stimulated, guided, directed and encouraged through teaching. Teaching is thus a communication and communion between two or more persons who influence each other by their ideas and learn something in the process of interaction. Robert Gagne, (1965), defines teaching in a psychological manner when he says "Teaching means arranging conditions of learning that are external to the learner. These conditions need to be constructed in a stage-by-stage. Each stage is the just acquired capabilities of the learner the requirements for retention for these capabilities".

Teaching, to be precise, is a process of communication for achieving certain objectives. These objectives, of course, should be desirable and specific to various groups of learners. Kulkarni, (1986) has, therefore, defined teaching as "the process wherein conditions are deliberately created (environment organised) to enable a specified learner (or group of learners) to behave in a specified manner, to perform or to experience certain desired objectives. "Teaching thus aims at helping learners to learn or change their behaviour" in a relatively permanent manner and involves arrangement of situations for facilitating learning.

The important general maxims of teaching are : it should proceed from the known to unknown from analysis to synthesis, from the simple to complex, from the whole to part, from concrete to abstract, from the particular to the general, from empirical to rational, from psychological to logical and so on. Good teaching recognizes individual differences among students; it should be interesting and need-based. It should be challenging as well as sympathetic to the learner. It ought to promote productivity and self-study. Teachers should take the social and psychological background of pupils into account. Good teaching should be dynamic and well planned. Teachers in order to make their teaching effective, need acquaint themselves with curriculum, school routine, standards of the class, and if

possible brief biodata of students. Successful teachers should project themselves as sympathetic and sincere, warm and friendly persons to their pupils.

11.2 WHAT IS LEARNING?

In laymans language, living is learning. As we grow, we learn, we are apt to learn more than any other living beings. We adjust with our environment better than any other being. We influence our environment and the environment also influences our living styles. The interaction between the living being and environment results in the change of behaviour. Such a change is called learning.

That is why, learning is called the modification of behaviour. It implies change in knowledge, understanding, skills, interests, habits, attitudes and so on. Learning thus consists of all changes in thinking, feeling and doing in course of life. The human child is the most helpless of all creatures and his helplessness is again longer than that of any other living being.

It is said that such helplessness of human child gives a greater scope for learning. The world is full of problems. The human being faces problems in his every day life. But he tries to solve them with his own knowledge, insight, reasoning, skills and techniques of adjustment. Human life

is thus a continuous process of learning, a series of experiences gained through living.

Skinner has, therefore, defined learnings as "a process of progressive behaviour adaptations". Crow & Crow has considered learning as "the acquisition of habits, knowledge and attitude". According to Munn, learning is "more or less permanent incremental modification of behaviour which results from activity, special training or observations". Mc Connel has precisely defined learning as the modification of behaviour through experience.

Kulkarni (1986) has summed up all these elements of learning in his definition. According to him, learning means "relatively permanent change in behaviour which occurs as a result of experience or practice". On the whole, learning can be defined as the process of effecting change in behaviour that brings about improvement in our relations with environment. Learning is rightly called the pivotal issue in education. The main aim of education is to effect designed changes in the behaviour of students. Learning is thus a natural outcome of the individuals' attempts to meet their basic and normal needs.

The learner cannot afford to be passive in this process. He has to interact with his environment. Learning is a complex process by which an organism faces new problems, acquires new knowledge, develops new modes of

behaviour which tend to persist and create a general behaviour pattern of the organism. All this brings about changes of behaviour - in doing, expressing one's thoughts, feelings, attitudes.

Learning is a process which involves changes taking place over a country/period. There are various aspects of the process of learning which needs be taken care of for ensuring its effectiveness. These aspects are, for example, needs of the learner, readiness to learn conditions of learning, interaction and so on.

As regards its main characteristics, learning is growth through experience; it is an adjustment to the environment; it is a synthesis of old and new experiences; it is purposeful and intelligent; it is both individual and social; it affects conduct of the learner. There is difference in adult learning and child learning. For instance, the adults learn through concentration of mind on essentials which are useful and rejects the useless, children, on the other hand, learn through all senses in a natural and active way. The vastness of adults' experience may help or hinder their learning whereas children's learning is immensely promoted due to their strong spirit of curiosity, inquisitiveness, free and frank attitude towards the outside world. Therefore, children should not be forced to learn in adult ways and methods with narrow utilitarian

objectives.

11.3 TEACHING VERSUS LEARNING

Prior to this century teaching was considered as a rigid, formal and stereotyped process of transmitting knowledge, facts and figures. Education was taken as a bipolar process with teachers at the giving and students at the receiving end. Teachers were deemed to be the only source of knowledge, may be through manuscripts and printed materials. Schools were the knowledge shops and teachers the information managers or vendors. Methods of teaching were logical, sequential and routine without the best attention to the psychological needs and conditions of learners - their interests, curiosity, freedom and flexibility. Emphasis was laid on rigid discipline, blind memorisation and hard reinforcement. Verbalism was enforced and no audio-visual aids or materials were utilized in the field of education.

The learner was always kept at the receiving end and was considered as an empty vessel to be filled with knowledge and information, facts and figures. With the advent of the 20th century a child started being considered a tender plant whose growth is facilitated by the teacher as a gardener. Then aards efforts are being made to teach the child according to his abilities, attitude, interests and

aptitudes. He is helped to learn and to grow. Now "to teach is to nourish or cultivate the growing child or to give him intellectual exercise or to train him in the horizontal sense of directing or guiding his growth". Children are motivated to search and experiment together facts and information. They learn by doing and learn how to learn both individually and in groups. Various media and materials are used for making learning more interesting and effective.

Recently, learning has assumed more importance than teaching. It has been rightly observed by the International Commission on the Development of Education, (1972), p. 150), that there has been a change in the learning process which is tending to displace the teaching process. New theories of learning highlight the principle of contiguity and the importance of needs and motivations, of choice of content of the hierarchical nature of learning, the inter-relationship between educational content and environment, etc. Multi-media systems have now acquired more significance and educational technology has been used on a mass scale for effectiveness.

Now stress is laid on the mathetic principle of learning rather than on the traditional pedagogic principle of teaching. Mathetic, the science of the Pupil's behaviour, has recently acquired more importance than pedagogy, the science of the teacher's behaviour. The term 'mathetics' is

derived from the Greek root signifying the learner, and the process of learning is given high priority. The mathetic principle is now used for designing various programmes for individual learning by pupils. Thus, pedagogy has given place to mathetics and teaching to learning.

CHAPTER 12

MODEL OF INTERACTIVE LEARNING: VISITORS TO THE SCIENCE GALLERY OF BIRLA MUSEUM EXPERIENCE, AND REVIEW OF THE DESIGNER

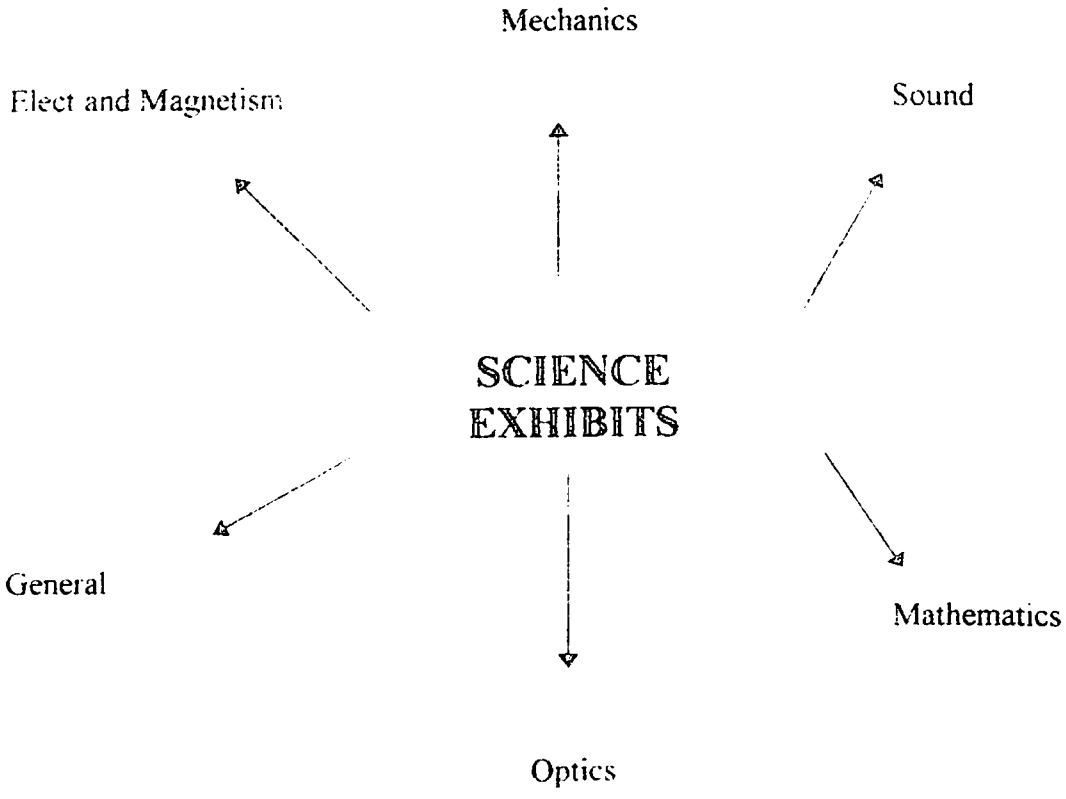
12.1 INTRODUCTION

In India we have a number of Science and Technology museums and recently introduced science centres. Some of the important institutions of this kind are: (1) Birla Museum, Pilani (2) Birla Industrial and Technology Museum, Calcutta (3) Visesvarya Industrial & Technological Museum, Bangalore (4) Nehru Science Centre, Bombay, (5) Rajeev Gandhi National Science Centre, New Delhi (6) B.M. Birla Science Centre, Hyderabad and recently introduced science centre at Jaipur.

Birla Museum, Pilani was established in the year 1954. It has grown as a pioneer institution and has an interesting and important science gallery, Eureka.

Birla Museum attracts a large number of visitors from various parts of the country and foreign visitors. There are also regular organised/sponsored groups of visitors to the museum. The present study has been done to investigate the educational impact of science gallery of Birla Museum, Pilani. The information is based on the detailed study of:

1. The exhibits
2. Types of visitors


Mechanics
Elect and Magnetism
Sound
SCIENCE
EXHIBITS
General
Mathematics
Optics

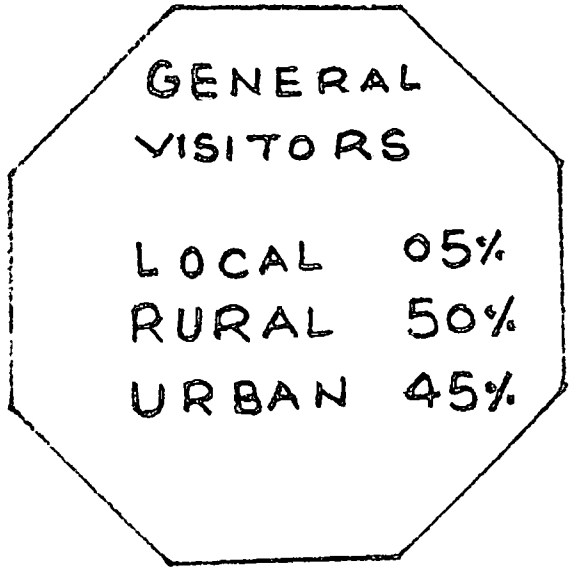
3. Correlation between the educational level of the visitors and the educational concept of the exhibit designs and

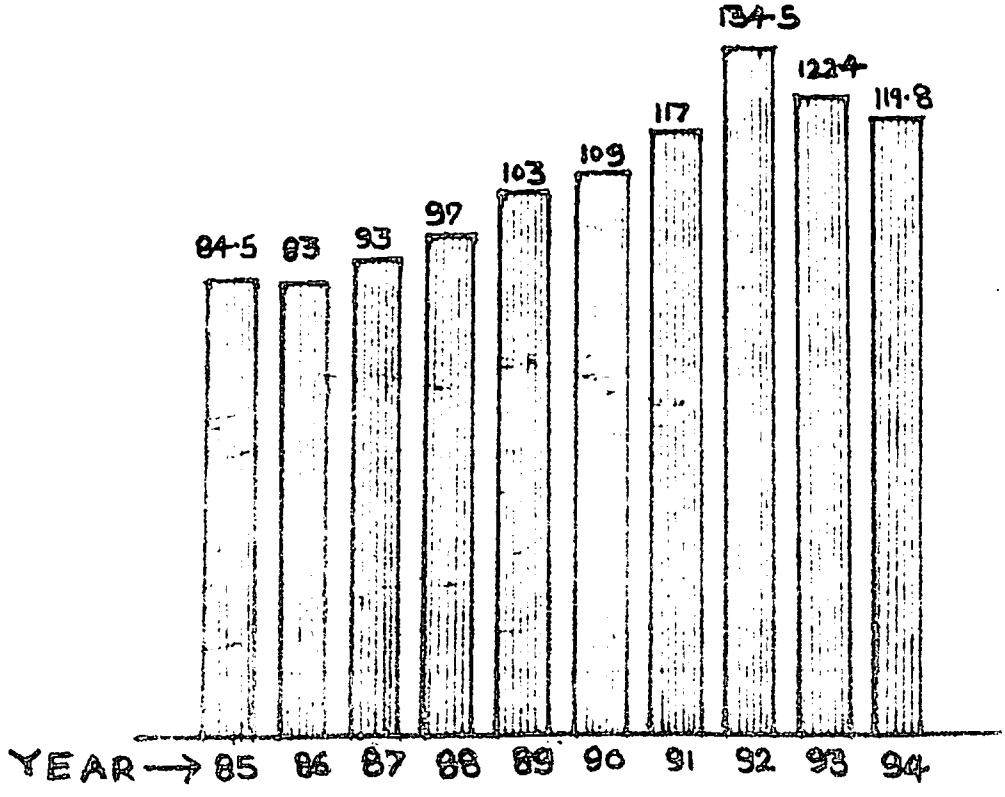
4. Opinions of experts in the area and evaluation of impact of science gallery of Birla Museum.

1. THE EXHIBITS

Science gallery of Birla Museum, Pilani has been designed with an objective to provide knowledge of scientific principles which have tremendous applications in day to day life and environment of the child and to inculcate scientific temper and awareness among the children and the general masses. Science concepts which are abstract and which the child finds difficult to understand in the classroom have been simplified and designed in such a manner so that children find them interesting and stimulating and easy to understand in museums. Though the same science concepts are taught to the children in the school laboratory through conventional apparatus and methods, but due to an entirely different approach which museums adopt to design and present the same concepts through participatory hands-on-minds-on interactive exhibits, attract and motivate the child and makes the learning easier and more enjoyable, meaningful and memorable experience to him.

COMPARITIVE DISTRIBUTION OF GENERAL VISITORS FROM LOCAL, RURAL AND URBAN AREAS TO THE BIRLA MUSEUM DURING THE YEAR 1985 - 94.





This popular science section of the museum called Gallery Eureka contains exhibits on various subjects of physics and other physical sciences. Most of the exhibits are on mechanics, optics, sound, heat, electricity and magnetism. Exhibits depicting basic principles in other branches of science are also included in this section. There is a separate corner for mathematics in the gallery where people of all ages and backgrounds and particularly school children, understand the abstract nature of mathematics through active exploration and manipulation of various educational games and puzzles.

The popular science gallery of the museum is a highly structured environment. No behaviour patterns or learning strategies have been imposed on visitors. They are free to move in the gallery and free to go to any exhibit of their liking. Explanatory graphics explaining the method of operation of exhibits, scientific principles and their day to day applications have been provided both in Hindi and English with each exhibit. Free standing exhibits encourage free exploration by the visitors and interaction among the strangers. Most of the exhibits can be approached from three sides, thus promoting social interaction between visitors. Out of the total 81 exhibits in the science section about 80% of them are on mechanics, optics and mathematics. A small number of exhibits on other subjects of physics i.e. sound, electricity and magnetism are also there.

2. TYPES OF VISITORS

Since large number of visitors of all age groups and backgrounds and school children from the nearby villages, states and educational institutions are visiting this museum, therefore the present study is an attempt to critically assess/analyse the educational potential of science exhibits intended to convey the concepts to children of all age groups and different socioeconomic background. The study includes the following aspects:

1. To find the educational/academic level of variety of children and schools visiting the museum.

2. To understand the socio-economic background/status of the schools visiting the museum.

3. To know the active period of visit of school groups to the museum and their purpose behind the visit.

3. CORRELATION BETWEEN THE EDUCATIONAL LEVEL OF THE VISITORS AND THE EDUCATIONAL CONCEPT OF THE EXHIBIT DESIGN

Past 10 years' analysis of the survey of educational level of visiting children has shown (Fig. 12.1) that 20% of the visiting school children belong to primary level education, 45% from middle level schools and the remaining 35% are from secondary/higher secondary schools. Further analysis of the socio-economic background of these school

FIG-12.1

CORELATION BETWEEN LEVEL OF VISITING STUDENTS AND EDUCATIONAL LEVEL OF SCIENCE EXHIBITS :

SR. NO	LEVEL OF STUDENTS	%	EDUCATIONAL LEVEL OF EXHIBITS
1	PRIMARY	20	—
2	MIDDLE	45	20 %
3	SEC. / HR. SEC	35	60 %

REMAINING 20 % EXHIBITS ARE OF HIGHER LEVEL !

groups has shown that 70% of the visiting school groups are from rural areas. There has been a gradual regular increase in the number of school groups. It has increased to three and a half times during the past 10 years (Fig.12.4).

It has also been observed that visit of school groups is mostly during the beginning of winter season and then towards the close of winter season i.e. the period when majority of school children are free from their internal or external exams (Fig.12.3) .

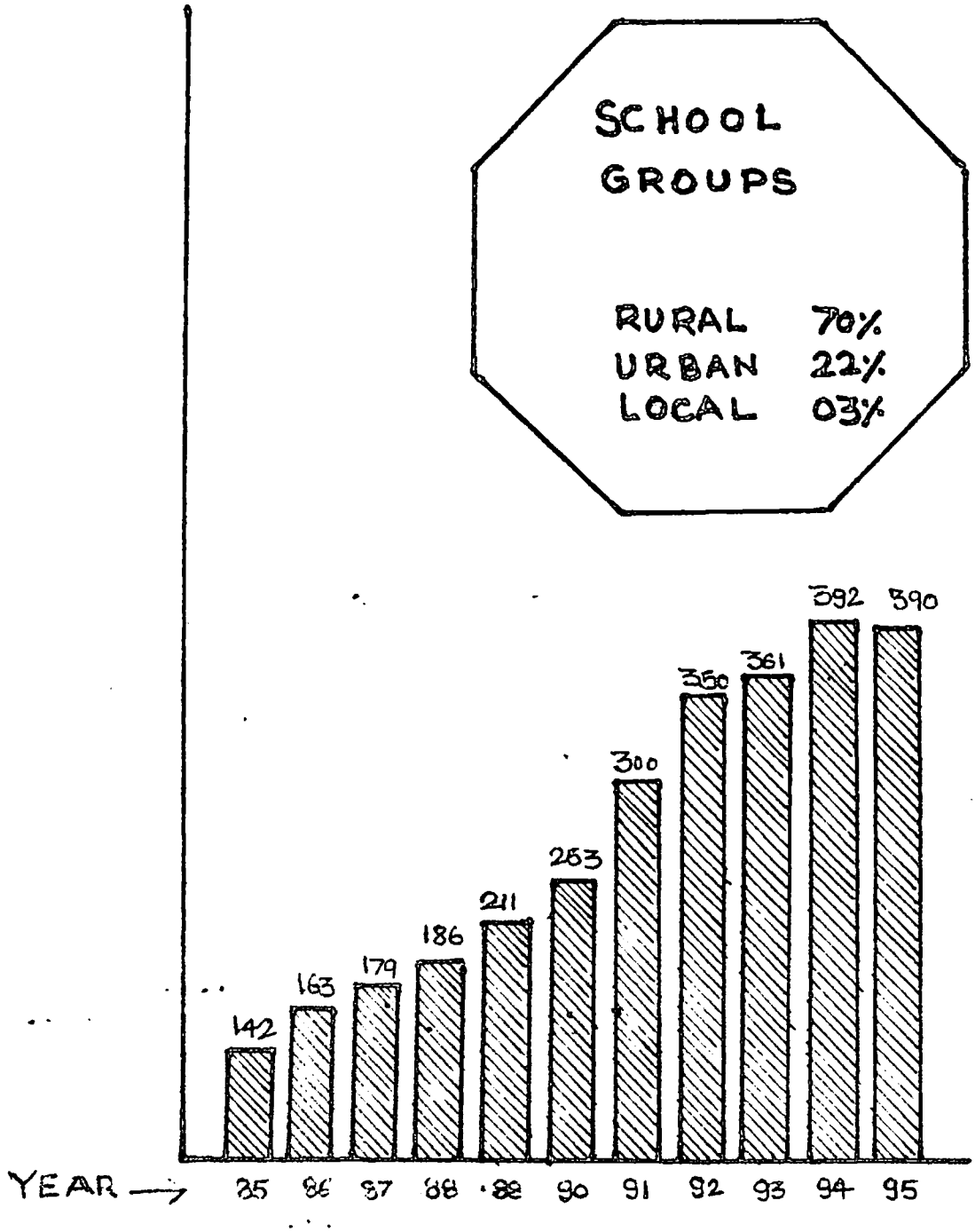
Although there is a good number of exhibits which cater to the needs of children belonging to middle and higher level students (Fig.12.1) but almost negligible number or exhibits have been found to be meant for primary school children.

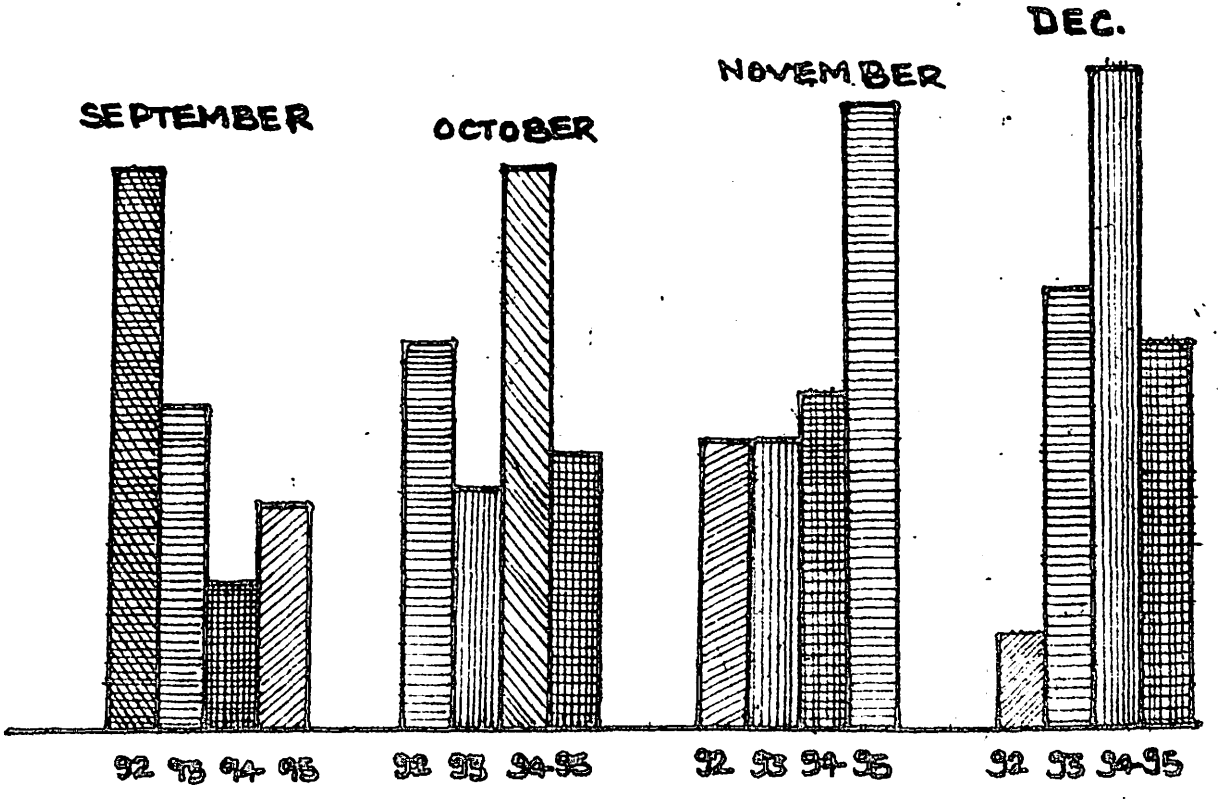
4. OPINIONS OF EXPERTS IN THE AREA AND EVALUATION OF IMPACT OF SCIENCE GALLERY OF BIRLA MUSEUM

A museum has an atmosphere which sets a context of color, mood, and time, within which all other experiences for learning will occur while, science and technology centres are organized environments in which learning can take place. They have a unique characteristic when compared to schools, the other major learning environment in our culture. The visitor (the potential learner) is thereby has a choice and this choice makes the science center a unique learning environment. School groups consider a trip to a center as a special event and so arrive with more initial

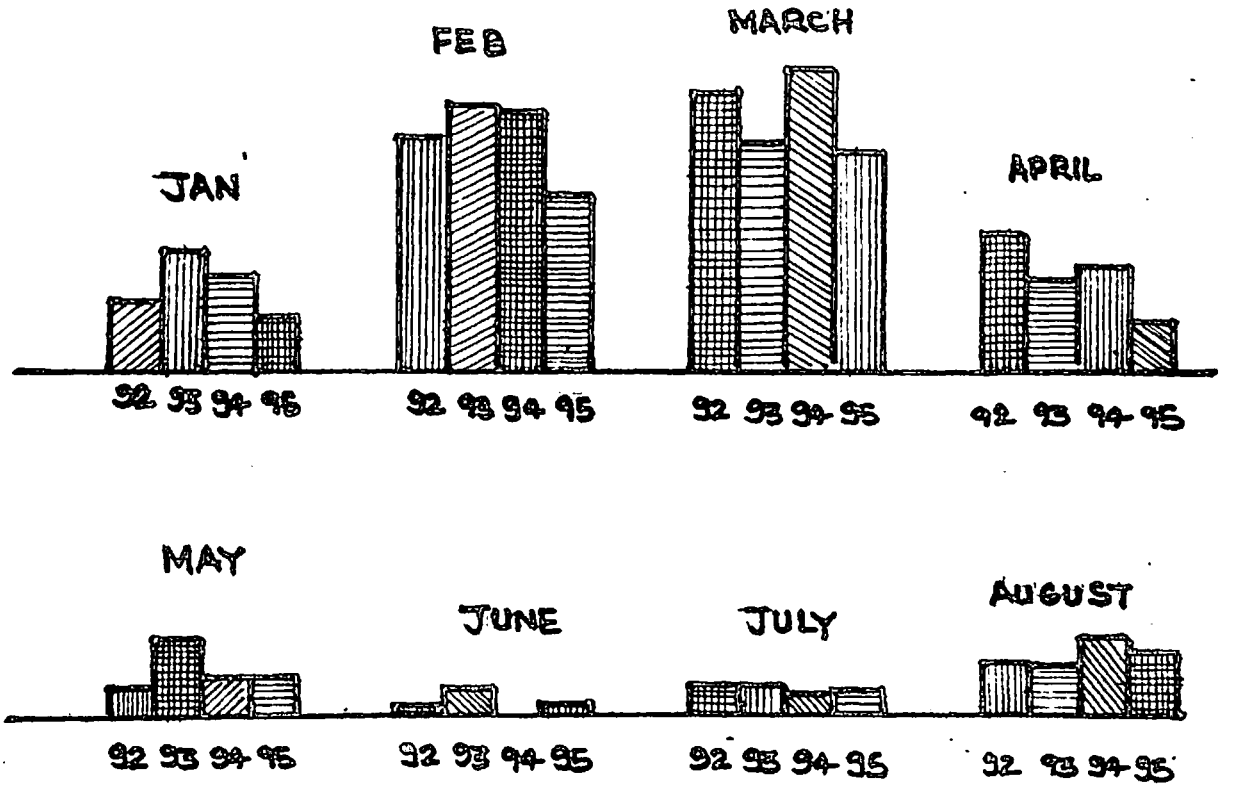
12.42

YEAR-WISE SCHOOL GROUPS VISIT TO THE BIRLA MUSEUM: 1985 TO 1995.




SEPTEMBER
OCTOBER
NOVEMBER
DEC.
92 93 94 95
92 93 94-95
92 93 94-95
92 93 94-95

MONTH / YEAR-WISE DISTRIBUTION OF SCHOOL VISITS TO THE BIRLA MUSEUM DURING 1992 TO 1995.



interest and motivation than they probably feel at school each day. When visitors arrive, this center can reinforce its uniquerous by providing many program choices.

Paul A. Fine (1963) has identified two kinds of learning in a museum. One is rooted in wonder with two intertwined aspects, (i) the awe and astonishment and (ii) asking "why?" which begins the process of critical examination. Paul (1963) questions this approach for the design of the exhibits and says, "can there not be a perfectly natural course of events which proceeds from the awe and astonishment in the initial wonder to the asking of questions?" This approach will help the designer. The second kind of learning is that the museum exhibits are the educational tool, therefore, the designer should point the perception in the direction from which true understanding will eventually come, and at the same time should maintain the excitement and interest without which the effort required to achieve understanding will not be forthcoming.

We should also ask: If the exhibit leading the visitors from astonished wonder to critical wonder? Are they just looking or is there anything which leads them to look for specific features of the exhibit? The educational effectiveness of the exhibit really does not occur until much later, after the individual has left the exhibit and re-entered his daily life.

PART-IV : APPROACH FOR EDUCATION

CHAPTER 13

13(A) EFFECTIVE TEACHING: CHILD CENTRED APPROACH PLAYWAY METHOD OF EDUCATION AND PLAY MATERIALS FOR PRE-SCHOOLS

13.1 INTRODUCTION

Soren Klerkegaard (1813-1855), Kare Jaspers (1883), and Martin Heidegger advocated a new approach to the objective and the procedure for education and called it "EXISTENTIALISM AND EDUCATION".

Klerkegaard, father of existenialism, emphasized the existence of individuality, thinking as an introvert and subjective. Jaspers' thoughts show dissatisfaction with material world, completeness in subjectivity. Heidegger believed that objective knowledge may be both true and untrue. Education to contribute in the realisation of self (subjective) knowledge considered as more important.

Existenialism wants to maintain the individuality of a human being. It does not want that his individuality should be sacrificed at the altar of exploitation current in the industrial society. The life of the individual is meaningful only when his individuality is accepted.

13.2 EDUCATION ACCORDING TO EXISTENTIALISM

The following may be regarded as impacts of existentialism on education.

1. An existentialist wants the full development of the individuality of a human being. He does not like one-sided development.

2. An existentialist does not give too much importance to objective knowledge in the curriculum. This means that he dislikes over-importance given to science and mathematics, etc. At places he opposes them also. However, he does not regard them as useless. Jaspers wants to make objective knowledge as the basis of subjective knowledge.

3. An existentialist philosopher can realise the "self" by being in the world itself. He gives importance to the environment of man. The environment of the external world is the main means for an individual's education. By living in this environment he has to understand his 'self' and to effect its full development. Therefore, in any scheme of education due attention must be given to the environment of the individual. Only those subjects should be taught which may help the full development of personality of the 'self' in order to carry it upto the ultimate existence.

4. The existenlialist gives preference to subjectivity in place of objectivity. Therefore the system of education should be such as to make the individual subjective and

introvert instead of objective and extrovert. Only then an individual will be able to recognise his self.

5. Existentialism is not metaphysics. Therefore it does not take within its purview the analysis of the truth of this visible world, its eternalness and its reality. In fact, it is only a doctrine to help one to realise his 'self'. It is a way of thinking which wants to convert objectivity into subjectivity. It gives paramount importance to individuality and wants to develop it to the fullest extent. There can be no substitute to individuality. As already stated earlier, according to existentialism our educational system should promote the full development of personality and help one to realise his "self".

6. An existentialist opposes the scientific and technological way of thinking which places any obstruction in the experience of the self. He cannot tolerate the repression of one's individuality. The modern man is full of tension. He was not so a few hundred years ago. Due to objectivity of the modern times, the subjectivity of the individual is lying repressed. To day a man wants to understand a situation in relation to others, but he does not want to understand the same in his own relationship. This is the main cause of his downfall.

7. The modern man is so much involved in material hungers and conflicts that it is difficult for him to come out of them. The liberal education has been completely changed into vocational education. Existentialism is not against vocational education. But according to an existentialist the purpose of vocational education should be to enable a person to earn a living but not to lose the identity of his "self". In fact, vocational education should make one free from worries regarding necessities of life and should ultimately lead him towards realising his self.

13.3 EDUCATIONAL PROCESS ACCORDING TO EXISTENTIALISM

We shall now discuss the implications of existentialism for the teacher, the student and the curriculum :

THE TEACHER : According to existentialism the teacher is the main pillar of the entire educational process. An existentialist teacher has to help the student towards realising his "self". The teacher has to be a guide. The teacher should be an introvert, in order that he may change the objective into subjective. Only then he can help the student to experience his self.

THE STUDENT : The student should feel completely free to realize his self. Under the guidance of the teacher, the

student should try to realize his self through introspection. The student accepts the discipline prescribed by the teacher and does not become irresponsible. The purpose of freedom given to him should be to enable him to effect the full development of his individuality.

THE CURRICULUM : An existentialist wants to bring the child into close contact with the external world. In other words, various subjects of arts, sciences, and humanities may be taught to the student, but the purpose of this teaching should be to enable him to acquire subjective knowledge with the help of the objective means. The main purpose of teaching any subject would be directed towards this goal.

In short, existentialism wants education of the entire humanity as represented in an individual.

13.4 PLAYWAY METHOD OF EDUCATION AND PLAY MATERIALS

Introduction

The most crucial period in a child's life, when he can build his ego firmly, covers his second and third years. At this time, play may be only his real means of building self-image. The child must be the center of every play and situation. He must play the mother, father, or the baby. He is not ready to allow dolls to play these roles. He becomes the baby, occupies the doll carriage, and often destroys it by his weight or its lack of sturdiness. In their search for

bigness, Toddler-Twos imitate the important people in their lives; mother talking on the telephone, tackling father's tools, helping push the Lawnmower, walking in big sister's high-heel shoes; etc.

Because of her smallness, the two-year old is shut out from playing any role in the exciting real-life world of adults: during a car, steering a boat, building a skyscraper. The two year-old deliberately creates a make-believe world of roads with blocks, ears and play people, and makes all do his bidding. As more language develops, she uses words to fanta size and recreate many of the settings and events in the real world. As he maneuvers his play, people and trucks in this imaginative play, he is fortifying his inner feelings about his own powers.

Ruth E. Hartley, Lawrence K. Frank and Robert M. Goldenson (1952) in their book "In Understanding Children's Play" elaborate: "When they build airports, skyscrapers, they are not merely reproducing objects; they are, at least in fantasy, gaining control over things that ordinarily driving them".

Transportation toys, give children the feeling of being "In the driver's seat". They feel titanic as they cause harmless head-on collisions of these toy vehicles on their building-block Roadways. When a child of two and a half or

three knocks down his block structure he is merely asserting his right to destroy his non self-created product.

The play materials that most readily enable a child to affect her environment are the unpainted hardwood nursery school unit blocks and hollow blocks and play boards (for in door and out door use). With such large blocks a child can build a "big world" in a short time.

13.5 STRUCTURED VERSUS UNSTRUCTURED TOYS AND PLAY

Dr. Mary Ann Pulaski (1973) reports that the structure of the toys available to a child has a profound effect upon the level of her make-believe play and creativity. One of the characteristics that distinguishes human from animal play in childhood is the capacity for make-believe. Dr. Pulaski is concerned that in today's society there are increasing less opportunities for children to exercise their imagination. Through movies, television and their tools children are provided with the utmost in prefabricated play materials. "Dolls are well dressed and sophisticated as vogue models, and war toys so realistic as often to be gruesome are rampant. Nothing is left to the imagination. Thus it is conceivable that imagination and fantasy may decline in some groups for lack of practice".

Structured play things have more detail, lack multi purpose, and can be used for one situation only; they are

less flexible in a play setting. For example a milk truck designed with great detail can be used only for playing at milk delivery. However, a wooden block on wheels with no details can be used in all kinds of floor play. Why pay for elaborate play settings when one set of blocks and a few play people and animals can reproduce almost all of these at a reaction of the cost?

Unstructured play materials provide more play choices to the child and in which the reward lies in the excitement of discovery and in the play activity itself. There are no pre-conceived goals engineered into. Unstructured playthings, no adult-imposed objections. Most often, such toys are the low materials of play; which include nursery school unit building blocks, clay, sand finger paints, water poster paints, brushes, paper, pegs and peg boards, design cubes, etc. for all of which there are no restricting blueprints to follow.

Initially the child "fools around" with the material; i.e. he may arrange blocks in long roads or stand them up on end and topple them. He may try filling a large piece of paper with board strokes of paint. All children gain pleasure and a real sense of confidence in themselves each time they master the elements in their play word.

13.6 CAROLINE PRATT PLAYTHINGS

Caroline Pratt, teacher of woodcraft and founder-

principal of the City and Country School in New York City for three-to-thirteen-year old, was a pioneer educational toy maker. She knew that the secret of good toys is multiple usage, freedom from frustrating details, and ease in manipulation.

She created wedge-shaped people, six-inch-high wooden cutouts of everyday community workers and family figures, wide at the bottom and thin at the top so that they could stand without toppling. She designed wooden trucks and cars and interlocking floor trains without wheels for easy maneuvering by the youngest girls and boys.

Miss Pratt set about providing young children with a climbing-carrying-pulling-pushing environment with limitless city and country building and dramatization possibilities. From the carpenter, she borrowed the sawhorse; from the painter, the ladder and walking board as well as wide paint brushes, pails, and rope. From the bricklayer, she adapted large wooden hollow blocks for building houses, stores, etc. From the cement worker, she took the single-wheel barrow and made it into a two-wheel barrow for greater stability. From the dock worker, she adapted the oversized wooden packing crate, barrel, and platform truck. Out of all these Miss Pratt created a mobile play environment that could start physical activity and imaginative play working overtime.

Lifting the heavy but portable hardwood hollow blocks activates the back muscles. Maneuvering a packing create and building a house or a boat require the cooperation and strength of several children. The walking board exercises physical coordination and a sense of balance.

In play and work projects, Miss Pratt believed in teaching all children to "manage danger". For example, she removed grardrails on climbers, slides, and raised platforms.

Her finest accomplishment remains her unit building blocks. These floor play blocks consist of many matched units: the unit block, square or half unit, double unit, and the quadruple unit. Also included are curves, cylinders, ramps, triangles, pillars, etc. The smooth, accurately engineered, natural-finish hardwood blocks are easily handled by children and can be put to an infinite variety of uses.

Miss Pratt though that blocks were suited perfectly to children's play purposes because a simple geomatric shape could become any number of things: a house, truck, plane, boat, railroad, car, barn, or skyscraper. Building with blocks starts out at about two years of age as a simple, individual play activity; cooperative block play begins at about four or five years of age, when plans and constructions grow increasingly complicated.

A child cannot build unless she has sufficient building blocks on hand; at least twenty or more units and twenty or more double units. If your department store or toy shop does not sell blocks by the piece, try the school supply house listed in your telephone Yellow Pages directory.

Here are our recommendations for age-graded block sets:

Starter Block SWet for Two-Year-Olds

10 half units (2 3/4" x 2 3/4")

10 units (2 3/4" x 5 1/2")

10 double units (2 3/4" x 11")

8 pillars (1 3/8" x 5 1/2")

8 small triangles (2 3/4" x 2 3/4")

Block Set for Three-Year-Olds

12 half units (2 3/4" x 2 3/4")

16 units (2 3/4" x 5 1/2")

16 double units (2 3/4" x 11")

2 roof boards (2 3/4" x 11" x 11/32")

12 pillars (1 3/8" x 5 1/2")

2 small cylinders (1 3/8" x 5 1/2")

2 large cylinders (2 3/4" x 5 1/2")

10 small triangles (2 3/4" x 2 3/4")

2 large triangles (2 3/4" x 5 1/2")

Block Set for Four-Year Odds

12 half units (2 3/4" x 2 3/4")

16-26 units (2 3/4" x 5 1/2")

16-30 double units (2 3/4" x 11")

4 quadruple units (2 3/4" x 22")

12 pillars (1 3/8" x 5 1/2")

4 large cylinders (2 3/4" x 5 1/2")

6 small triangles (2 3/4" x 2 3/4")

6 large triangles (2 3/4" x 5 1/2")

2 tramps (2 3/4" x 5 1/2")

2-4 elliptical curves (2 3/4" x 13 1/2")

1 Y switch (8 1/4" x 11")

1 right-angle switch (5 1/2" x 8")

2-4 circular curves (2 3/4" x 8")

The thickness of all blocks, unless indicated otherwise, is 1 3/8".

Keep adding to a starter set each month until your child has enough blocks to build a structure as tall as he is. Do not worry about their cost. After your children have used them daily for about eight years, you will be able to sell them as desirable "seconds" to schools or other parents. You will be mazed at the prices people pay for these hardwood block sets twenty years later. So beg, borrow, or budget the money; hardwood unit building blocks will be your best toy investment! (We recommend that you buy your building blocks from a reputable nursery school or kindergarten supplier. Blocks are hard to make at home

because they require precise measuring and heavy-duty cutting tools).

Bendable or wedge-shaped play people in proper scale (one inch to one foot), assorted animals, and cars and trucks expand the play possibilities of unit building blocks. Parents who watch a city or country scene unfold can accelerate learning by introducing signs to identify streets and buildings, ferries and barges for food and other waterway transport, etc. They can intervene with suitable stories and trips to local places of interest to keep curiosity perking.

Intervention is a role that parents need to assume with great care. Children relish interchange of playfulness with adults, but only when it is not heavy-handed. There is real imprinting on creativeness in later life if a child has enjoyed adult support for his or her early play fantasies and efforts. The right suggestion, the right word at the right time can deepen and enrich play experience.

The following lists are designed to help you choose appropriate toys for twenty-four- to thirty-six months olds:

Quiet and Manipulative Play
dress-me dolls (zippers, snaps, buckles, etc.)
self-help cloth books
beads to string (and laces with long metal tips

13(B) PLANNING FOR ACADEMIC EXCELLENCE

13.7 EMERGING TEACHING LEARNING STRATEGIES AND CLASSROOM MANAGEMENT

Educational set up in India is characterized by a long chain of structures and sub-structures. At the one end of this chain are the agencies responsible for policy decisions, controlling education at macro level, while at the other end is the child representing the end product of the process. Perhaps in education, this line is much longer with its sub-structures on the one hand; represented by decision at the national level by agencies like CABE, MHRD, NCERT, Directorates of Education, supervisory and administrative, prescribed curricula, text-books, annual schedules etc. This distance between policy formulation and the transformed individual child, as a consequence of education, is symptomatic of dependence the schools have in today as part of this vast network.

13.7.1 BOTTOMLINE OF EDUCATIONAL HIERARCHY

The reasons for this state of affairs are too many meet an ordinary eye view. It is the school where the two sub-lines, as defined earlier, coverage; one represented by the hierarchical structures with their administrative dictates, controls over resources,

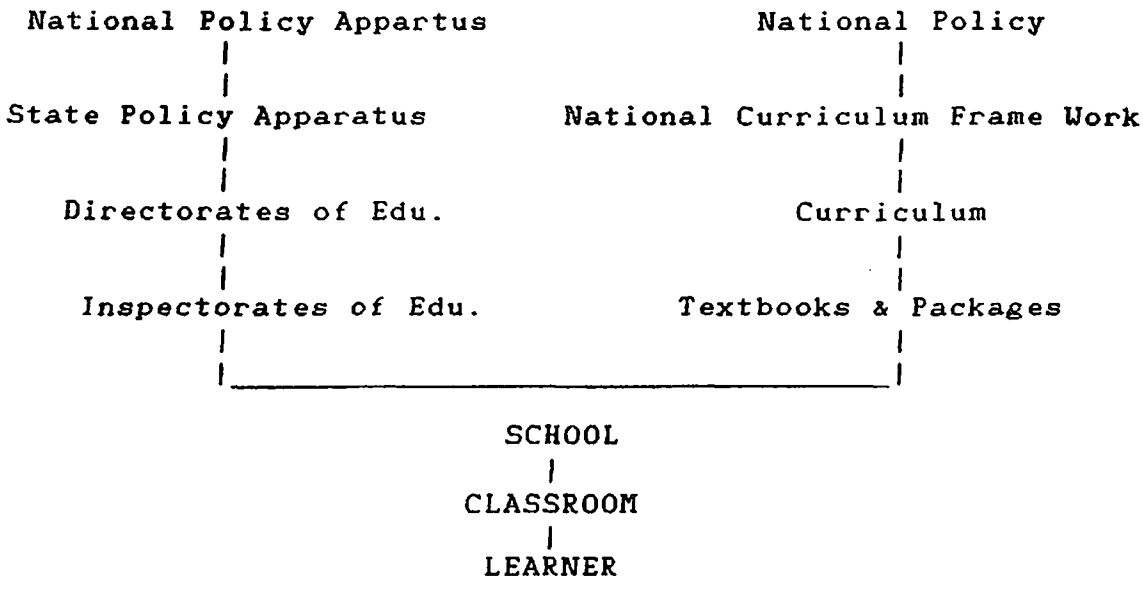
operational constraints etc. while the other is represented by the imposed academic process i.e. given curricula, given-text-books, given performance expectations and given system of evaluation. Schools in the Indian set up find themselves straight-jacketed without the much needed elbow space, with the result that classroom operations have become a routinized affair with their fixed annual schedules, fixed sizes of classrooms, standardized packages of instructions, collective teaching, collective promotions. It would not be wrong if a school is compared to a factory which brings out a standard product at the end of the line with a fixed mix of given raw materials, given tools of work and given discipline of work. This raises a serious question as to whether this conveyer-belt technology is capable of raising individuals, who are unique in their responses, possess finer sensibilities and are characterized by rational and resolved minds; human beings with a sharp intellect, warm hearts and benevolent outlook on life.

The answer perhaps lies in greater initiative on the part of schools to break away from the bond of dependence in which they have allowed themselves to slip, thereby crippling their creative energies. This possibly can happen either by asking for greater

autonomy in all vital matters or by exercising initiative within the given system. The latter can happen by regulating the process of education within the school with clearer perceptions and sharper focus on issues where schools are required to act with authority. Both the situations call for powerful sensors and decoders for appreciating the policies, the end goals to be achieved, identifying resources and infrastructural needs, understanding the role of schools in the total set-up, estimating the margin of freedom and initiative feasible, the demands of the clientele and for balancing scores of factors resulting from their interaction.

The schools are the most powerful nuclei at the bottom-line with a universe of their own which can be likened to a cell in the human body, one among billions; which has its well-defined sphere of action yet operates in harmony with the total rhythm of the body. Perhaps school too has a similar role to play where the societal goals, handed down through curricula, text-books and other such means come into play with the individual child, his aspirations, potentials, and expectations of the parents. The outcome is an individual surcharged with his own source of energy reaching out for maximum self-fulfillment in harmony with the ideals the society cherishes.

Educational Hierarchy



13.7.2 CLASSROOM MANAGEMENT AS A CRITICAL MASS

In order to achieve this ideal, the school discharges several functions ranging from resource management, financial management to behavioural transformation. In this process, school buildings, libraries, laboratories, transmission and projection gadgets and all its constituents play a significant part. In this myriad of factors operational in school, classroom management forms a critical mass around which all these factors revolve. These factors, in a direct or indirect relationship, are contributory to the critical mass and supportive in its growth. With the failure of classroom management would collapse the entire

super-structure. The role of school, therefore, has to be critically examined in the context of classroom management, the changing strategies of learning and the impact it is going to have on the total functioning of the school system.

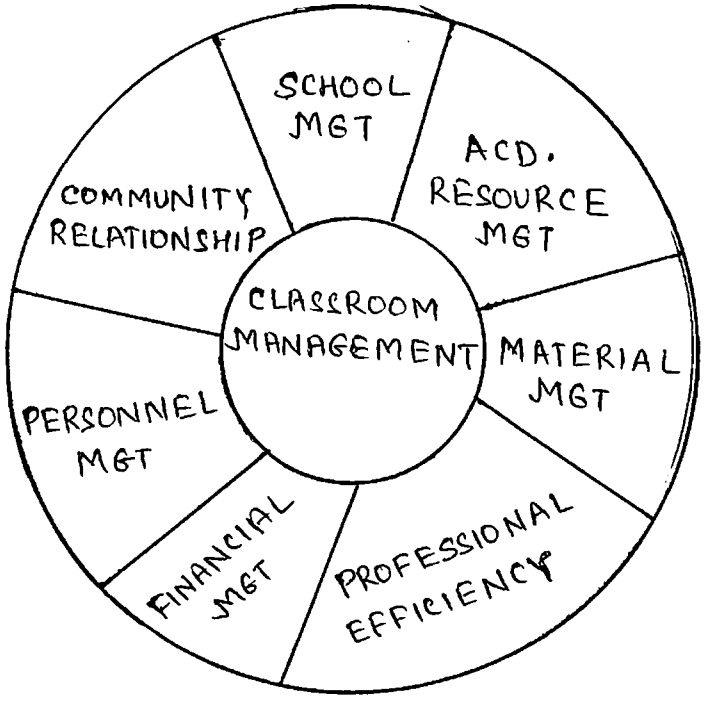


Figure 1 : Classroom Management as Centre of School Management

There are multi-sided demands on the school system which differ from region to region and society to society, depending on the setting they are placed in. As such, there cannot be any finality about their role yet some universally accepted parameters are emerging against which their role can be judged. They are seen as;

(a) Transmitters of culture

(b) Promoters of inherent human potential

(c) Instruments of socio-economic change

(d) Curtain raisers for future

From these emerge a multitude of activities with child as the focal point. Some of these happen within the classroom while some others happen outside the classroom. It is the school which, through the agency of the teacher, promotes inter-play between factors mentioned earlier and the individual child. The growth of the child encompasses his intellectual, physical,moral, emotional and aesthetic development. But to delimit the scope of the paper the discussion will be confined only to intellectual growth and consequential transformation in moral, aesthetic and emotional composure of the individual on the one hand and the classroom management on the other. In this context, it would be necessary to examine emerging trends in the process of education which are having far-reaching impact on classroom management in modern times.

Education is seen more as a by-product of socio-economic forces than as a cause generating these forces. How the schools could wrest initiative to be a self-generating source of energy surrounded by other peripheral pressures built on them by administrative set-ups, academic structures evergrowing parental expectations and varying potentials of individual student, indeed a mute question. For a suitable answer some constant and universal factors may have to be identified clearly and sharply which can impart a self-

sustaining quality to the classroom management; a direction which the schools should set for themselves amidst all constraints to forge ahead in future. A look at the developments throughout the world which have transformed pedagogy and are shaping the future classrooms may be pertinent in this context.

Man's quest has been continuing in all fields. Every science is bringing more and more specializations. In each field of investigation the process of inquiry is perception. Laws of physics as understood in the times of Issac Newton have been altered beyond recognition. Physics which once upon a time itself used to be an area of specialization has given birth to innumerable inter-linking disciplines. Atom no longer is the last frontier of knowledge but has given place to neutrons, protons, electrons and strange elements like tacheons.

13.7.3 IMPACT OF EDUCATION

Analysis of the events described in the fore-going paragraphs has a powerful message for education. Some of the quickly drawn surmises could be as follows :

i. Static pattern of education and its characteristic slow response can render the whole process of education ineffective. It will have to be quickened in its

response, through faster perceptions of the growing needs and challenges, faster organization of means of learning in order to be a forward looking enterprise rather than being merely an outcome of the myriad of forces operative.

ii. Ever-expanding knowledge will make its transmission and retention difficult. Knowledge is doubling every six years. In a few years, this speed will out pace itself. Perhaps new structures of knowledge may have to be conceived and new learning strategies may have to be devised by which essential skills of living are imparted and a sense of confidence is generated in the individual to face the unknown future.

iii. A mechanism may have to be thought of which enables schools, teachers and learners to respond quickly through organized efforts. The present form of response in an isolated and unrealistic situation, both at the teaching and testing stages, will not take us very far About this enough has been said by successive Commissions and Committees.

13.7.4 INDIVIDUALIZED LEARNING

Under the impact of these fast moving changes, education too has been changing its characteristics world-wide. There is a greater realization on the part of planners

and pedagogues :

i. that students are required to respond to a variety of situations which are ever-changing and difficult to conceive. No fixed body of knowledge can satisfy the needs of learners if they are to be prepared for an unknown future.

ii. that this is further compounded by different propensities and levels of attainment of individual learners.

It is being hotly debated whether a standardized programme of learning can have any relevance at all; given in the form of standard curricula, text-books and teaching schedules. The need is being felt for tailored programmes of varied durations, a variety of options, to give enough opportunity to individuals to pick and choose from, suiting their talents. The thrust is towards individualized learning. Perhaps this may call for :

(a) detailed profiling of each individual learner in the class with reference to a discipline, competencies and levels of achievement therein

(b) More particularized opportunity and attention during the process of learning

(c) tailored responses for slow learners, fast learners and

average learners

(d) deep insight into the under-currents of thought revealed through responses, in terms of conflicts, learning blocks, fallacies, wrong notions, idiosyncrasies, relevance of thought etc., demanding more studied response from the teacher to promote learning

(e) specially structured and individualized assignments requiring individualized responses

(f) respecting unique responses.

The concept of individualized learning is forcing yet another dimension. Apart from unique aptitudes, individuals differ in their styles of comprehending the situation, analysing it, seeing the existing relationships between different attributes of the problem, sequencing the alternative solutions.

13.7.5 SELF-PACED LEARNING

This demands a more compatible atmosphere of learning than a crowded classroom where the identity of individual is totally lost and communication on one to one basis is broken. The individual has to be given sufficient time to select the course, set pace for his own learning and have

freedom to move from one stage to another on the basis of progressive mastery of the package. Thus there is a growing interest in Self-Pacing of Learning within the given limitations of the existing classroom system. To this more liberalized form of response may be needed such as :

(a) Periodical Tests at the readiness of the child in a given topic

(b) Grouping of students according to preparedness for a job or qualities on occasions

(c) Individualized remedial measures for unique weaknesses

(d) Instituting peer teaching according to Compatibility and Competence

(e) Flexible policy of ranking and promotion according to levels of achievement in each individual discipline.

13.7.6 INTER-ACTIVE MODE OF LEARNING

This would require a fundamental change in the teaching-learning technology. Simply transmitting of knowledge through passive means, as is the case today, will not give learning any permanence unless the students are allowed to experience by themselves. This can be provided either in real situations or contrived situations. No amount of classical treatises, howsoever masterly they may be in

their exposition, can make one an accomplished musician unless one is put through that hard rigour of practical training wherein each metre and note is carefully studied and symphony or harmony is distinguished from cacophony. A debating mind cannot be expected in a situation where students are just passive listeners and arguments take place in someone else's mind rather than the learner's. Experience is best ensured when teaching-learning situation involves active and equal participation of learners. This mode of learning is characterized as Participative or Interactive Learning.

In this mode of learning, every individual pupil acts along with the teacher and among his peers, according to one's own motivation, initiative and potential. Teacher is a co-partner in the entire venture. He is not a supremo but one of the members of the class ready to explore, amend and learn. Mistakes are carefully analysed and candidly accepted. The entire process is marked by open-ness, give-and-take, democratic way of thinking, accepting the ideas, challenging them if the need be on the basis of unquestionable logic and rationale. "Teaching is a process by which teacher and students create a shared environment including sets of values and beliefs which in turn colour their view of reality."

13.7.7 MODELS OF LEARNING - PROMOTING INTERACTION

Over the centuries several models of teaching have been advanced which can, according to Joyce and Weil, be categorised into four families of models.

The purpose here is not to go into merits and demerits of each individual model but only to indicate wide sweep of alternatives available which prominently focus on one or two significant strategies that can be judiciously selected by teachers in view of the purpose(s) they aim at.

13.7.8 INFORMATION-PROCESSING MODELS

These are basically targeted towards enhancing information-processing capabilities of students which refer to ways of handling stimuli from the environment, organizing data, sensing problems, generating concepts and solutions to the problem and employing verbal or non-verbal symbols. Some of the models suggested in this family are given in the table below showing their main characteristics.

MODEL	MAJOR THEORIST	MISSION OR GOAL
Inductive Thinking Model	Hilda Taba	Designed primarily for development of inductive processes and academic reasoning
Inquiry Training Model	Richard Suchman	Capacities are useful for personal and social goals as well.
Scientific Inquiry	Joseph J.Schwab (also much of the Curriculum Reform movement of the 1960s)	Designed to teach the research system of a discipline, but also expected to have effects in other domains (sociological methods may be taught in order to increase social understanding and social problem-solving.
Concept Attainment	Jerome Bruner	Designed primarily to develop inductive reasoning, but also for concept development and analysis.
Cognitive Growth	Jean Piaget Irving Sigel Edmund Sullivan Lawrence Kohlberg	Designed to increase general intellectual development especially logical reasoning, but can be applied to social and moral development as well (see Kohlberg, 1976)
Advance Organizer	David Ausbel Model	Designed to increase the efficiency of information-processing capacities to absorb and relate bodies of knowledge.
Memory	Harry Lorayne Jerry Lucas	Designed to increase capacity to memorize.

13.7.9 PERSONAL MODELS

The models under this family are oriented towards the individual and self-hood. They emphasize the processes by which individuals and organize their unique reality. The following models have been suggested under this family :

MODEL	MAJOR THEORIST	MISSION OR GOAL
Non-directive Teaching	Carl Rogers	Emphasis on building the capacity for personal development in terms of self-awareness.
Awareness Training	Fritz Perls William Schutz	Increasing one's capacity for self-exploration and self-awareness. Much emphasis on development of interpersonal awareness and understanding as well as body and sensory awareness.
Synectics	William Gordon	Personal development of creativity and creative problem-solving.
Conceptual	David Hunt	Designed to increase system's personal complexity and flexibility.
Classroom Meeting	William Glasser	Development of self-understanding and responsibility to oneself and one's social group.

13.7.10 SOCIAL INTERACTION MODELS

The models in this family emphasize the relationship of the individual to society or to persons. They focus on the processes by which reality is negotiated. Consequently, models from this orientation give priority to the improvement of the individual's ability to relate to others, to engage in democratic processes and to work productively in the society.

MODEL	MAJOR THEORIST	MISSION OR GOAL
Group Investigation	Herbert Thelen John Dewey	Development of skills for participation in democratic social process through combined emphasis on interpersonal(group) skills and academic inquiry skills. Aspects of personal development are important outgrowths of this model.
Social Inquiry	Dyron Massialas Benjamin Cox	Social problem solving, primarily through academic inquiry and logical reasoning.
Laboratory Method	National Training Laboratory (NTL) Bethel, Maine	Development of interpersonal and group skills and, through this, personal awareness and flexibility.
Jurisprudential	Donald Oliver James P.Shaver	Designed primarily to teach the jurisprudential form of reference as a way of thinking about and resolving social issue.
Role playing	Fannie Shaftel George Shaftel	Designed to induce students to inquire into personal and social values, becoming the source of their inquiry.
Social Simulation	Sarene Boocock Harold Guetzkow	Designed to help students experience various social processes and realities and to examine their own reactions to them, also to acquire concepts and decision making skills.

13.7.11 BEHAVIOURAL MODELS

In this family of models the common thrust is on emphasis for changing the visible behaviour of the learner. Based on principles of stimulus control and reinforcement, behavioural models have been successfully employed in interactive conditions, and mediated conditions, both on individual basis and group basis.

MODEL	MAJOR THEORIST	MISSION OR GOAL
Contingency	B.F. Skinner	Facts, concepts, skills management
Self-Control	B.F. Skinner	Social behaviour/skills
Relaxation	Rimm & Masters Wolpe	Personal goals (reduction of stress, anxiety)
Stress Reduction	Rimm & Masters Wolpe	Substitution of relaxation for anxiety in a social situation
Assertive Training	Wolpe, Lazarus, Salter	Direct, spontaneous expression of feelings in a social situation
Desen-sitization	Wolpe	
Direct Training	Gagne	Pattern of behaviour, Smith & Smithskill.

Interactive mode of learning basically has three dimensions :

Linear Interactions :

1. Interaction between Teacher and Learner
2. Interaction between one individual and the other
3. Multi-directional interaction with more than one member

In this context peer/pair learning, group discussions, role-play simulation, dramatization, projects, surveys and several other forms of interactions assume importance. Some of them are self-explanatory. Yet a few of them may need more elaboration.

13.7.12 SYNETICS MODEL

Propagated by William J.J. Gordon, it is an approach to the development of creativity to work together to function as problem-solvers or product developers. There are several underlying assumptions which it bases itself upon :

i. Creativity is important in everyday activities.

ii. If individuals understand the basis of creative process, they can learn to use that understanding to increase creativity with which they live and work.

iii. Creative invention is similar in all fields and is characterized by the same underlying intellectual processes.

iv. Individual and group inventions or creative thinking are very similar.

The process is challenging and requires careful insights into inherent operations :

i. The creative process needs to be brought to the conscious level rather than being an intuitive or sporadic phenomenon.

ii. Creativity is nearer to emotional component than intellectual component. Hence irrationality at times is

more important than procedure bound rationality. The basis of decision is however always rational.

iii. Emotional and irrational elements must be properly understood in order to increase the probability of success.

In its operational form it is a relationship of likeness, comparison of one object with another, using one idea in place of the other. Through these seeming substitutions the creative process occurs, connecting unfamiliar with the familiar or creating a new idea from the familiar ideas. Synetics provide a structure through which persons can free themselves to develop imagination and insight into every-day activities. Three types of analogies are used as the basis of synetics :

Personal Analogy	-	Students emphathizing with the ideas or objects to be compared.
Direct Analogy	-	Simple comparison of two objects or concepts.
Compressed Conflict	-	A two-word description of an object where the words seem to be opposite or contradict each other e.g. friendly foe, life saving destroyer. This analogy can be expressed through similar opposite ideas or concepts with hidden relationships.

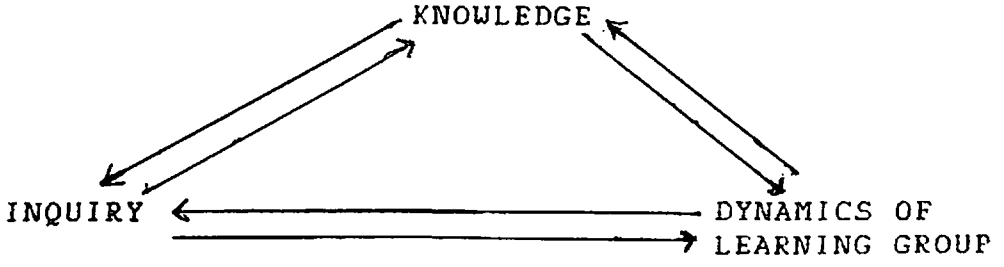
Participation in a synetics group invariably creates a unique shared experience, that fosters interpersonal understanding and a sense of togetherness and collectivity.

13.7.13 GROUP-INVESTIGATION METHOD

This is considered to be synonymous with the democratic process of learning. It is believed that a society of reflective thinkers would be capable of improving itself and preserving the uniqueness of individuals. Further, it stresses that knowledge is constructed and continuously reconstructed by individuals, and groups. This knowledge is not conveyed merely through sensory interaction with our environment but we must operate on experience to produce knowledge.

The individuals' ways of reflecting on reality are what make their world comprehensible to them and give them personal and social meaning. Someone who is insensitive to much of his experience and does not reflect on it will have far less richly constructed world than others.

Three concepts are central to this strategy.



A. INQUIRY

The process of inquiry involves following elements

(a) Simulation through confrontation with the problems

(b) Involvement of students both as participants and observers

(c) Consciousness about method of inquiry

(d) Capacity for reflection and synthesizing experience

B. KNOWLEDGE

Knowledge here relates more to applications of the universal principles drawn from past experience to present experience.

C : DYNAMICS OF LEARNING GROUP

The composition of group pre-supposes commonality of values for easy communication and similar ways of working. However, there should be enough differences to generate alternative reactions.

The advantages of such a model are many and varied. Though it is one of the most difficult methods requiring highly flexible mode of learning with highly attentive and well versed teacher, yet advantages far outweigh the

problems it may generate. The advantages are :

i. learner assumes on himself responsibility of learning

ii. capatalizes on the fund of previous knowledge and relates it to new situation

iii. Analyses the currents of thoughts and inter-faces them with his own

iv. weighs the arguments and appreciates their relevance and meaning in the context

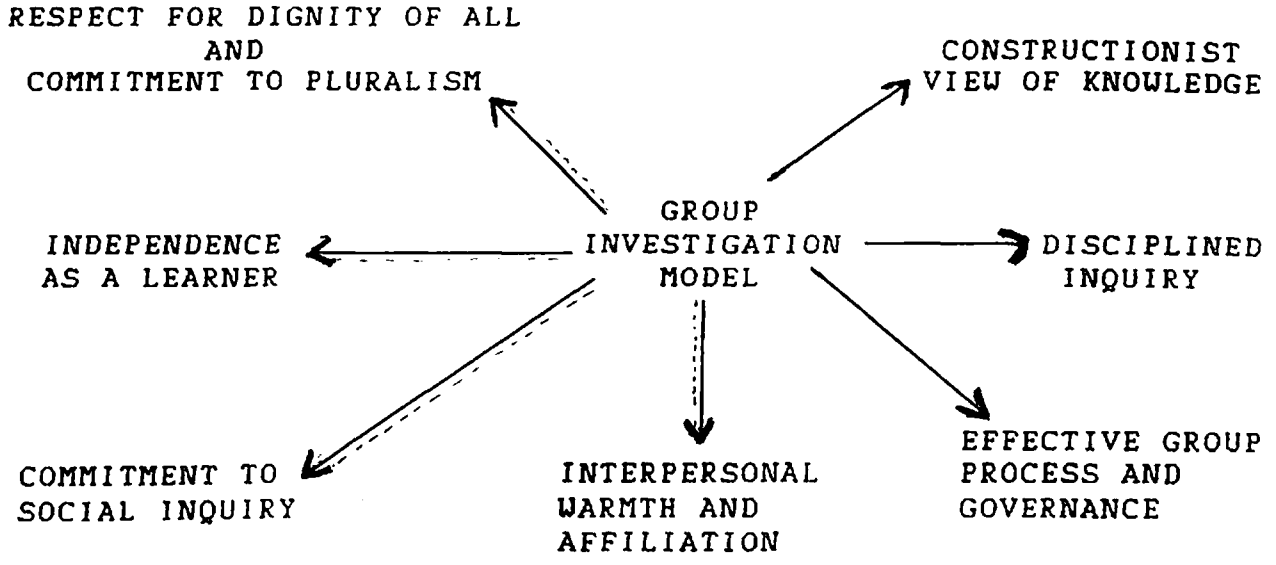
v. finds gaps and suggests bridges

vi. comes out with alternative plans acceptable in a situation

vii. modifies own thoughts and relates new generalizations to old beliefs and ideas

Thus the whole behaviour gets transformed which is illustrated by the diagram suggested by Joyce and Weil (1985).

Instructional and Nurturant Effects :



_____ INSTRUCTIONAL

..... NURTURANT

13.7.14 OUTCOMES OF INTERACTIVE MODE

The learner in the inter-active mode of learning through his active participation and intensive involvement,

i. projects his ideas with force;

ii. seizes initiative rather than waiting for opportunity given;

iii. assumes greater responsibility for self-learning;

iv. brings his own experience into inter-play with the

situation;

v. receives inputs in their varied forms through different sources;

vi. responds to and registers them more quickly than before;

vii. sifts relevant from irrelevant for building proper linkages and relationships between inputs being received;

viii. evaluates and assesses significance in the given context;

ix. modifies his own idea, assumptions, values, attitudes, behaviour as the exposure deepens; and

x. questions old assumptions on the basis of new formulations and generalizations arrived at, etc.

This is, indeed, a revolutionary transformation from a situation where the learner will receive knowledge in passivity. This marks a baffling change from :

(a) superficial learning to in-depth understanding

(b) forced efforts to conscious learning

(c) information processing to behavioural transformation

(d) uni-directional learning to multi-directional learning.

13.7.15 ROLE OF TEACHER

As a result of innovations in transaction of learning activity, the role of teacher too is undergoing rapid transformation. He is far too removed from the traditional role of a narrator or transmitter of knowledge. Teacher now is perceived as a powerful agent of change in human behaviour. He is always involved in a dynamic interaction with various players in the game.

Teacher Learner

Incomplete

Teacher(s) Learner(s)

Situations

In the context of the dynamic setting illustrated through the figures above and various models of learning, the following roles of teachers clearly emerge :

i. Since education is a deliberately planned effort every act is planned. **A Planner**

ii. Planning involves critical and rational decisions. Some times they are intuitive too. **A Decision Maker**

iii. Suitable climate needs to be generated or altered in which learning takes place. **A Visualizer**

iv. Sets interaction within given parameters.

An Initiator

v. Operates at the level of learners to find alternatives and critically examines or evaluates a situation.

A co-partner with equal stakes

vi. Selects resources to facilitate learning.

vii. Times and orchestrates the flow of learning. **A Manager**

viii. Anticipates problems and removes road-blocks in learning. **A facilitator**

ix. Ixites imagination and opens up new possibilities.

A motivator

x. Gives meaning to the act and crystallizes notions.

As authority

xi. Generates confidence in self-effort and gives a sense of direction and purpose. **A Friend**

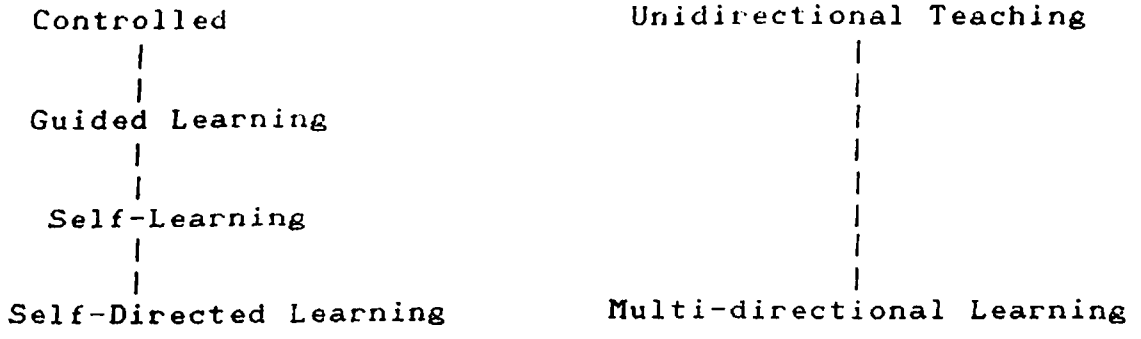
xii. Brings ideas and thoughts nearer to social reality.

A Bridge

xiii. Discerns under currents and reflects them with greater clarity etc. etc. **A Communicator**

xiv. Monitors and evaluates growth. **A Supervisor**

A teacher thus is an active agent in and outside the classroom, sensitive to all happenings taking place among various partners and factors responsible for learning. A careful analysis of the events would reveal that there is a drift from controlled learning experienced a few years ago to more positive happenings which can be illustrated through the following flow-diagram :



13.7.16 CHANGING DIMENSIONS OF CLASSROOM MANAGEMENT

The newly emerging strategies of teaching-learning are also re-shaping the present-day classrooms. New challenges call for more dynamic classroom-management. It is important to mention that distant teaching technologies, which have recently emerged have threatened the traditional grouping of students of seemingly equal levels of achievement and motivation for learning into a manageable mass of learners, known as a class. The general notion of class signifies that students of seemingly equal levels of achievement are

exposed to a similar design of experience to produce similar outcome differentiated only by their inherent potential.

13.7.17 PROMOTING BETTER MANAGEMENT

The interactive mode of learning may also have impact on overall functioning of the school. Principals, as managers and supervisors may have to make several adjustments in the working of the school. Some of these are listed below which hopefully may further prompt the principals to devise better alternatives :

i. Sharing the ideals with teachers and learners

ii. Discussing various strategies of learning

iii. Cultivating resources, both academic and material, for better professional efficiency

iv. Encouraging ingenious ideas through informal sharing of views, group discussions, formal staff meetings, symposiums etc.

v. Working out alternative strategies of learning

vi. Experimenting them by undertaking special projects

vii. Acknowledging merit and new ideas to promote talent

viii. Devising more effective means of supervision, other than examination results e.g. feedback from students, nature of tasks completed, accomplishment of students

shown in qualitative terms,,degree of sincerity shown in the effort etc.

ix. making adjustments in the total rhythm of the school; from financial allocation down to putting up with noise level and minor dislocations for the larger gains resulting from interactive mode of learning.

x. Showing understanding to the suggestions made by teachers and learners which are contributory to better academic health of the insituation.

The spirit of innovation revolves around the pragmatism shown by the principal and the management. Judgements formed on the basis of examination results can be inadequate and faulty, discouraging the sincere and hardworking teachers who honour professional values. A watchful eye of the principal with an understanding mind can do miracles in changing the dynamics of classroom management on which the foundations of successful school management rest. Other aspects, though significant in their own right, are only peripheral in nature and cannot take us far if the management in the classroom fails. Any reform in school management necessarily may have to be centered around the improved classroom management techniques and efficient ways of learning.

PART-V : EDUCATIONAL TECHNOLOGY

CHAPTER 14

PROGRESS OF EDUCATIONAL TECHNOLOGY IN INDIA

14.1 BACKDROP

The Government of India in the Ministry of Education and Social Welfare realized the importance of Educational Technology for qualitative improvement of education as long back as in 1971 and included Educational Technology in its 5th Five Year Plan. This Project has four sub-schemes as follows:

a) Setting up an Educational Technology Unit in the Ministry of Education & Social Welfare.

b) Establishing a Centre for Educational Technology in the NCERT.

c) Assisting States for setting up Educational Technology Cells and their programmes on 100% basis.

d) Strengthening a few educational institutions for undertaking Educational Technology Programmes.

Accordingly a Unit was started in the Ministry since 1971 and a CET in the NCERT was set up during 1973. Educational Technology Cells came into being in different States from 1972-73 onwards. With a view to strengthening selected educational institutions for undertaking Educational Technology Programmes, some assistance was given

to 50 continuation education centre by the NCERT.

The Unit in the Ministry made all planning, policy-making and providing funds for implementation of the Educational Project and the CET in the NCERT started functioning in the following areas:

a) Systems designing and innovations.
b) Training in different areas of Educational Technology.
c) Prototype production of suitable hardware and software.
d) Research and Evaluation.
e) Collection and dissemination of information data and consultancy services.

The establishment of ET Cells, however, coincided with introduction of ETV Programmes, mainly on account of Satellite Instructional Television Experiment in the Six States of Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Orissa and Rajasthan from the 1st August 1975 onwards. The hectic preparation for implementing the time bound SITE project took most of the time and energy available with the ET Cells. However, the ET Cells functioned in the following areas according to the local demands and available resources.

i) Planning programmes for making efficient use of mass media and modern educational technologies including schools and college education, open schools and open

universities, further and continuation education.

ii) Co-ordination with local AIR and Doordarshan Stations for production of suitable educational programmes of Radio and Television.

iii) Preparation of plans for production of educational films for all stages of formal education and for out of schools informal adult and teacher education, etc.

iv) Organisation of training courses for scriptwriter, presenter and classroom teachers required for implementing ET Programmes.

v) Production of background literature and Guidance materials required for effective use of educational radio and TV programmes.

vi) Showing educational films in the classroom in relation to curriculum.

vii) Exploring the possibilities of non-formal education, radio and television.

viii) Production and utilization of various audio-visual media and materials.

ix) Liaisoning between the Government of India in the Ministry of Education, Centre for Educational Technology on one hand and the State Department of

Educational Institutions and other concerned agencies on the other.

The ET Project was conceived as a broad-based and collaborative effort among the Ministry of Education, the Ministry of Information & Broadcasting, the Indian Space Research Organisation and other concerned organisations. It underlined the importance of inter-agency coordination, systematic planning, scientific evaluation and effective utilization. Operationally, the Scheme sought to extend the benefits of technology to large groups, particularly those in rural areas. It aimed at improving the quality of education at all levels, to reduce wastage and stagnation and introduce new methods of teaching and innovations. The programmes of ET Cells were shaped mainly in two ways according to the pressing requirements and facilities available in: (i) SITE States, and (ii) Non-SITE States.

14.2 PROGRAMMES IN SITE STATES

Although the Project was initiated in 1971, it took off only with the launching of the SITE in 1975-76, the instructional television programmes were transmitted directly from the Satellite TV reception sets in 2300 villages in the six States mentioned earlier. These programmes were transmitted in the morning to primary school students and in the evening to adult viewers.

The ETV Programmes were produced by the Upgraha

Doordarshan Kendras and Indian Space Research Organisation. The TV Sets were installed mostly in Primary Schools, Community Halls and Panchayat Ghars. The ET Cell, provided all management and supporting services and facilities for proper use of ETV Programmes which include electrification of buildings, appointment of custodians, payment of their remuneration and energy charges, supply of programme schedules and support materials like teacher's notes, etc.

The ET Cells organised training courses for user teachers in the handling of TV sets and utilization of ETV Programmes. They also assisted in the planning of programmes and organisation of training courses for scriptwriters, the ET Cells actively participated in the massive training programmes for science teachers of elementary schools through a multi-media package developed by the CIET, NCERT. About 47,000 teachers were given orientation in science through such training programmes.

The ET Cells conducted research studies and evaluated various aspects of SITE individually and jointlyin collaboration with other agencies. Some ET Cells like in Orissa undertook in-depth studies of the impact of educational television programmes. These studies have been useful for bringing about a better understanding of the implication of educational television. Consequently, the ET Cells acquired greater understanding, clarity and insight

into the TV Process.

They also planned and implemented various programmes for promotion of the use of radio, films and slides in education. Some employed radio and television in training primary school teachers in order to avoid dislocation, to cut down costs and maintain continuous contacts in service. Thus, they gained experience and expertise into organisational and management systems and logistics necessary for large scale use of various media and materials in education.

14.3 PROGRAMMES IN NON-SITE STATES

The ET Cells in Maharashtra and Tamil Nadu have developed an infrastructure for production and utilization of TV Programmes. Telecasting of the programmes produced by them was, however, done by TV Stations at Bombay and Madras respectively. Besides, ET Cells in Tamil Nadu launched a special drive for providing radio sets through voluntary assistance of the people and its achievement was remarkable. It also took several measures for integration of educational radio programmes with the school system. The ET Cell in Punjab planned a thematic approach to radio programmes.

The ET Cell in Gujarat launched a training programme involving 10,000 primary school teachers for improving their competence in teaching English. This programme consisted of

a systematically planned series of radio programmes and printed materials. It was implemented in collaboration with AIR, State Institute of Education and H.M. Patel Institute of English. In Kerala, a radio-cum-correspondence teacher-training programme was organised since 1975 in collaboration with AIR SITE and other state agencies. The encouraging experience of such programmes facilitated the development of ET Cells in the State.

Besides the six States (Andhra Pradesh, Karnataka, Madhya Pradesh, Orissa and Rajasthan) Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh and Jammu and Kashmir had their ET Cells by 1977-78. In the following two or three years ET Cells were established in most of the remaining States like Himachal Pradesh, Nagaland, Manipur, Meghalaya, Sikkim, Assam, West Bengal and Mizoram.

14.4 POST-SITE PROGRESS

As discussed earlier, the ET Cells in six States were mostly devoted to implementation of the SITE Programmes during the period from August 1975 to July 1975. The Centre for Educational Technology NCERT plays a leadership role in planning and organising various educational technology programmes. The CET and ET Cells worked as catalytic agents in this field and heralded changes in the educational system. They tried out new approaches to the achievement of

educational objectives such as universalization of primary education and removal of illiteracy. Thus, a number of innovations were introduced and implemented both for quality and quantity of education.

The CET organised training programmes in order to develop expertise at the national and state levels mainly in the following areas:

i) Orientation courses in Educational Technology;
ii) Training Courses for Scriptwriting in ETV and Educational Radio.
iii) Training Courses for resource persons for media utilization.
iv) Training courses for writing self-instructional materials.
v) Training courses for system designing, animation graphics, etc.

A CET conducted a number of surveys and studies in the field of radio, television and other aspects of educational technology for effective planning, utilization and production of Educational Programmes. It also produced prototype materials and afford consultancy services in different aspects of Educational Technology.

The Ministry of Education launched some research studies on the qualitative appraisal of ETV Programmes and

their impact on enrolment and attendance in collaboration with States ET Cells and Doordarshan Kendras. In Orissa, for example, through intensive field work data were collected from 1349 children and 238 teachers and inspection officers. The report of the study has already been published by the Ministry of Education. The findings of this pioneering study are felt useful and enlightening for production and utilization of educational television programmes.

The ET Cells paid their attention to systematic planning for better production and utilization of radio and television programme, slides and films. Training programmes were organised for Radio and TV user teacher and scriptwriters workshops were held for developing self-instructional materials and graphics. Seminars and conferences were organised for generating awareness about the developing skills in educational technology. A good number of research studies and surveys were conducted by the ET Cells in the use and qualitative appraisal of Radio and TV programmes. The ET Cells also produced various kinds of support and publicity materials and brought out research report in educational technology.

14.5 TERRESTRIAL TELEVISION

Experience gained during SITE period was quite encouraging for expansion of TV Service in the country. This

led Government of India to decide for starting the SITE continuity community viewing programme. That is 40% of the villages within 40 Kms of radius were provided community viewing facility in six States SITE cluster areas by setting terrestrial transmitters. It was also possible due to availability of the infrastructure and studio facilities developed during SITE period. Thus, the terrestrial transmission was made available from 1977 to 1982 and educational television programmes were telecast in the morning hours along with other programmes in the evening.

During this period consolidation took place in several States. Since only a skeleton staff consisting of an officer-in-charge, two programmers-cum-scriptwriters, two office assistants, one typist-cum-stenographer, a peon and a driver was sanctioned for all ET Cells, it was difficult to cope up with the expanding works. All the States have Audio-Visual units/departments started in nineteen fifties. In such States these units were merged with ET Cells and in some States the officers-in-charge of AV Units were given the charge of ET Cells. In the remaining states both the ET Cells and AV units worked separately. With a view to avoiding duplication of work and waste of physical and human resources, the Ministry of Education decided to amalgamate both the units officially. Although this decision was materialized in some states, it faced strong opposition in others on several grounds. Hence, diversity and variety were

evident in the infrastructure and resultant activities of the ET Cells which functioned under the Secretariat or Directorate of SCERT (SIE).

Although all emphasis has been laid over these years particularly on production of ETV programmes for the children in the age-groups of 5-8 years and 9-11 years and teachers of primary schools, the status of production of the quantum of ETV programmes, on the whole, is far from satisfactory. In comparison to huge expenditure incurred on payment of staff salary, installation of costly equipment and other recurring as well as non-recurring expenditure, the outcome is very negligible. Besides, the SIET's are required to train the teachers, scriptwriters and other concerned with production, utilization and evaluation of ETV programmes, to conduct studies and produce support materials to ensure better utilization of such programmes. But unfortunately the progress in these aspects has not been encouraging at all.

These SIET's and ET Cells/Departments working in various states are expected to work for production and utilization of ther media and materials like radio and audio programmes. Various appropriate technologies are not used and developed for improvement of school and teacher education. But such activities are not satisfactory in most of the states. Hence, the programmes and problems of these

agencies or organisations needs to be reviewed.

Detailed study of the educational scenario in India and analysis of of the educational activities and academic environment of some selected schools of Pilani and nearby villages, shows that the above mentioned educational technology activities are not available in majority of the rural/urban schools and there is an urgent need for the development of appropriate material for the proper teaching and learning environment in the schools.

The dimensions of the problem, is vast and the properly designed materials for the pre-primary class for the motivation of learner for education is great and purposeful effort has been made in this study (research workers to understand):

a) For development of conceptual approach for designing of educational models/aids and
b) Designing and development of the working models for selected subjects of early education.

CHAPTER 15

CONCEPTUAL APPROACH FOR DESIGNING OF EDUCATIONAL MODELS/AIDS

15.1 INTRODUCTION

Sensory experiences form the basis of knowledge. There are five senses: visual (eyes), aural (ears), olfactory (nose), gestatory (tongue) and tactile (skin). These five senses have been called the "gateways of knowledge". Development of the thinking process begins with concrete experiences. Such concrete experiences form the basis for abstract learning. Sensory experiences are concrete experiences. All those experiences/activities which appeal to the senses are far more effective than abstract learning experiences. Since educational aids i.e. hands on minds or teaching aids involve the use of senses, therefore, there is a strong case for using these aids in teaching.

Though all the five senses are important, but the aural and visual senses are widely involved in almost all classroom situations. COMENIUS was the first to introduce picture in books. Pestalozzi advocated the use of objects before words. Montessorie provided for intensive sense training in her scheme of education. Teaching aids make teaching effective and increase the span of retention.

Incomplete

Educational Aids

More Learning	Quick Learning	Longer Retention

Educational aids may be used mainly in three situations:

i. To motivate and prepare the learners for receiving instruction (preparation stage).

ii. To explain difficult concepts during teaching a lesson (presentation stage).

iii. For reviewing a lesson and also for evaluation (review stage).

15.2 WHAT CAN EDUCATIONAL AIDS DO?

Properly prepared educational aids can help teach a subject matter with increasing effectiveness at all levels of learning. Learning becomes effective when children are actively involved in the teaching-learning process. To the extent their different senses are related, their learning becomes more meaningful and successful. For using various senses different "multi-sensory materials" are utilised in the classroom and the learning experiences are made relevant and effective. Teaching aids not only make teaching interesting and effective but also make the learning meaningful and relevant by making up the deficiencies in the personal backgrounds of the children by equalising

opportunities in perception and conception, by providing direct interaction of the children with the realities of the physical and social environment and by generating interest and aspirations through motivation and stimulation.

The degree of interaction and intercommunication between the child and his learning environment determines the extent to which learning takes place in a particular situation. The most useful Chinese proverb in this context should be taken note of by both teachers as well as students.

> "I hear and I forget, I see and I remember, I do and I understand".

15.3 ADVANTAGES IN THE USE OF EDUCATIONAL AIDS

The Committee of the National Society for the Study of Education, 1940, in its forty-eighth Year-Book (1949) reported the following advantages in the extensive use of educational aids:

1. They provide a concrete basis for conceptual thinking and reduce meaningless word responses of students.

2. They have a high degree of interest for children.

3. They furnish the necessary basis for developmental learning and hence make learning more relevant and

permanent.

4. They offer reality of experience, which stimulates self-activity on the part of pupils.

5. They develop a continuity of thought process.

6. They contribute to growth of meaning and hence vocabulary development.

7. They provide experience not easily secured through other means and contribute to the efficiency, depth, and variety of learning.

Many studies have shown that the use of educational aids promotes learning, particularly in respect to factual learning. It is also found that students of all categories, whether bright or average or inferior, gain from the use of teaching aids. Research has also confirmed that not only students of all levels of ability but also of all ages and grade levels, from primary to university, profit from the aids. Ofcourse, all do not gain equally. Their gain is usually correlated with their intelligence.

Learning mainly aims at acquisition of knowledge which is basic to all congnitive development. Our five senses are the gateways to acquire knowledge. But these receptive mechanisms vary in their functions which again differ from one individual to individual. The five senses are: (i) sight

(ii) hearing, (iii) smell, (iv) touch and (v) taste. Research studies have established that we learn 83.0% through sight, 11.0% through hearing, 3.50% through smell, 1.5% through touch and 1.0% through taste.

It is evident that of all the senses, sight is the most powerful, which provides rich and varied experiences to the individual. More than 80% of the experiences that a person gains in the world are acquired by this particular sense. Visual experience is also very effective and visual literacy is, therefore, given priority, as it enables us to learn the most and thereby integrating all sensory experiences. A person with adequate visual literacy can discriminate and interpret the visual actions, objects and symbols that he perceives in his environment. With the help of visual competency an individual is able to learn most effectively.

We also do not remember equally of what we receive through the five senses. Research findings have shown that we remember 20% of what we hear, 30% of what we see, 50% of what we see and hear, 80% of what we say and 90% of what we say and do. It is a fact that our sensory experiences are mixed, when we see a fruit we not only perceive its colour or size, but also we smell its fragrance or flavour and experience its texture or smoothness.

15.4 EDUCATIONAL AIDS: DESIGN CONSIDERATIONS CRITERIA

While designing educational aids the following factors are taken into consideration:

A. Background of the learner.

i. Age

ii. Socio-economic background

iii. Mental level i.e. intelligence and experience of the learner

B. Physical Considerations

The following physical aspects do contribute significantly towards making an educational aid more effective in its use and in overall cognitive development of the learner:

i. Size of the material aid

ii. Shape

iii. Overall weight

iv. Kind of material/materials to be used for final fabrication

v. Texture provided in the material-aid

vi. Use of colours

vii. Easy to maintain/attend to repairs in the event of damage

viii. Manipulative potential

ix. Easy handling

x. Self operating/instructional guidelines

xi. Durability

xii. Nature of designed aid concrete or semiconcrete, i.e. Degree of concreteness.

C. Cognitive, affective and psychomotor aspects:

i. Does the material closely relate with the child's immediate environment?

ii. Is it meant to convey just a single concept or multi-concepts?

iii. Is the material-aids concept at the comprehension level of the child?

iv. Is it designed to be interactive or non-interactive i.e. simple recall of or knowledge of facts?

v. Does it stimulate child's interest?

vi. Has the aid enough holding power i.e. catching and holding child's attention for grasping the concept intended to be conveyed through the aid?

vii. Does the aid involve use and enjoyment of all the senses?

viii. Retention power of the concept to be learned.

ix. Will the child be able to generalise the concept?

x. Will the child be able to transfer the concept learned in one activity to another related activity i.e. some problem-solving activities?

xi. Meaningfulness of the material

xii. How well it requires any action/actions to be taken by

the child on an object to be designed or is it going to be just an observatory material-aid?

xiii. Visual cues provided in the aid to help the child understand the concept easily and quickly

xiv. The quantum of play potential to be incorporated in the aid

xv. Safety aspects of the aid

xvi. Replicability of the designed aid

xvii. Overall get-up and finishing of the aid

xviii. Cost effectiveness

xix. Suitability for target age group

xx. Educational value/potential incorporated in the aid

xxi. Is the activity/aid going to be open-ended or closed-ended.

xxii. Are the materials designed to reinforce/strengthen the concept learned in an activity, i.e. just a single activity doing the whole job or is it in the form of kit to provide varied opportunities to explore materials or learn the concept in various contexts.

15.5 CHARACTERISTICS OF TEACHING AIDS:

An effective teaching/learning aid/model may have the following characteristics.

i) Manipulative Value

It is desired to involve the child in play with the designed aid provided to him for as much time as possible so

that he is able to learn the concept properly. Aids which have a high degree of manipulative potential enhance and strengthen the child's understanding of the concept. Child's activities are enhanced if he is able to use the aid in as many different ways as possible. Manipulations involve using the aid in many ways to provide the child opportunities to explore the concept, thus enhancing and strengthening the learned skills. Manipulative aids have great educational potential for young children.

ii) Educational Value/Potential

The criteria of an aid's educational potential is as important as its play potential. The criterion of an aid's play potential is as important as its educational potential. Adopting play-and-activity based method/materials bear great significance to provide learning experiences to young children. It is therefore necessary to focus the design on the educational or learning value of the aid.

Aids which provide learning experiences to the children by involving their fine muscular power, motivate them to develop their observation power, keep them physically active and mentally alert, help them in the development of language and vocabulary, apart from the main concept to be learnt and some other related concepts etc., have a high degree of educational potential.

iii) Play Potential

The degree of play potential provided in the aid is a crucial factor in making the experience gained through that aid more meaningful, interesting and joyful. The child should be able to play with the aid or derive joy and fun out of it. Play potential of an aid depends upon its manipulative potential, attractiveness and potential to activate the child. Materials which attract the imagination of young children most have great play value. This is an essential ingredient in the learning process of the young child. The child should be able to perform actions on the object easily and in as many different ways as possible and be able to derive pleasure in each such activity.

iv) Involvement of the Senses

Children have their sensory organs and muscles and they are always eager to use them for exploring their immediate environment.

"He who grasps the particular in vivid fashion" writes Ludurg Lewisohn, "is given the general, whether he is aware of it or becomes aware of it only later". Concept development begins with a child's eagerness to assemble and unify the varied details that his senses have revealed to him. Materials that make strong appeal to the child's senses: things that he can see, hear and touch, projects in which he can actively participate, help to shape a child's

sense experience artistically and aesthetically. No one sense is all important in learning. Indeed we should design materials which provide the fullest possible use of every faculty that a child has for exploring the world of things and ideas for learning.

v) Motivation for learning

Motivation, the desire for learning, is an essential element in any meaningful learning process. Well designed educational aids can do much to increase a child's motivation. The resulting education becomes emotionally stimulating and intellectually rewarding if the following factors are included in the designed material:

1. Its concreteness and interest
2. The continuity of thought that is fostered with explanation provided with supplementary pictures etc.
3. Aesthetic delight present in the aid.

vi) Appeal to Students of Varied Abilities?

Designed materials should make the learning clear and appealing to children of diversified backgrounds and varying abilities. Since some children lack in verbal learning, they can more effectively learn from such concrete aids.

vii) Encouraging active participation of the child

Educational aids can do much to encourage active participation of the children in the learning process. The

designed material must engage the children in stimulating provocative discussions after watching the aid. The aid should be such that involves group participation of the learners so that a less motivated, slower student in a group can seek help and learn the concept by interacting with his intelligent partners.

viii) Assure order and continuity of thought

Concept building, of course, is in no sense a random accumulation of diversified experiences. There must be an order, a logic that is implicit in the process. Educational aids can be especially beneficial in this regard.

A well prepared educational aid can present the subject matter of the concept in a logical, carefully structured fashion. Relationships between various elements of the material should be clearly indicated and important similarities and distinctions vividly illustrated through the aid.

ix) Safety Aspects

The designer should be aware of the safety aspects of an educational aid. It should be free from the following potential hazards:

1. There should be no sharp edges or nails that can cause cuts/injuries to the child.
2. There should be no inferior paints/colours containing toxic substances applied on the aids.

designed material must engage the children in stimulating provocative discussions after watching the aid. The aid should be such that involves group participation of the learners so that a less motivated, slower student in a group can seek help and learn the concept by interacting with his intelligent partners.

viii) Assure order and continuity of thought

Concept building, of course, is in no sense a random accumulation of diversified experiences. There must be an order, a logic that is implicit in the process. Educational aids can be especially beneficial in this regard.

A well prepared educational aid can present the subject matter of the concept in a logical, carefully structured fashion. Relationships between various elements of the material should be clearly indicated and important similarities and distinctions vividly illustrated through the aid.

ix) Safety Aspects

The designer should be aware of the safety aspects of an educational aid. It should be free from the following potential hazards:

1. There should be no sharp edges or nails that can cause cuts/injuries to the child.
2. There should be no inferior paints/colours containing toxic substances applied on the aids.

3. Materials designed should be soft, smooth-textured, easily and safely operative and light in weight so that while touching, handling and in case of its falling down on the child, it does not cause any injury.

x) **Durability**

Educational aids which are less durable may only have an occasional value. Durable items could be permanently used in children's activities. Aids made out of soft wood, plastic, hardboards etc. are durable. Aids and play things made out of paper, cardboard etc., though very economical, are comparatively far less durable.

xi) **Replicability**

The designed aid should have the potential to be replicated. It should not be so complicated that its replication becomes difficult. Aids which can be easily replicated and produced in larger quantities can be made available to children in a large number of schools.

15.6 ECUCATIONAL AIDS: OBJECTIVES

It is an established fact that the primary stage is the most crucial stage of learning. This is the stage when the child assimilates fundamental concepts and foundation is laid for a sound learning process in the future.

All things, turning and nonturning, are related to

science. Science is thus at the base of all knowledge. In the early stage of one's growth, knowledge is largely gained through observation, exploration and understanding of natural phenomenon, the scope of which continually expands.

Knowing the syllabus and answers to questions is not enough, the more important objective is to develop in the students an ability to learn independently and perceptively through keen observation, proper interpretation and relevant activities. Educational aids not only help in sustaining the interest of the young child but also arouse his curiosity to widen the scope of his learning. Materials are designed to enable the child to verify observations and explorations through simple experiments rather than accept them without scrutiny and thereby develop what is termed as the 'scientific temper'. The following objectives are proposed to be achieved for children learning science through teaching aids:

A: To develop interest, attitudes and aesthetic awareness.

B: To develop skills of observation, exploration and ordering observation.

C: To develop basic concepts and logical thinking.

D: To acquire knowledge and learning skills

E: To develop skills of communication

F: To develop skills of interpreting the findings critically

Attitudes of enquiry, objective judgement, personal responsibility, ability to work independently and organise one's work can be established in children at an early stage by providing them vivid, concrete experiences.

Mathematics is a subject that can be both a fun and a nightmare. Therefore, one of the major objectives of teaching primary mathematics is to enable children to solve speedily and accurately the numerical and spatial problems, which they encounter at home, in the school and in the community. Materials are designed to help children develop understanding of key mathematical concepts at each level. These aids also help children develop an understanding from the concrete to the abstract, from the specific to the general. Therefore, educational aids for mathematics are designed to achieve the following objectives:

A. To provide ability to perform computations with speed and accuracy.

B. To translate verbal statements (a) in mathematical form using appropriate symbols and (b) diagrammatically;

C. To give the child knowledge and understanding of mathematical terms, symbols, concepts, etc.

D. To enable the child to develop mastery over computational skills and other basic mathematical processes;

E. To enable the child to apply his or her skills in solving problems with proper emphasis on speed, accuracy and precision.

F. To develop the power of reasoning in the child.

G. To inculcate in the child the habit of logical thinking;

H. To enable the child to apply mathematics in real life situations.

I. To develop in the child a sense of creativeness.

J. To develop competence in the child which would enable him/her to continue the study of mathematics after the completion of formal education.

15.7 WHY PLAY AND ACTIVITY-BASED LEARNING MATERIAL/ EDUCATIONAL AIDS?

Teaching and learning through formal methods do not provide effective learning experiences to young children. It makes the learning environment dull, monotonous and joyless. Children remain passive in the whole process. The learning environment at preprimary and primary stage of education could be made stimulating and joyful to children if they are taught through play-and-activity based educational aids/ experiences.

It has been established that experiences/materials/ aids, which are child-centred, involve hands-on-minds-on activities through play and active participation of the children, have the following advantages over formal method of education:

1. They take the child as the focal point and not the curriculum.
2. The individuality of the child and the individual differences between children are taken into consideration.
3. Children receive concrete experiences through doing. Thus learning becomes experience and activity-based.
4. Since play comes naturally to all children, therefore, through hands-on learning experiences children learn best and remain active throughout the learning process.
5. Children at the early stages of their growth are not yet capable of abstract thoughts and ideas, therefore ideal medium for their education is to provide them direct first-hand and concrete experiences through which they can sharpen their understanding and explore the world around them more meaningfully.
6. Well designed educational aids can provide ample opportunities for exploration, observation, planning, organisation and doing. These are the basic ingredients

involved in learning and cognitive development of young children.

7. Process of socialisation and social learning is accelerated when children share the materials with each other, interact and share their ideas while working with the educational aids.

8. Educational aids have an enormous potential to keep children's interest alive by involving them in activities for a long time.

9. Children learn themselves, sharpen their mental faculties by acting on the objects and then critically observing and interpreting the outcome through these concrete and continued learning aids.

It has been universally recognised that early experiences through concrete materials received by children at early stages of their growth lay the foundation for better adjustment and achievement in primary stage, as the best way to learn effectively at primary stage is also activity based.

Teaching aids in this research work have been mainly designed on mathematics of primary level education. The following designing approach was followed:

15.8 APPROACH FOR DESIGNING OF TEACHING AIDS

Good teachers develop in pupils an interest and enthusiasm for arithmetic. The teacher gives to the program living experiences and adapts them to the students' experiences and to their level of maturity. The result for the student is one of accomplishment rather than one of frustration and failure.

The curriculum is the total of all the learning experiences carried on at home and in the school. No textbook can effectively utilize these experiences and make all the adjustments to meet individual differences. Only the teacher can identify the interests, abilities and experiences of the pupils and go beyond the content of text materials to satisfy them. Following major principles and guidelines have been followed in planing and designing learning materials for primary stage mathematics :

1. Arithmetic is a way of thinking about a system of the ideas, processes, properties and relationship. Thinking is the central theme of the operation. In an environment such as this, children are stimulated to work on their own to discover "why" things happen as they do. They are taught how to think about a problem through a developmental sequence which unifies common ideas. It is the task of the children to discover meaning and a way to use this information in solving

particular situation.

2. Content and experiences for each child must be selected on the basis of his experiences and understanding. Many children come to school with number experiences. It is the role of the teacher to evaluate these experiences in the light of the understanding which children have acquired. She places this content into a proposed sequence which seems logical and appropriate for each child. As an example, division is not appropriate if the child cannot subtract. For this reason, the teacher continually plans and revises the content of the arithmetic program so that the needs of each child are met. The content in arithmetic for each grade level, therefore, is determined by the child's understanding, not memorization of concepts and principles.

3. Understanding concepts, processes, properties and relationships is basic to the learning process. Development of ideas through concrete and semi-concrete materials before proceeding to the abstract gives a basis for understanding the abstract. The development of language stresses the relationships which exist as one proceeds from one process to another. To make learning interesting and meaningful is to develop a logical order in thinking which permits transition of concepts understood to new concepts, that is, from

counting to addition, to subtraction and so on. This emphasis on interpreting concepts develops the ability to relate, verify and generalize.

4. The pupils are provided opportunities to discover concepts, principles and relationships. They are encouraged to think critically. The process of discovery places upon the student the necessity to recall facts, to identify related principles and to test his generalization. He sees in new situations some identifying elements already learned and he applies these known ideas as an approach to the solution of the unknown problem. He accomplishes his goal through the use of exploratory materials such as concrete objects, the number line, charts and by manipulation. The teacher is the guide. She accomplishes her purposes through the art of asking questions and challenging the student by suggesting alternate approaches. Discovery is a way of thinking.

5. Repetition is planned to develop and maintain some degree of proficiency. Drill is provided only after the pupil understands the concept. Teaching for meaning does not do away with practice; drill is a means of maintaining skills and techniques already developed. Practice is often effective when it is presented in situations different from the one in which it was

learned. In the upper elementary grades, drill in the addition facts can be accomplished through an activity in which numbers are reversed and added until the sum can be read the same from right to left and left to right.

6. Problem solving is a continuous daily experience. Textbook experiences are not sufficient; children and the teacher must supplement texts. Problems related to the environment of the children must be structured so that the children can find common and known experiences within the problem situation. Setting up equations which state the questions asked in the problem are essential and then rewriting the equation to indicate how it is to be solved completes the thoughts pattern. Problem solving must be daily activity in the arithmetic program.

7. Diagnostic and remedial work is an outgrowth of observed errors in thinking and computation. Wrong answers must direct one to find the reason for the error. Too much emphasis has been placed on the correct answer rather than on the thought process involved. Discovering why the children have wrong answers is the key to remedial work. Guide the children to think about this aspect of their work.

8. Freedom in the approach to a solution is important. There is no one way to solve a problem. The many solutions may be used to create interest and develop a greater depth in the understanding of a concept. Each solution is used to develop deeper insight of the process involved and the existing relationships. The algorism selected by the student at this time may be the only way in which he can solve his problem. If he is forced to another algorism, failure can be the outcome.

9. Repetition will not teach insight and understanding. With understanding, there is little need to memorize. learnings are presented in a sequential manner. The field of arithmetic presents a systematic organisation of its content. A child who understands multiplication of whole numbers sees very little that is new in the multiplication of fractions and decimals. It is the teacher's responsibility to guide and direct her teaching so that children will see arithmetic as a whole.

10. Children learn best when they are actively participating in a learning situation. Provide activities which will arouse their interests in mathematics. As children become involved, the teacher continues to challenge them with questions which guide

them through sequences which build new insights and relationships. As they gain new insights, more opportunities for expanding the original concepts are provided. Allow time for children to think and to grow from manipulating objects to abstract algorisms.

11. Mental calculations do not use the same algorisms as paper and pencil activities. Guide children to identify patterns which simplify mental calculations. As common algorisms are taught, the teacher can help the children to identify patterns in the numbers and to involve the children in using these patterns to structure algorisms which can be solved mentally. As an example, in multiplying 11 X 15, one can readily identify the partial products in the tens place to be the same digits as in the multiplicand because one multiplies by 1 unit and by one 1 ten. Since the partial products are added in the product, the digits in the multiplicand can be added to find the number to be written in the tens place. The product is 165.

CHAPTER 16

DEVELOPMENT OF THE WORKING MODELS FOR SELECTED SUBJECTS OF EARLY EDUCATION.

16.1 INTRODUCTION

The progress made so far towards achieving the goal of universal primary education is far from satisfactory. Though a substantial progress has been made towards achieving the goal of universal enrolment, the progress made towards achieving the goal of universal retention of children in primary classes has remained far below our expectations. The heavy rate of drop-outs at the primary stage of education, i.e. nearly 46%, has posed serious concern.

The National Policy on Education (NPE 1986), has recommended various measures towards achieving the goal of universal elementary education i.e universal enrolment and universal retention of children in school upto the age of 14 years. The policy resolves that : "it will give highest priority to solving the problem of children dropping out of school and will adopt an array of meticulously formulated strategies based on micro-planning and applied at the grassroots level all over the country, to ensure children's retention at school".

In the context of improving the rate of retention of children at the primary stage the quality of primary education and the programmes of Early Childhood Care and Education (ECCE) have been considered important. In order to bring about a qualitative change in primary education, the policy recommends that :

(i) a child-centred and activity-based process of learning should be adopted at primary state,

(ii) provision will be made of essential facilities in primary schools, including necessary toys, charts, maps and other learning materials.

16.2 THE ECCE PROGRAMMES

The ECCE programmes have been viewed as the most crucial input to support and strengthen primary education. There is ample evidence to demonstrate the significance of ECCE programmes in improving the prospects of life and learning or young children. NPE - 1986 has laid renewed emphasis on ECCE programmes and has recommended :

(i) that the programmes of ECCE will be child oriented, focused around play and the individuality of the child;

(ii) that at this stage, the formal methods and early introduction of 3R's should be discouraged;

(iii) that a full integration of child care and pre-primary education will be brought about both as feeder and a strengthening factor for primary education and for human resource development in general.

16.3 MAJOR PROGRAMMES OF ECCE :

(i) Anganwadis under Integrated Child Development Services (ICDS) - a centrally sponsored scheme-having largest outreach to young children upto six year of age.

(ii) Balwadis run by voluntary organisations/private organisations/local bodies.

(iii) Early Childhood Education centres run by voluntary organisations under grant - in - aid scheme of the Ministry of Human Resource Development (MHRD).

(iv) Day-care centres, creches run under the schemes of Central Social Welfare Board, Indian Council of Child Welfare and Private and Industrial Groups.

16.4. CHILD CENTERED APPROACH

Child-centered Approach to Education takes into Consideration

* the child as the focus point and not the curriculum or

the teacher centred instructions.

* the individuality of the child and the individual difference between children.

* the age, interest, aptitude, abilities and background of the child.

* the pace of learning of the individual child.

Activity-based Learning

* children receive concrete experiences through doing. Thus learning becomes experience and activity based.

* children's involvement and interest remain active, because all activity for young children is play.

* the scope of plan activities to enhance learning in different areas is immense and diversified to suit the individual child's needs and interests.

* the experiences received at early childhood education stage lay the foundation for better adjustment and achievement in primary school level as the approach to education at primary stage is to be activity based.

Play way Method

* essentially contains the elements of child centred and activity-based approach.

* is effective medium to provide learning experience to young children through a variety of activities, because play is natural instinct of young children and the drive to play is so strong during early childhood stage that children love to play for hours together.

* provides ample opportunities for exploration, observation, planning, organising and doing, which are the basic processes involved in learning and cognition.

* accelerates the process of socialisation and social learning.

* provides opportunities for emotional and creative expression and helps in the development of emotional maturity and creativity.

* provides opportunities to develop competence in communication skills, languages and dealing with environment.

* has the potential to keep children's interest alive in activities for a long time.

* has diagnostic and therapeutic value. Play enables the child to workout his/her pent-up feelings, tensions, worries and anxieties.

With the effective implementation of child=centred,

play and activity based approach, the learning environment at pre-primary and primary stages of education could be made stimulating and joyful to children. This will not only help in better retention of children in the school but also enhance the level of their achievement.

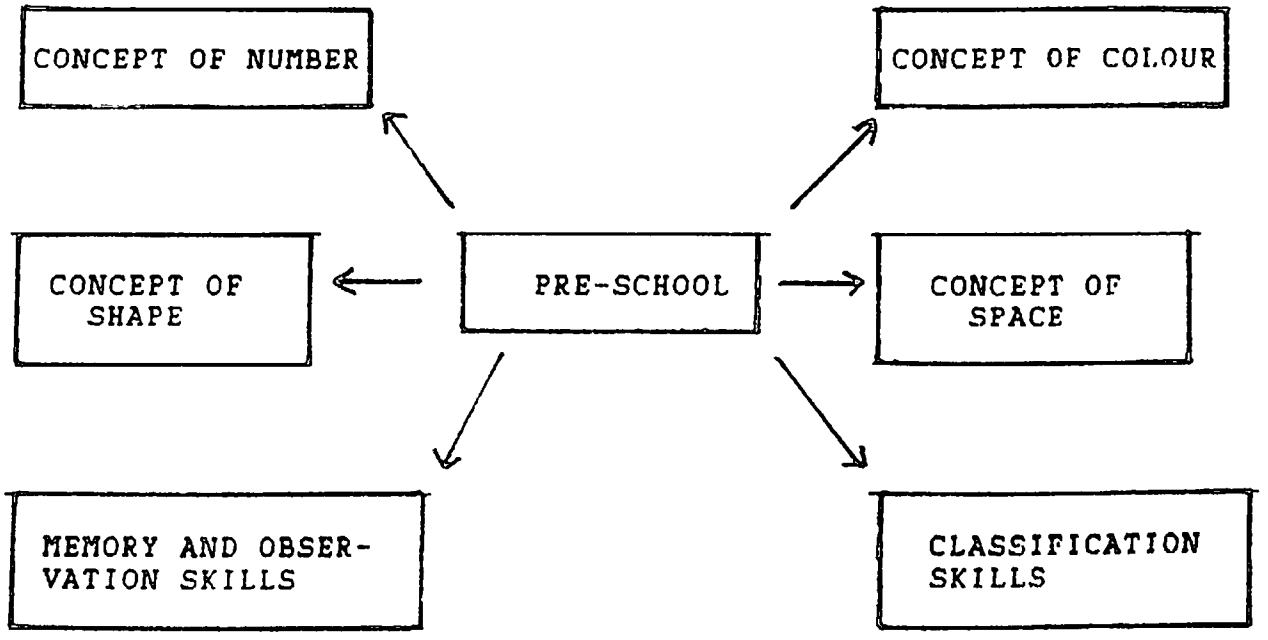
There are certain difficulties and problems in the effective implementation of child-centred, play and activity-based approach. The most important one is lack of suitable play materials/learning materials.

NCERT arranged a number of workshop on "Easy to make Toys and Games' during 1989-90 at (1) New Delhi, (2) Solan (H.P.), (3) RCE Bhubaneswar, (4) RCE Mysore in which seventy-two school teachers participated. NCERT (1993) published a book on the objectives and the designs developed by the teachers in these workshop. The review of the above work and detailed study of the materials available in the market show the need for the scientific study of the problem and the development of education materials/models/ aids for various subjects for the school education. The problem as mentioned earlier is gigantic and, therefore, an effort has been made in this study for the development and designing of some material.

In this study/research work, an effort has been made to design models for pre and primary classes for the following subjects and areas of learning. Figures 16.1, 16.2.

FIG 16·1

PRE-SCHOOL



PRIMARY STAGE MATHEMATICS

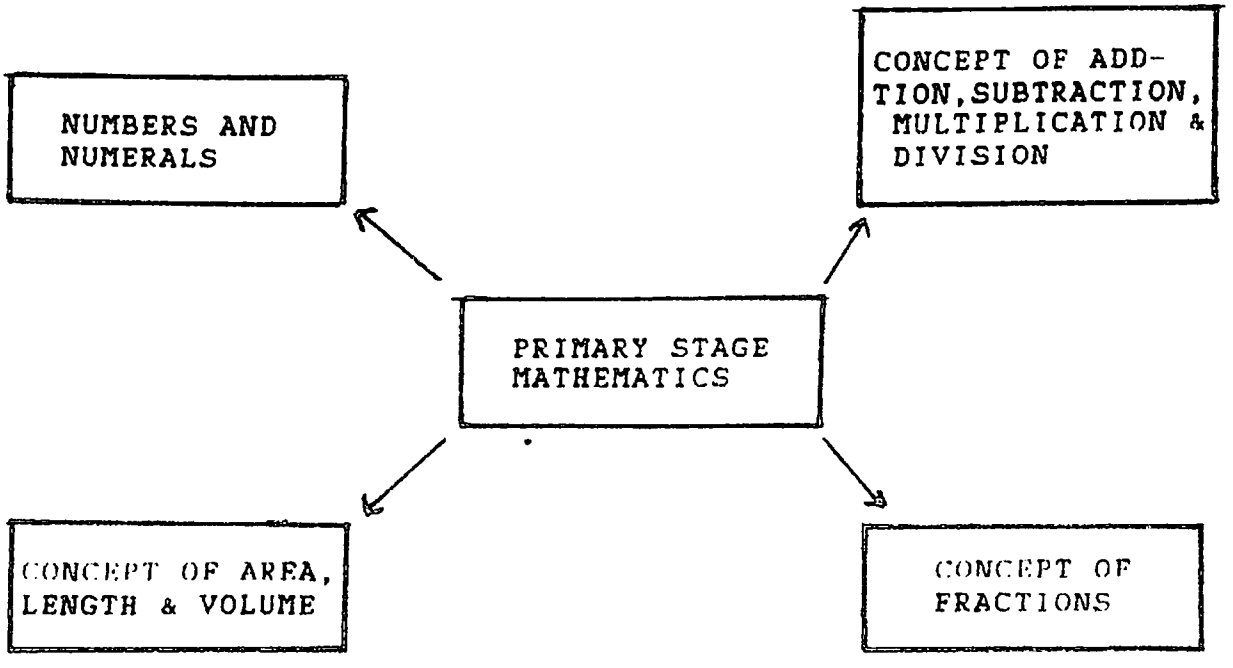


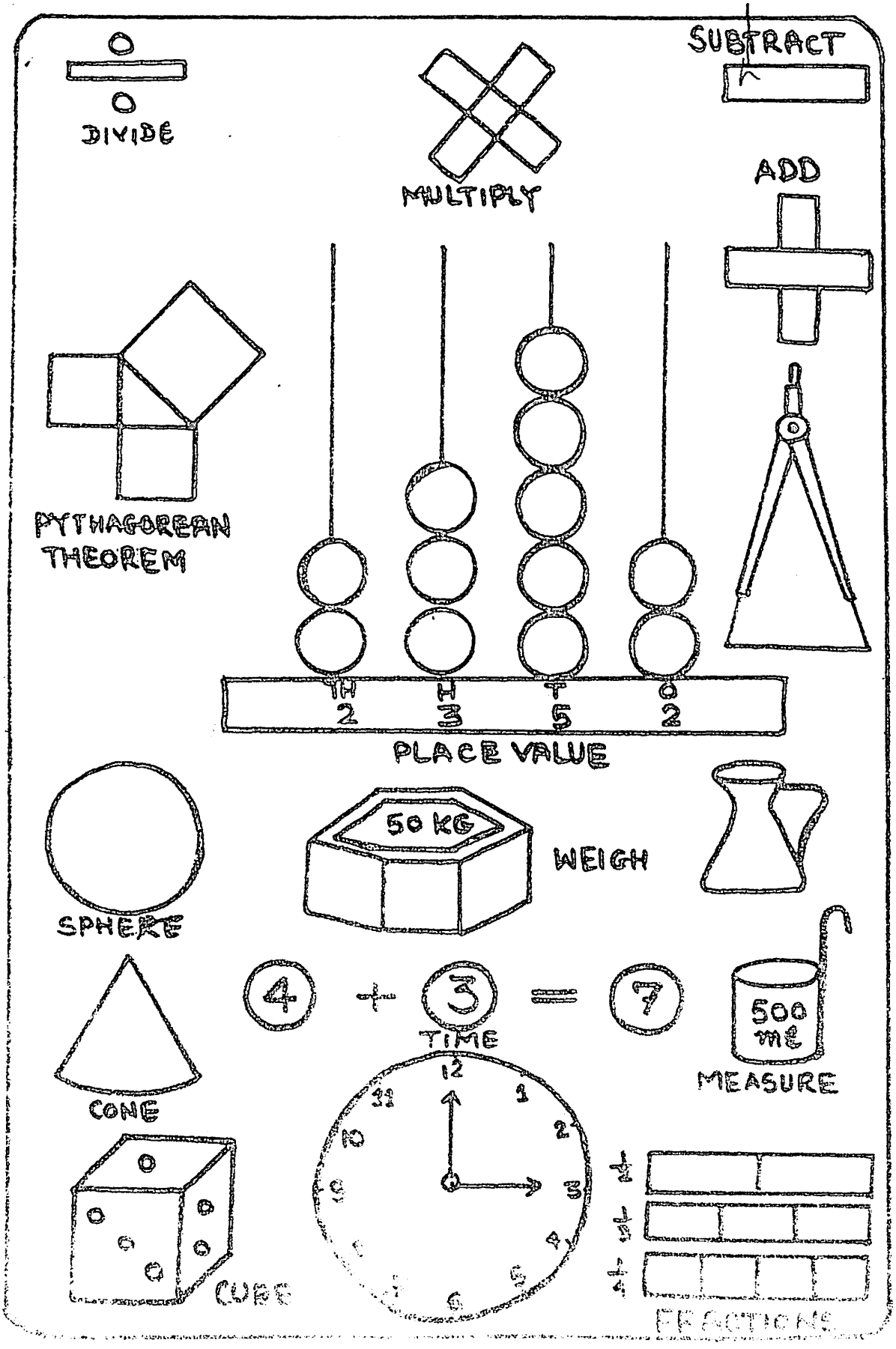
FIG 16·2

16.5 PROCEDURE FOR DESIGNING EVALUATING EDUCATIONAL MODELS/AIDS

The following steps were followed in planing, designing, and fabrication and evaluation of prototypes of teaching/learning aids for different subjects and areas of learning of children of pre and primary level of education as shown in the figure 1.

The concepts of the aspects (subjects for which models/aids has to be designed) were studied in detail. Layout drawings/sketches for the aids/models to be designed were drawn. The prototypes of the designed aids/models using scrap materials/cardboard etc. were developed. These prototype of the developed models/aids were sent to subject concerned teachers in various schools for evaluation/ feedback of the same.

The feedback was taken from the teachers about each of the designed aids. Final drawings/figures of these evaluated aids were then made as described in details in this chapter.


SUBTRACT
DIVIDE
MULTIPLY
ADD
PYTHAGOREAN THEOREM
TH H T O
2 3 5 2
PLACE VALUE
SPHERE
50 KG
WEIGH
4 + 3 = 7
TIME
500 ml
MEASURE
CONE
CUBE
FRACTIONS

MD-1

NAME OF THE MODEL : FOLDING GEO STRIPS

OBJECTIVES

i. To arrange numbers & objects in ascending/descending order from one to twenty.

ii. To recognize colours.

iii. To form meaningful shapes with these strips e.g. geometrical shapes - Triangle, Square, pentagon, hexagon etc. Some shapes of alphabets, numbers etc. can also be formed.

iv. To learn concept of perimeter, length and area.

LEVEL

Nursery to Class III.

DESIGN

The teaching aid has six sets of twenty plastic strips, each set having a different colour i.e. Red, Blue, Yellow, Green, Black and White. Each strip is four inches long, 1 inch in width and 1/8th inch thick. These strips can be hinged together in sets of 2, 3, 4 and so on. Numbers are printed on one side of the coloured strips and on the other sides, figures of familiar objects are printed. The number of figures of objects and the numeral on each strip is the same.

HOW TO USE

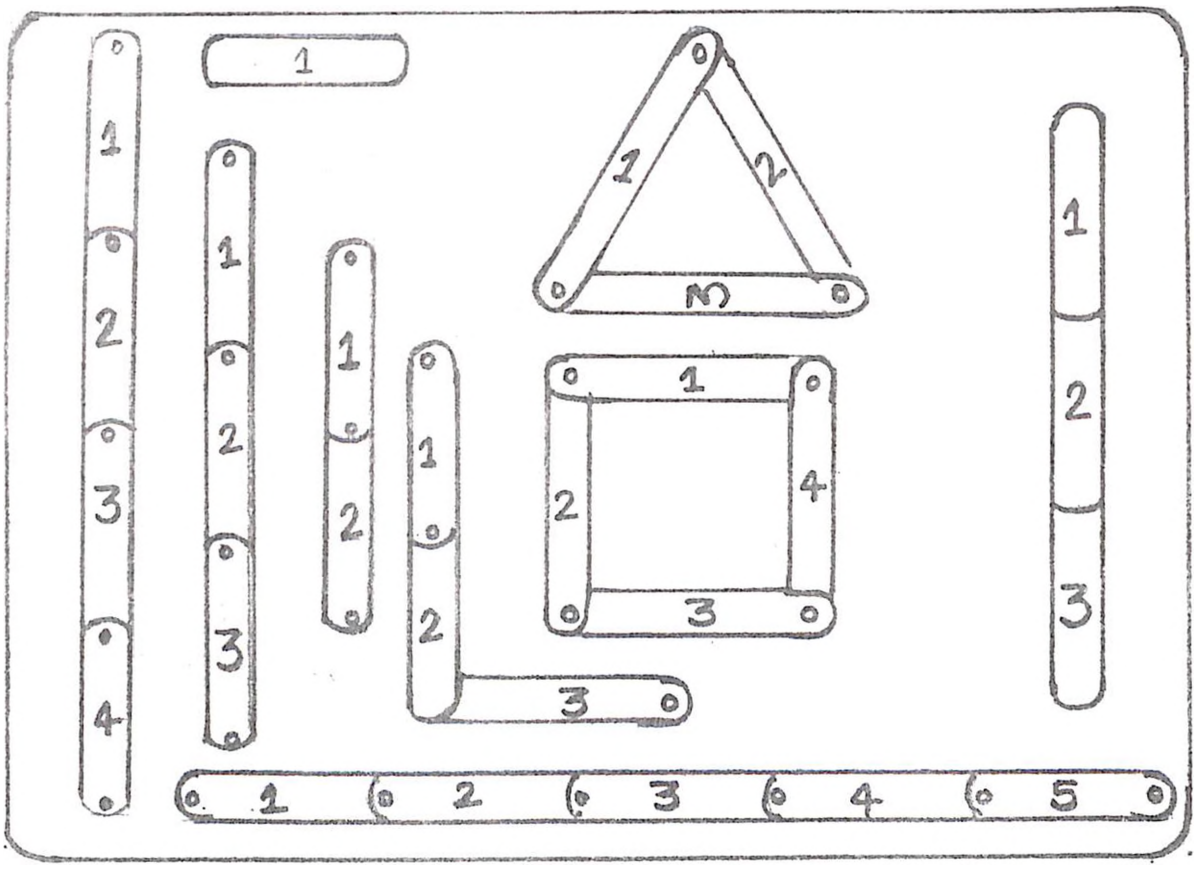
i. The child can arrange these numbered strips in order from one to ten or twenty. The child is free to pick up any strip of any colour while arranging them in order, either ascending or descending.

ii. Numbered strips can be hinged and arranged in order in sets of similar colours by the child. i.e. Red coloured strips hinged together in ascending/descending order from 1 to 20 or the 20 to 1 respectively. Since no two differently coloured strips can be hinged together therefore this aid is a self corrective material.

iii. By hinging together '3', '4', '5' numbered strips together, the child can learn to form triangles, squares, pentagons etc. by folding them. While doing this activity the child is told that the first and the last strip must be joined to form such geometrical figures.

Similarly several other figures can be discovered by hinging the strips and then folding them in as many different ways as the child thinks.

MD-1



MD-2

NAME OF THE MODEL : LOOP ABACUS

OBJECTIVES

This teaching aid has been designed to help child learn.

i. to match numbers with objects.

ii. to add single digit two numbers from one to nine.

iii. to subtract two single digit/two digit numbers from 1 to 20

LEVEL

Nursery to Class II.

DESIGN

There are three metal track loops of twelve inches height. They are fitted on the wooden rectangular block of size 9 inches X 4 inches X 1/2 inch. A numbered scale show 1 to 20 is provided along each tools track. Each of the three track loops holds twenty wooden beads of one colour i.e. Red, Yellow and Blue.

HOW TO USE

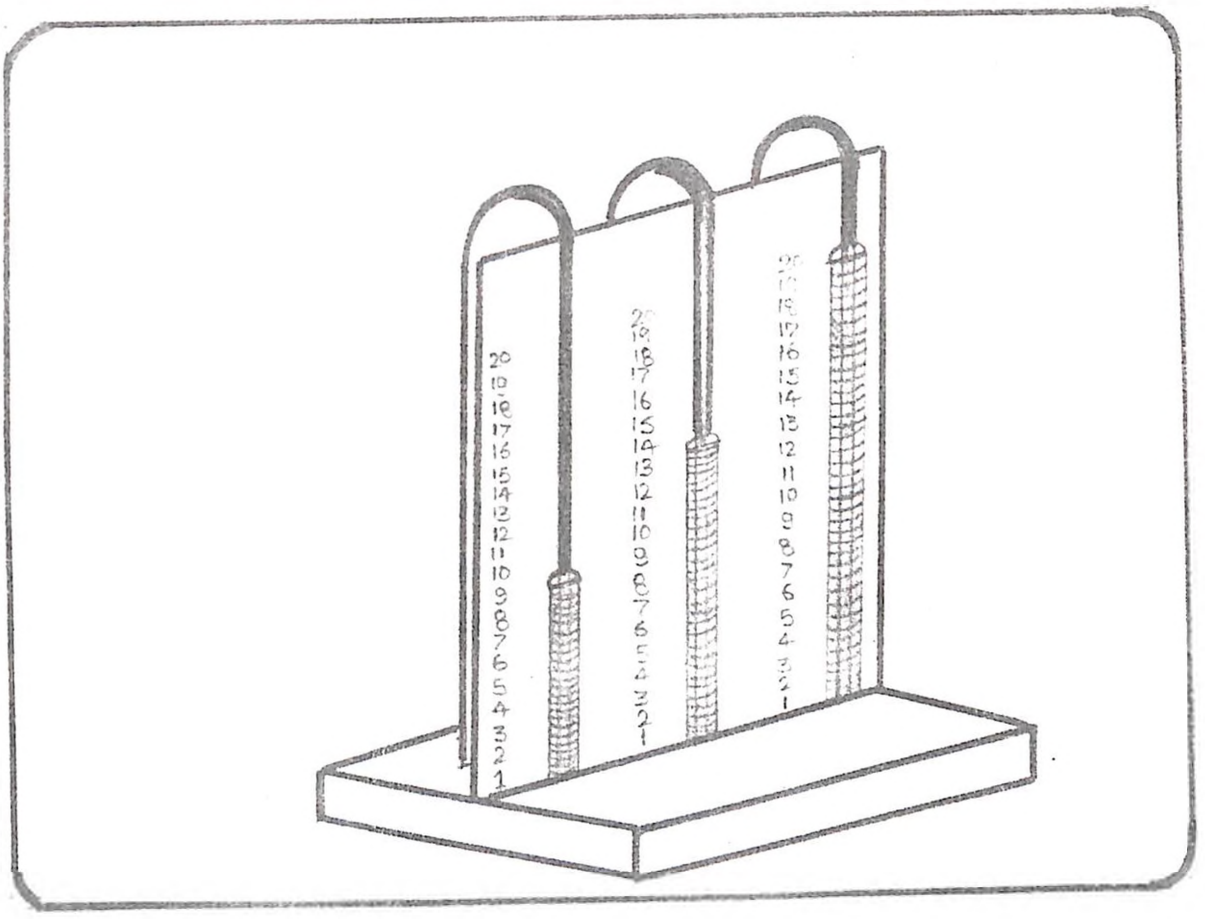
i. The child may be asked to shift any number of coloured beads from the back side of the loop to the front and

then verify the same by matching with the number on the scale.

ii. To learn addition of numbers, the child may be guided to shift the beads in two parts and then finding the answer. First by counting total number of beads and then matching the same on the scale. for example if the child has to add two numbers say 5 & 7, he may first shift 5 or 7 beads from the back to the front. he can also verify then operation by matching the no. of beads with the number on the scale and correct the same if required. Then he moves the beads as per the second number, he observed that the total number of beads match with the number '12' on the scale. Thus he learns that 7 beads and 5 beads are equal to 12 beads. He can verify the same by counting all the beads

iii. For subtraction of two numbers, the child is first guided to shift beads from the back side of the loop to the front. Corresponding to the bigger number say '15'. To subtract '5' from this number, the same number of beads are moved to the back side. The number on the scale will tell the child, that how many beads are left now. In this case it will be '10'.

MD-2



MD-3

NAME OF THE MODEL : WHAT IS MISSING/MISSING PUZZLES

OBJECTIVES

To help the child develop the ability to observe, remember and immediately recall 6 to 7 objects shown to him at a time.

LEVEL

Pre School children.

DESIGN

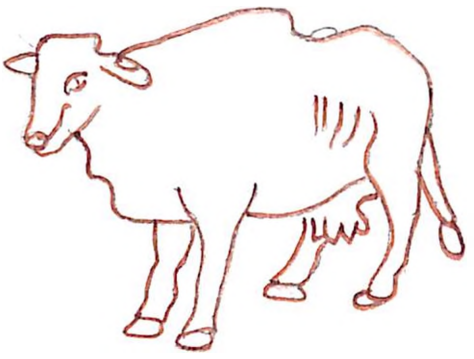
This is a 3-dimensional puzzle. Figures of some familiar objects (birds, animals, vehicles, utensils, furnitures, etc.) are given. Each object has some part of it missing. All these missing parts of each object are provided in a separate box.

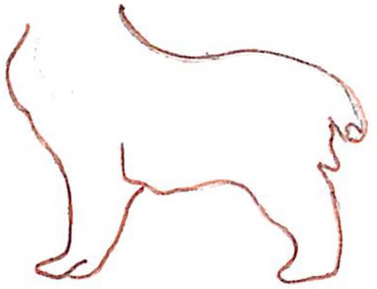
HOW TO USE

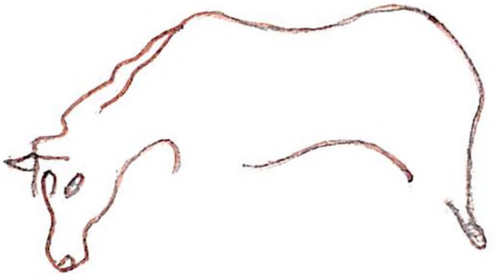
This activity has been designed to be carried out individually or in group.

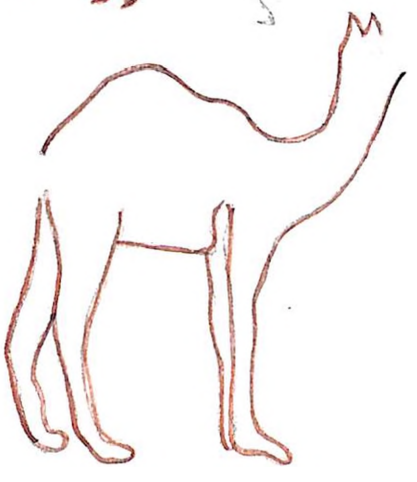
The teacher shows the items one by one and ask the child/children to identify the missing part. Their responses are rewarded by actually taking out the missing part and then putting it at the place where it is actually required to be put.

MD-3

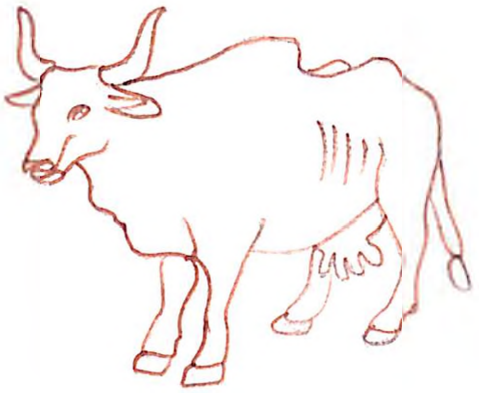


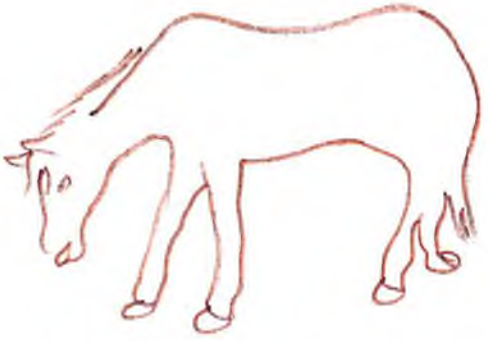






MD-3





MD-4

NAME OF THE MODEL : PUZZLE DISC

OBJECTIVES

To help the child develop

i. the ability to observe part whole relationship.

ii. the ability to match numbers with objects.

iii. the ability to match alphabets with objects.

LEVEL

Nursery to Class I.

DESIGN

There is a rectangular wooden frame of size 18 inches X 5 inches X 2 inch. Discs of size twelve inches in 4 sets are provided. On one disc parts of body of birds, on the 2nd disc part of body of animals, on the 3rd & 4th discs single objects for alphabets and number of objects matching the number 1 to 10 are printed. This disc is fixed when in operation.

The heads of all fixed animals; numbers 1 to 10 and alphabets are drawn on the outer movable ring.

HOW TO USE

This is a self learning and self corrective toy/puzzle.

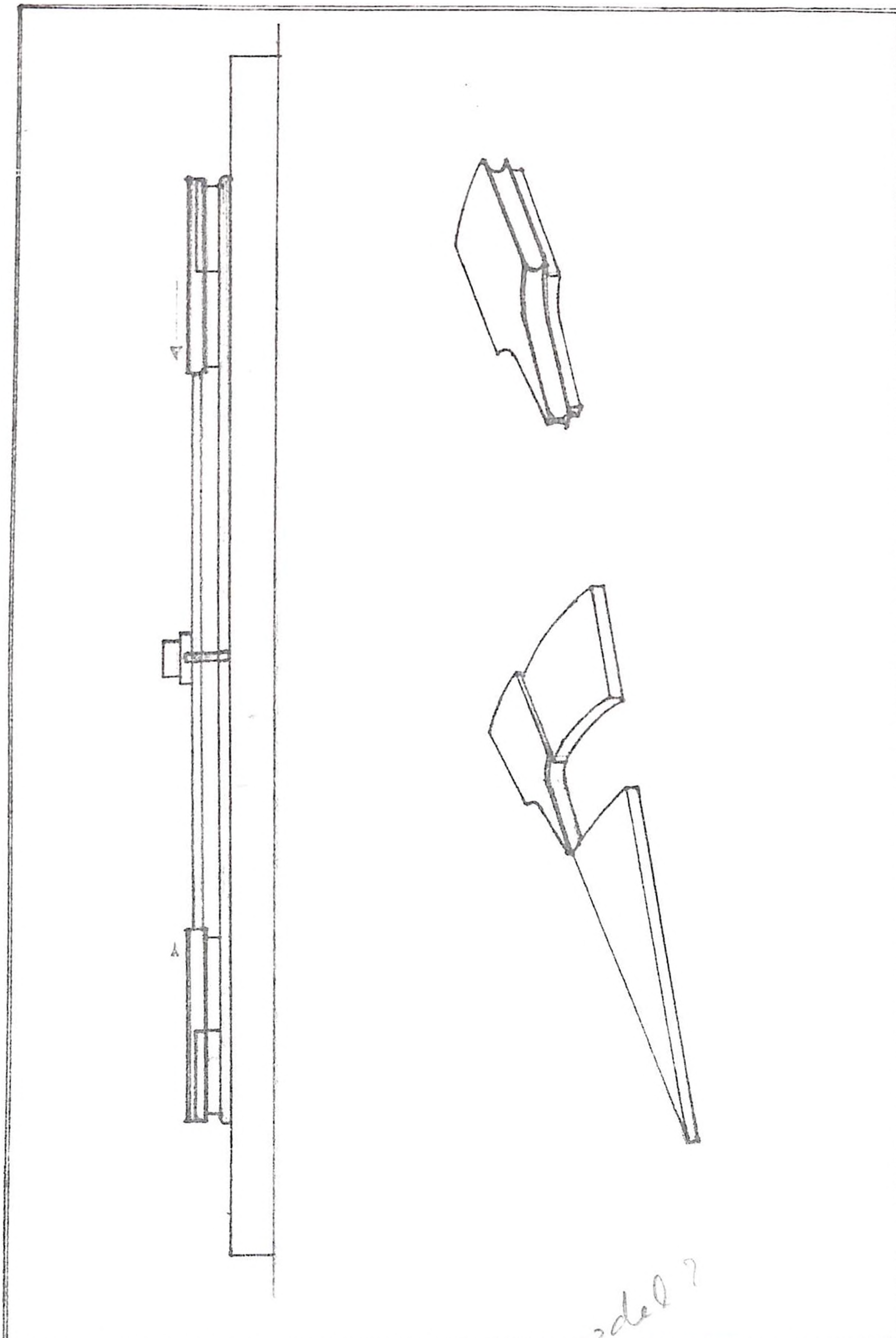
The teacher may ask the child or one child may ask the other child to match the head of any one particular bird or animal by particularly pointing the remaining part of the body to that bird or animal.

The child moves the outerring and tries to bring the correct head before that bird/animal. The head is pushed downwards to complete the figure, if it matches properly, the child moves on to the recognition of other remaining birds & animals otherwise correct this situation first to proceed further.

Activities with numbers and alphabets are done by the child in a similar manner.

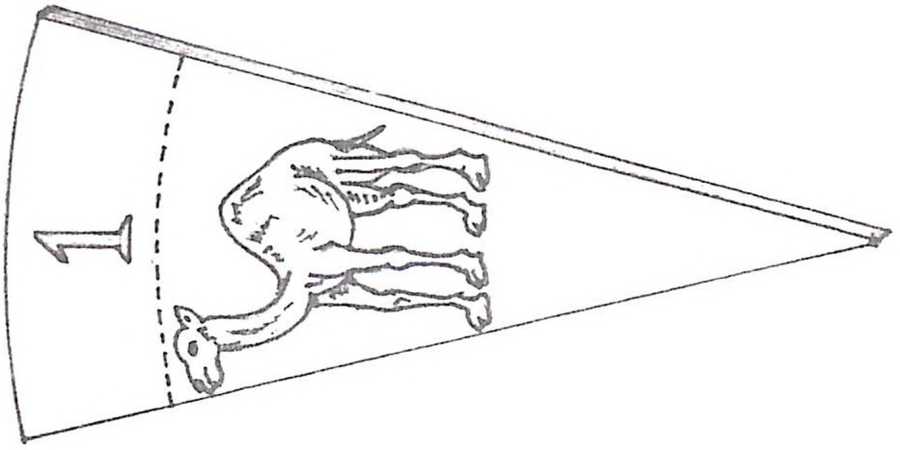
MD-4

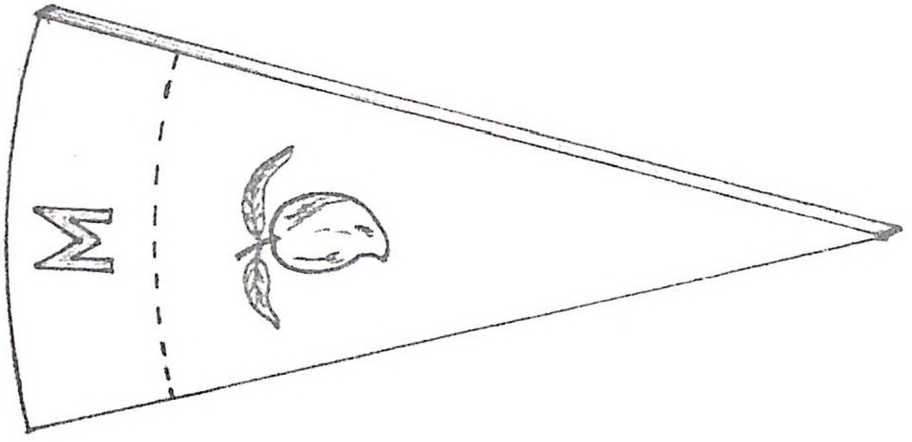
MD-4

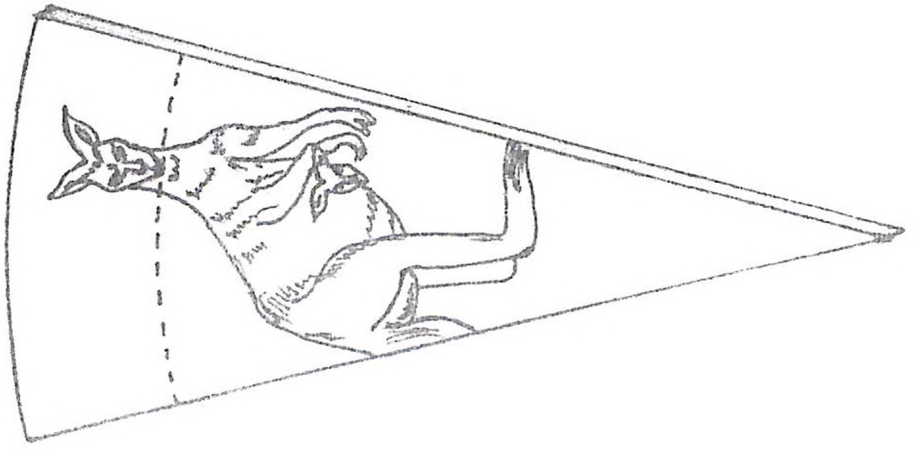


How is it related to model?

MD-4







MD-5

NAME OF THE MODEL : MEMORY BOARD

OBJECTIVES

To help the child develop skills of observation and memory, using the following themes :

i. Birds/Animals

ii. means of Transport

iii. Clothes

iv. Utensils

v. Furniture.

LEVEL

Pre-School children.

DESIGN

This is a long rectangular frame of size 18 inches X 15 inches X 4 inches. It has 5 - rectangular holes in the front and at the back pictures of objects, for example birds, animals, various summer & winter clothes, utensils and furniture etc. can be seen. There is a arrangement to change & replace the above mentioned items of the themes, and any picture can be covered/exposed through a slider.

HOW TO USE

This activity is designed to be done individually with children.

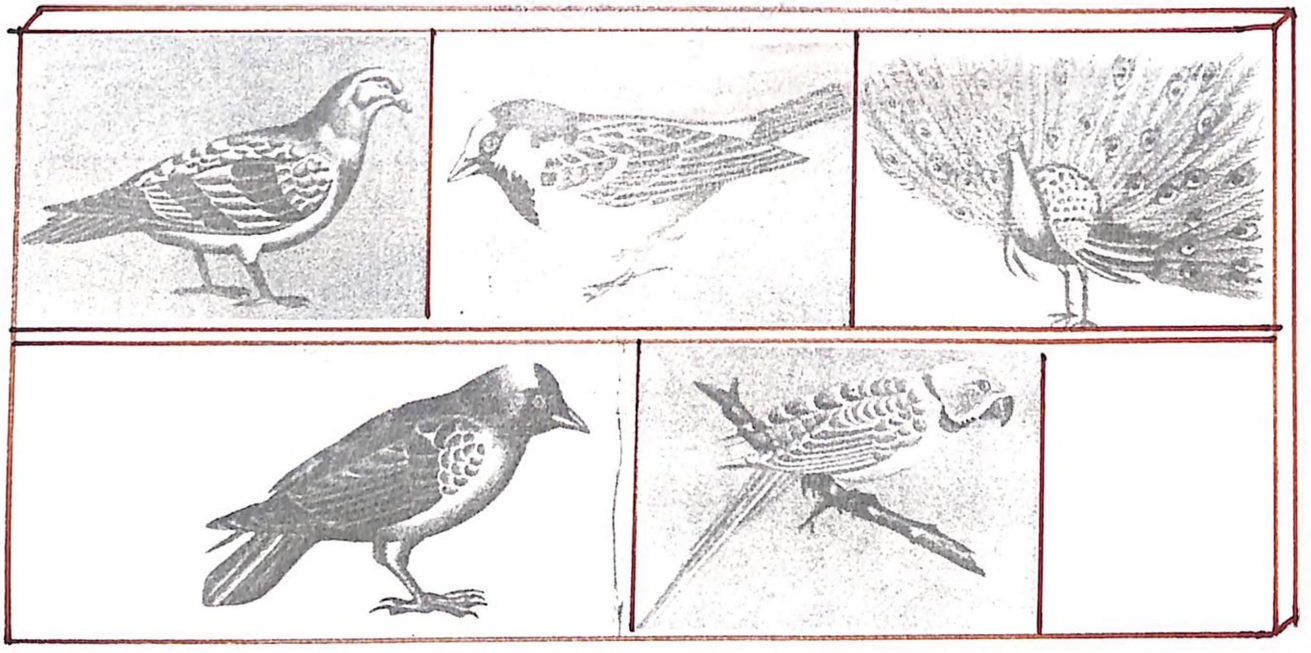
The teacher shows a set of pictures to the child for identification. When the child ensures the teacher that he is able to identify all the pictures then the child is asked to observe all the pictures and memorize them.

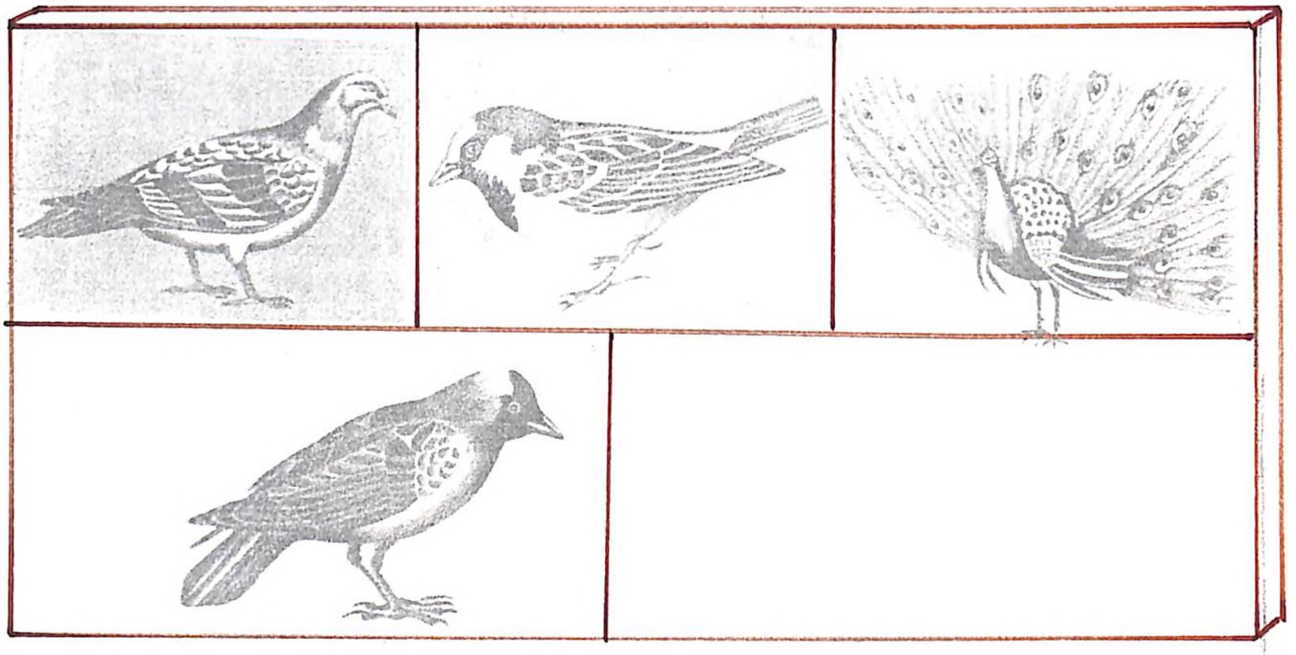
The teachers covers all the pictures through sliders and then exposes any four of the five pictures by sliding their sliders.

The child is asked to recall the picture that is missing from the set of pictures which he has just seen.

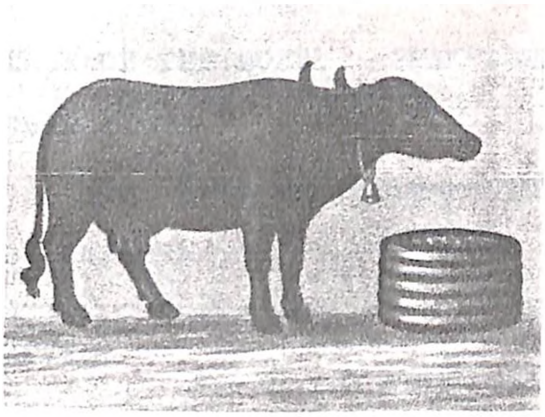
Gradually the number of missing pictures i.e. pictures to be covered may be increased and every time their position may also be changed.

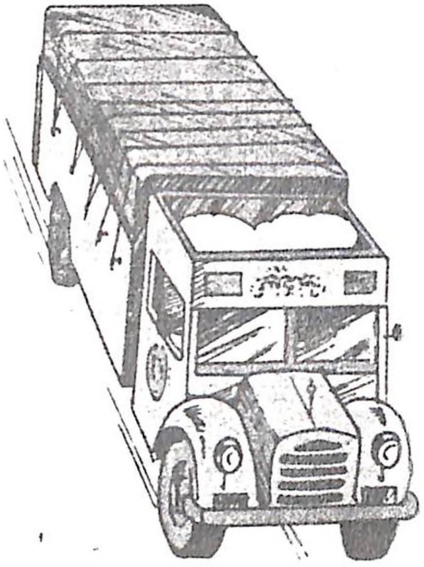
MD-5

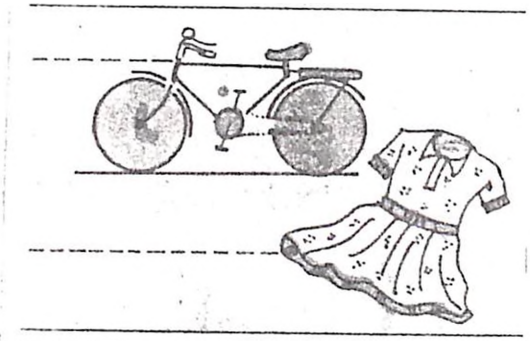


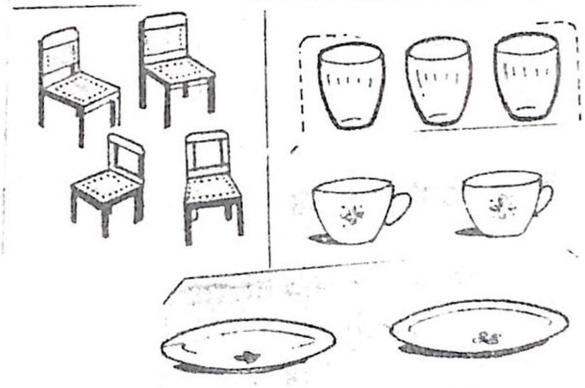


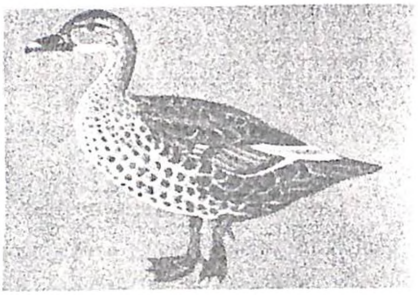
MD-5











MD-6

NAME OF THE MODEL : FRACTIONAL WHEEL

OBJECTIVES

To help child learn to discover parts of a collection of objects.

LEVEL

class III to Class IV.

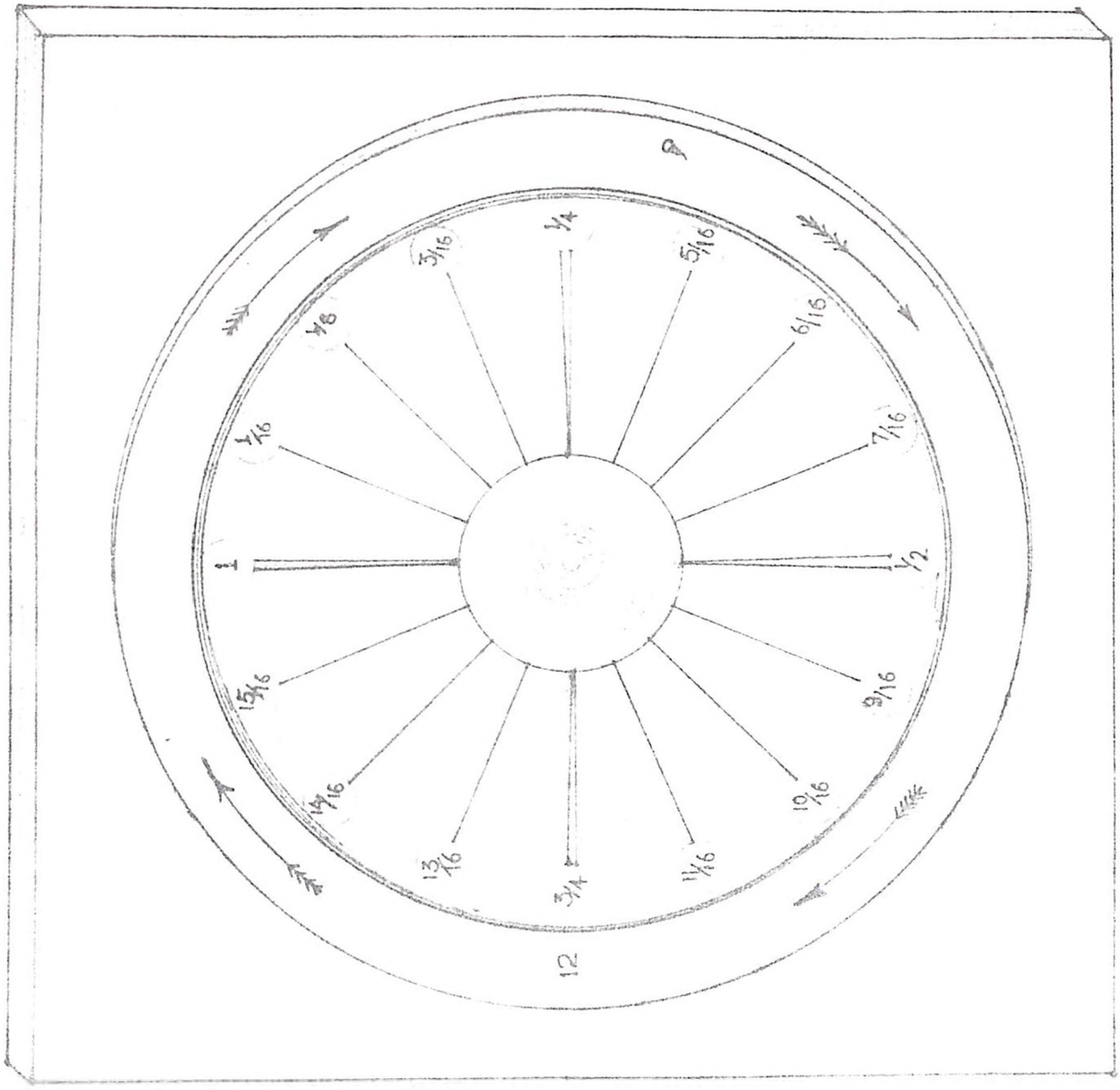
DESIGN

The aid consists of several sets of thick cardboard discs. There discs are numbered differently in each set and divided in two parts equal to the number whose fractional parts are to be found out. Each disc is kept fixed when in use. It is surrounded by an outer movable circular ring. The size of the disc is 6" diameter and the outer ring is 1 inch wide and 8 inches in diameter. It is provided with a hole. The lower disc over which this circular ring can move and the inner disc rests is also numbered.

HOW TO USE

If a child wants to know what is 3/4th of 16, he will simply bring the hole of the circular ring infront of 3/4 fractional number of the inner disc. The number which he sees under the wheel in this case will be 12 i.e. 3/4 of 16 is 12. Other disc can be manipulated in a similar manner.

MD-6



MD-7

NAME OF THE MODEL : COUNTING AND RECOGNITION TREE

OBJECTIVES

To provide

i. Counting experiences to children from 0 to 10.

ii. Recognition of birds and animals.

LEVEL

Nursery children.

DESIGN

On a square wooden frame of size 7 discs of fifteen inch diameter (15") are fixed. On the upper disc, a figure of tree is drawn in its natural colour. There are ten holes cut in this disc. The size of each hole is 2 inch. This disc remains fixed.

The lower disc is movable and has figures of birds, animals at different positions.

HOW TO USE

The lower disc can be easily rotated. At different rotations, different birds, animals in different numbers are observed by the child.

In the initial position it is set in such a manner so that no bird/animal is seen by the child. The lower disc has been set to have 10 rotations.

MD-7

MD-8

NAME OF THE MODEL : VOLUME CUBES

OBJECTIVES

To help children to develop the concept of volume.

LEVEL

Class III to Vth.

DESIGN

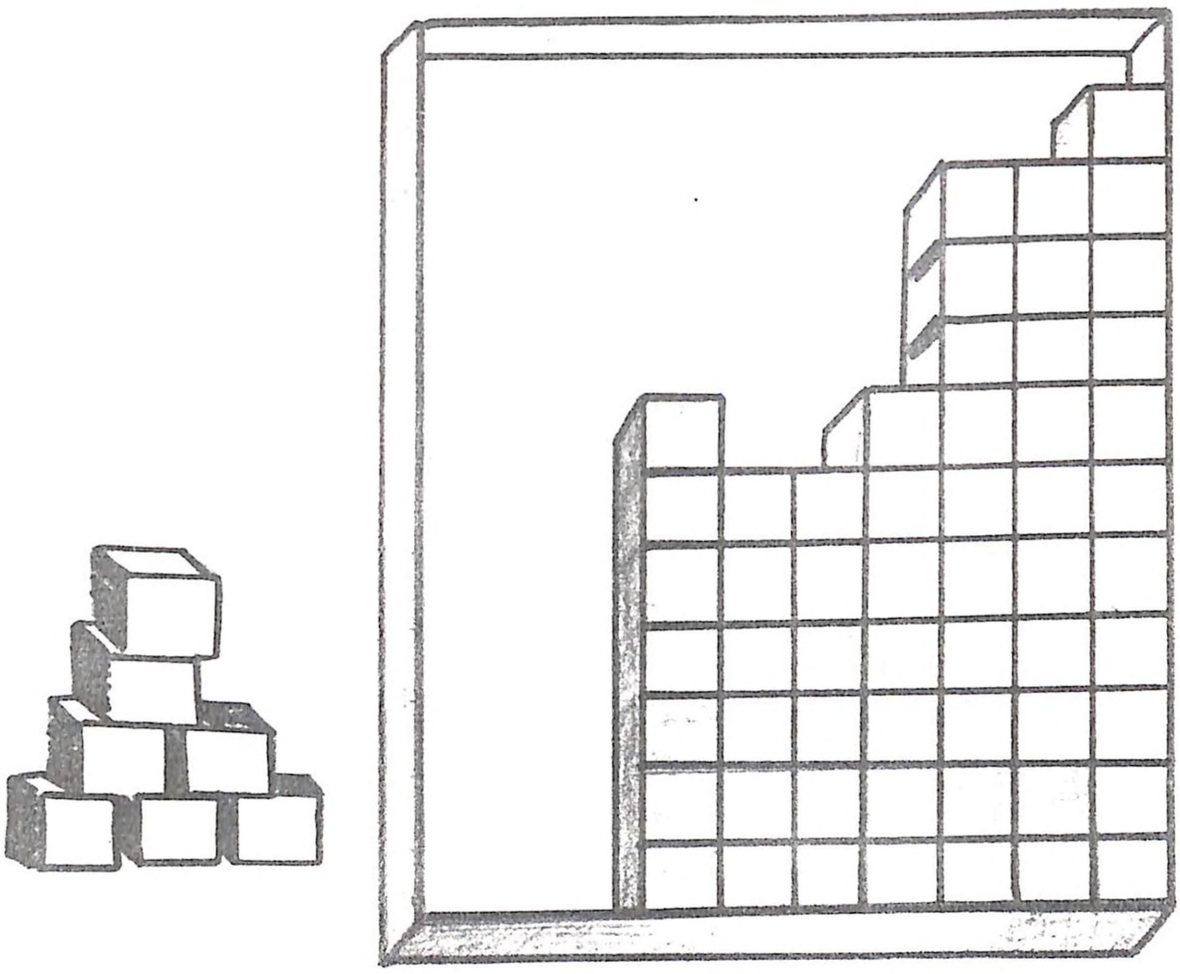
This teaching aid consists of wooden cubes of 1 inch X 1 inch X 1 inch size. Set consists of

i. One purple cube
ii. Seven orange cubes
iii. Nineteen blue cubes
iv. Three green cubes
v. Sixty one red cubes
vi. Twenty four white cubes.

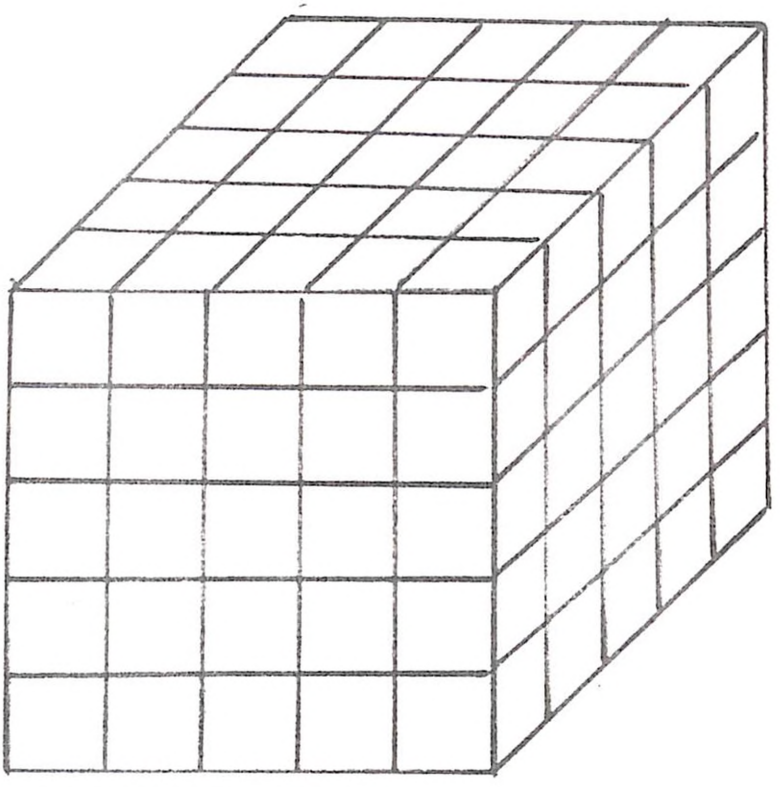
HOW TO USE

A five inch cube is made by progressively adding different coloured cubes. This visual teaching device shows in an unmistakable visual fashion that how four inch cube is countained within it, three inch cube within four inch cube, and two inch cube when three inch cube, finally the single purple one inch cube within 2 inch cube.

MD-8



MD-8



5 x 5 x 5 CUBE

MD-9

NAME OF THE MODEL : PEG OBSTACLE

OBJECTIVES

To develop thinking and reasoning abilities in children.

LEVEL

Pre-school to Class-II.

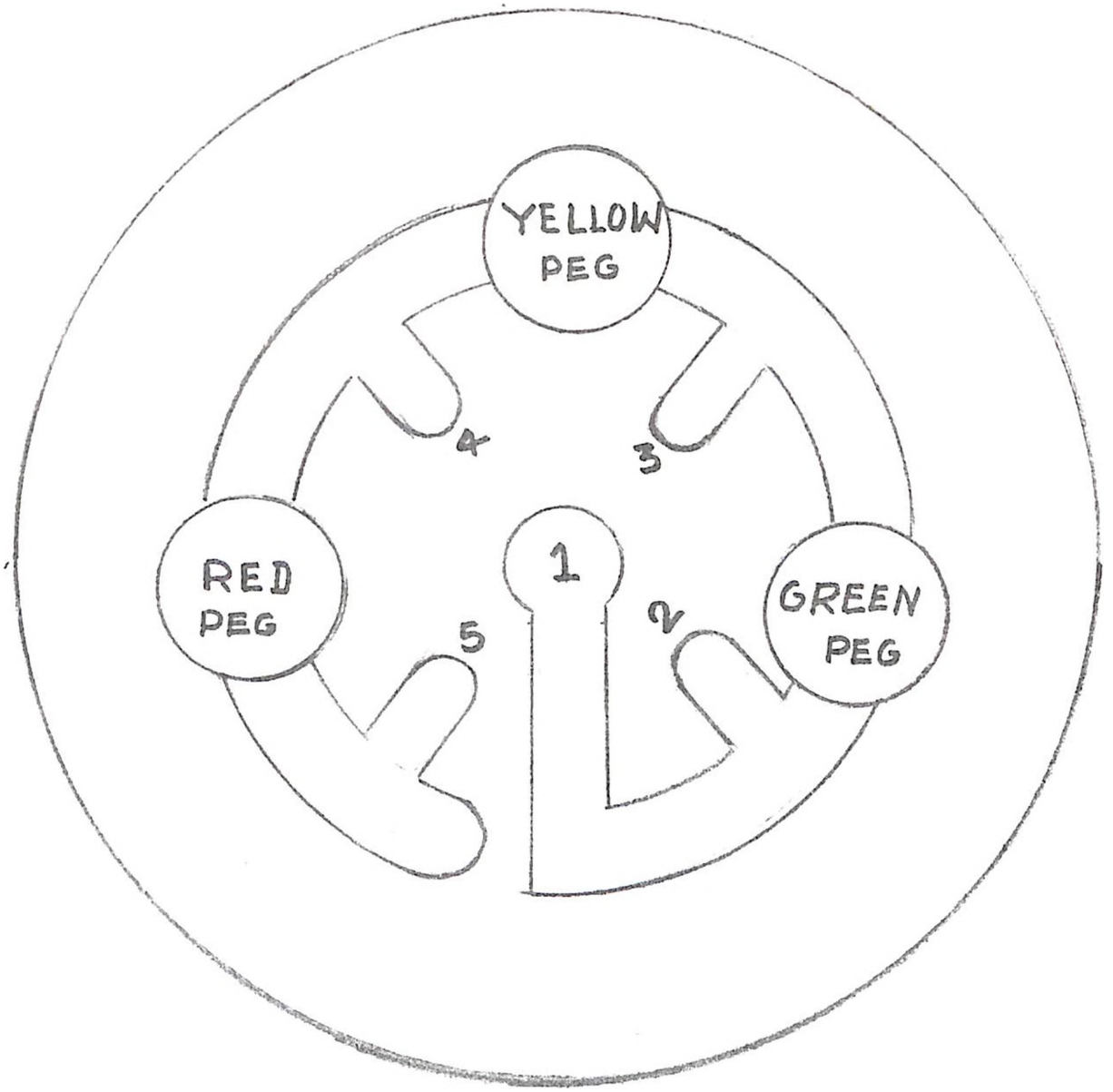
DESIGN

This aid consists of a nine inch diameter grooved wooden board. Three unremovable pegs with differently coloured tops (Red, Green and Yellow) are fitted within the grooved path. The inner details of this grooved board are shown in the figure.

HOW TO USE

Pegs are adjusted to their respective positions. The child is directed : "Slide the red peg to the red hole in the center". Since the pegs are not removable, the task can be accomplished only by sliding the otherwise obstructing yellow and green pegs out of the way into grooves at position 2, 3, 4 or 5.

MD-9



MD-10

NAME OF THE MODEL : GEO SOLIDS

OBJECTIVES

To facilitate understanding of basic geometric concepts among the children.

LEVEL

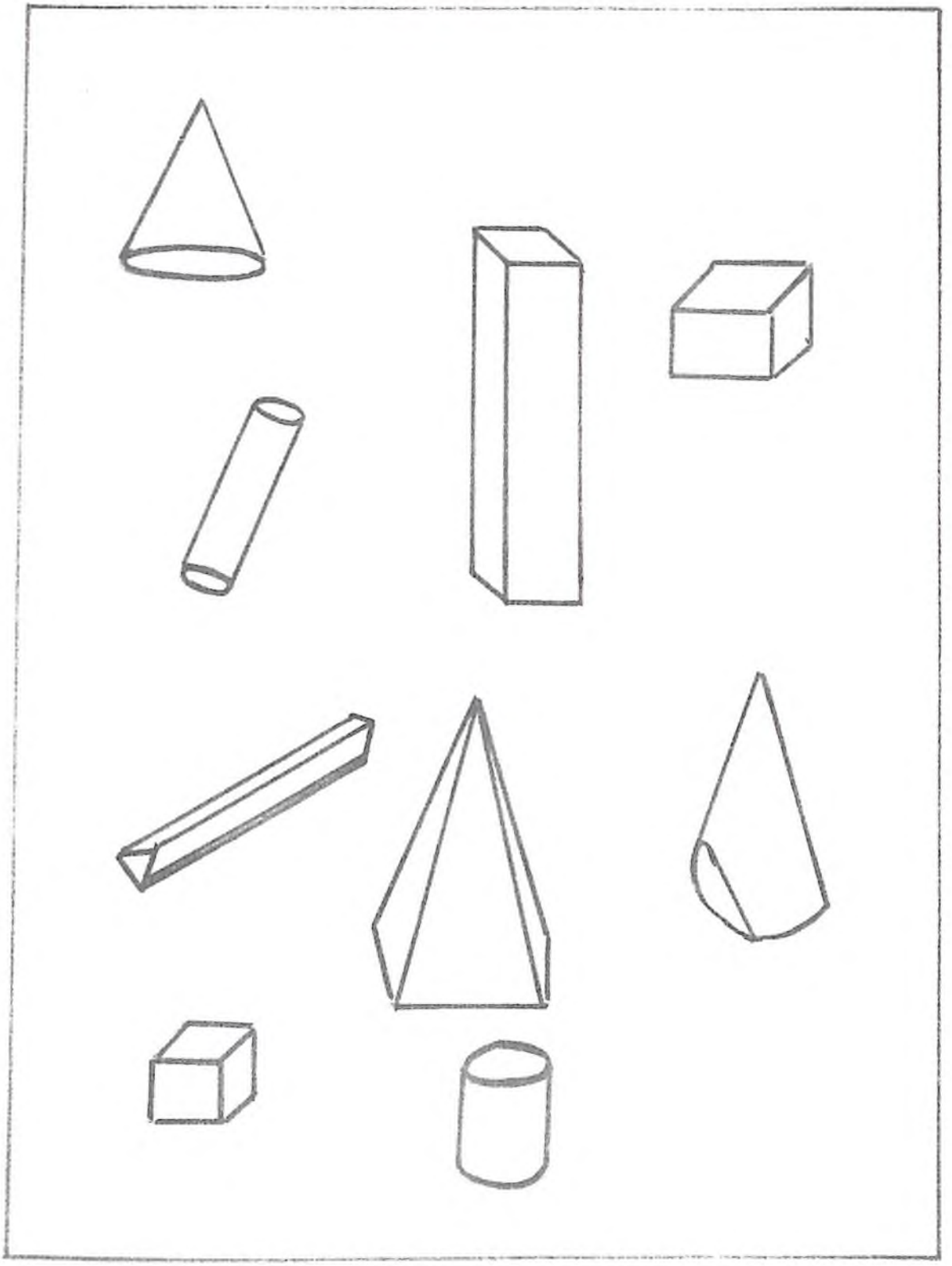
Class I to class V.

DESIGN

Twelve simple geometric solids made of transparent plastic and wood in two sets each are provided in this aid. Edges of the transparent plastic solids are marked in red for good visibility. The kit includes sphere, cube, rectangular prism, square prism, cone, sections of a cone, hemisphere, regular tetrahedron etc.

A set of fifteen more complex wooden geometric solids which include isosecles right triangular prism, parabola cut cone and ellipsoid are also provided.

MD-10



MD-11

NAME OF THE MODEL : FRACTION PIECES AND BARS

OBJECTIVES

To learn about

i. fractional parts and their relationships.

ii. the basic concepts and relationships of fractions.

iii. addition, subtraction, multiplication and division of fractions.

LEVEL

Class I to class IV.

DESIGN

This teaching/learning aid consists of six circular discs of different colours, and are made up of sturdy plastic. The size of each disc is same but they have been cut into different pieces, i.e. 2, 3, 4, 6, 8 and zero.

The other set consists of six squares cut into 2, 3, 4, 6 pieces. All the pieces are colour coded, so each fractional part is the same colour, whatever its shape may be.

Fraction bars kit contains colourful plastic board and a set of bars. These are also made of strong plastic.

HOW TO USE

The concept of 1/2, 1/3, 1/4, 1/6 and 1/8 etc. can be easily learnt by manipulating these pieces cut from different discs. Each cut piece of each circular disc is numbered in fraction as mentioned above. The child himself can discover relationship between fractions by manipulating these fractional pieces. For example one half of the circular disc can be fitted by 2' 1/4 th pieces, thus the child learn that 1/4 + 1/4 = 1/2.

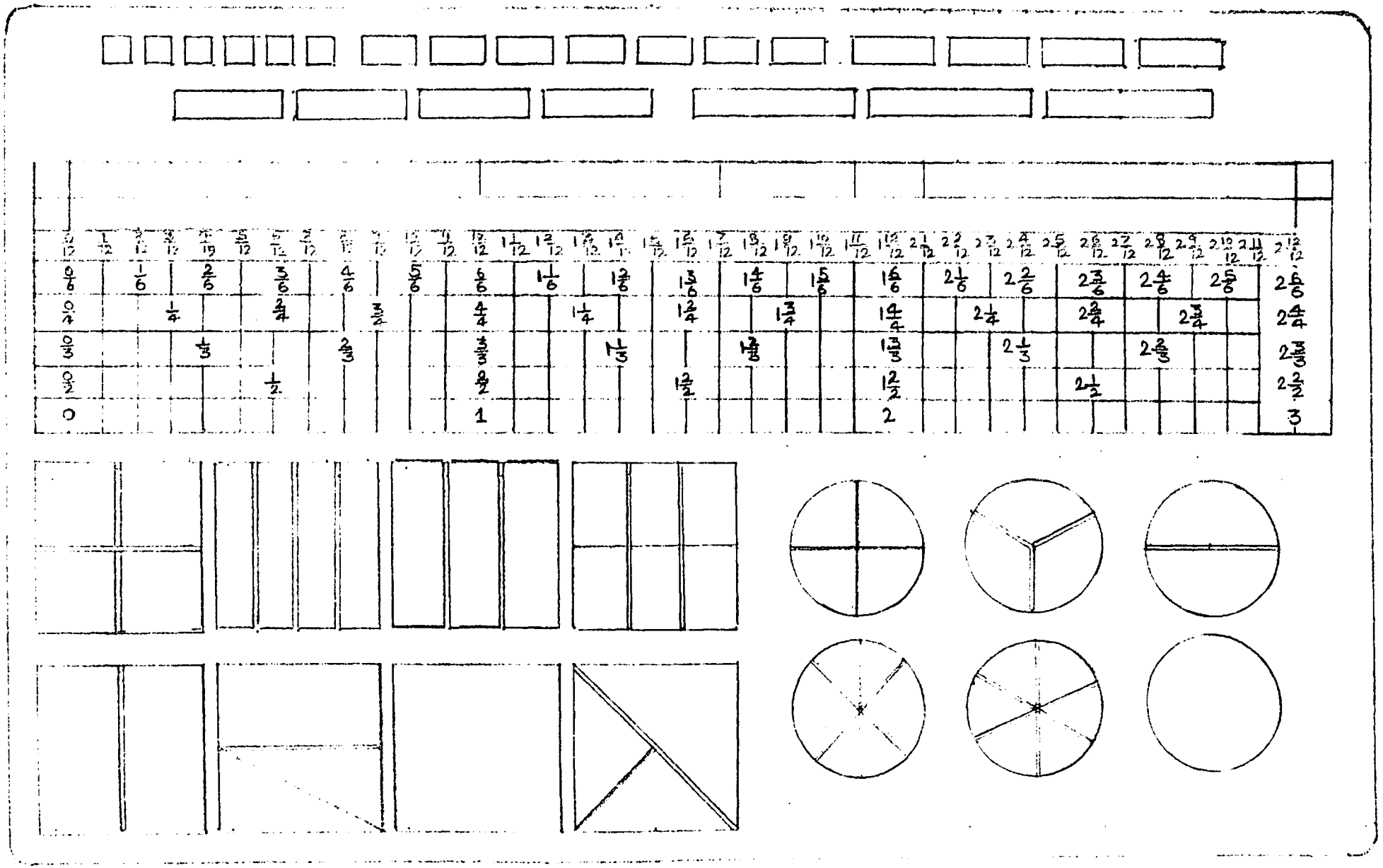
Similarly, the child himself can explore that the number of different fractional pieces of similarly numbered pieces when put into any circular disc to fill it up, add to give '1'. That is the sum of all fractional pieces in any circular disc is always one. The same activities can be done with 6 squares and their fractional pieces.

Fractional bars are manipulated by the child to discover the basic facts of fractions visually by comparing two bars and then finding which is smaller and which is greater. Addition, subtraction, multiplication and division processes involved in fractions can be easily understood by manipulating these bars. For example a fraction bar 12/12 is made of '6' bars of 1/6 units length, or '3 bars' of 1/3 units or '4' bars of 1/4 units etc.

The child can himself discover by using these bars that when a bar of length 2/3 is separated from a bar of length 3/4, a bar of unit 1/12 is left i.e. 3/4 - 1/12 = 1/12.

Similarly multiplication & division activities involved in fractions can be done and understood by the child by exploring this learning aid fractions bars.

MD-11



MD-12

NAME OF THE MODEL : FRACTION DISCS

OBJECTIVES

To help child learn and develop the basic concepts of fractions.

LEVEL

Class II to Class III.

DESIGN

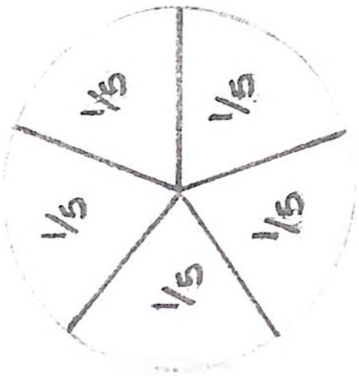
There are Eight plastic discs of diameter 6 inches and thickness 1/4 inches. All the discs have been cut into pieces as shown in the figure. Frational pieces of each disc are numbered and have similar colour but differ from the colours of the fractional pieces of other discs.

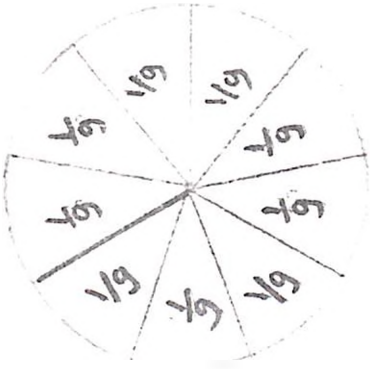
The aid also consists of a rectangular wooden frame of size 18 inches X 9 inches X 1 inch. It has two circular holes. The size of these holes is slightly to bigger than the size of the fractional discs.

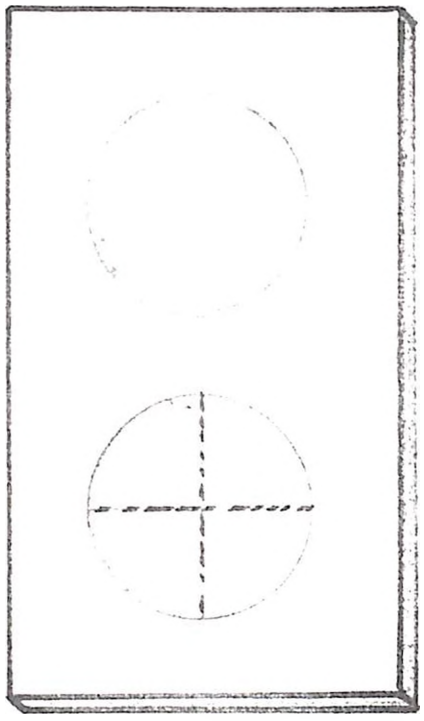
HOW TO USE

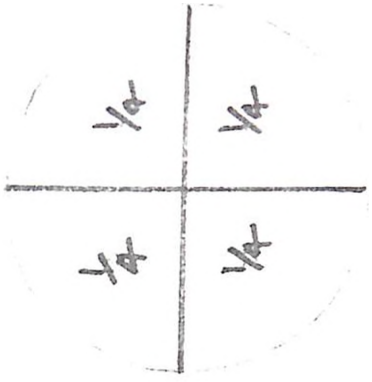
The meaning of fractional pieces and their relationships, simple addition & subtraction processes can be developed by the child by manipulating these materials. For example the child can discover that '3' pieces of 1/6 fraction are equivalent to one 1/2 fractional pieces. He can fill the circular hole by as many pieces and in as many different ways as possible and discover addition and subtraction processes himself.

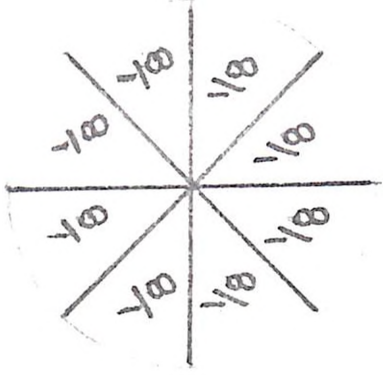
MD-12

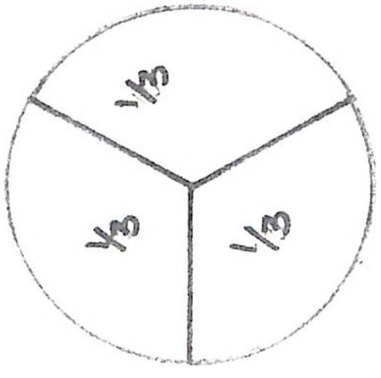

1/5
1/5
1/5
1/5
1/5

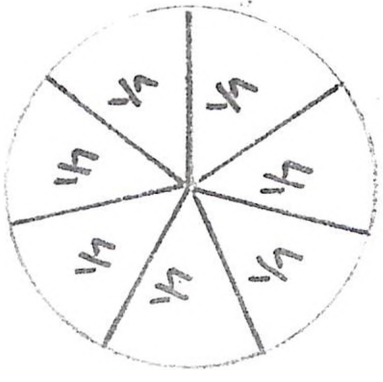

1/9
1/9
1/9
1/9
1/9
1/9
1/9
1/9
1/9

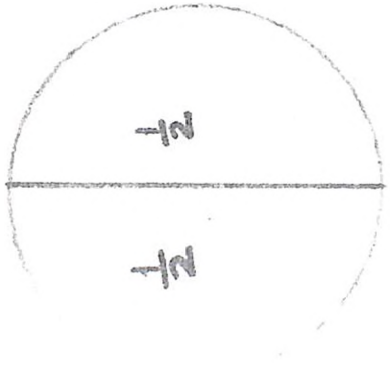


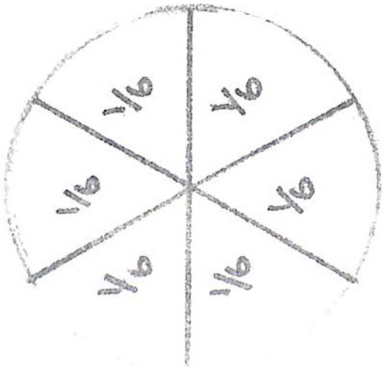

1/4
1/4
1/4
1/4


1/10
1/10
1/10
1/10
1/10
1/10
1/10
1/10
1/10
1/10


1/3
1/3
1/3


1/7
1/7
1/7
1/7
1/7
1/7
1/7


1/2
1/2


1/6
1/6
1/6
1/6
1/6
1/6

MD-13

NAME OF THE MODEL : SHAPE AND SOUND SORTER

OBJECTIVES

To help children develop the concepts of colour and shape.

LEVEL

Nursery children.

DESIGN

This is a wooden disc of diameter 6 inches and thickness one inch. On one side of the disc, holes of simple familiar objects are made and on the other side holes of some unfamiliar and mone complex objects have been made.

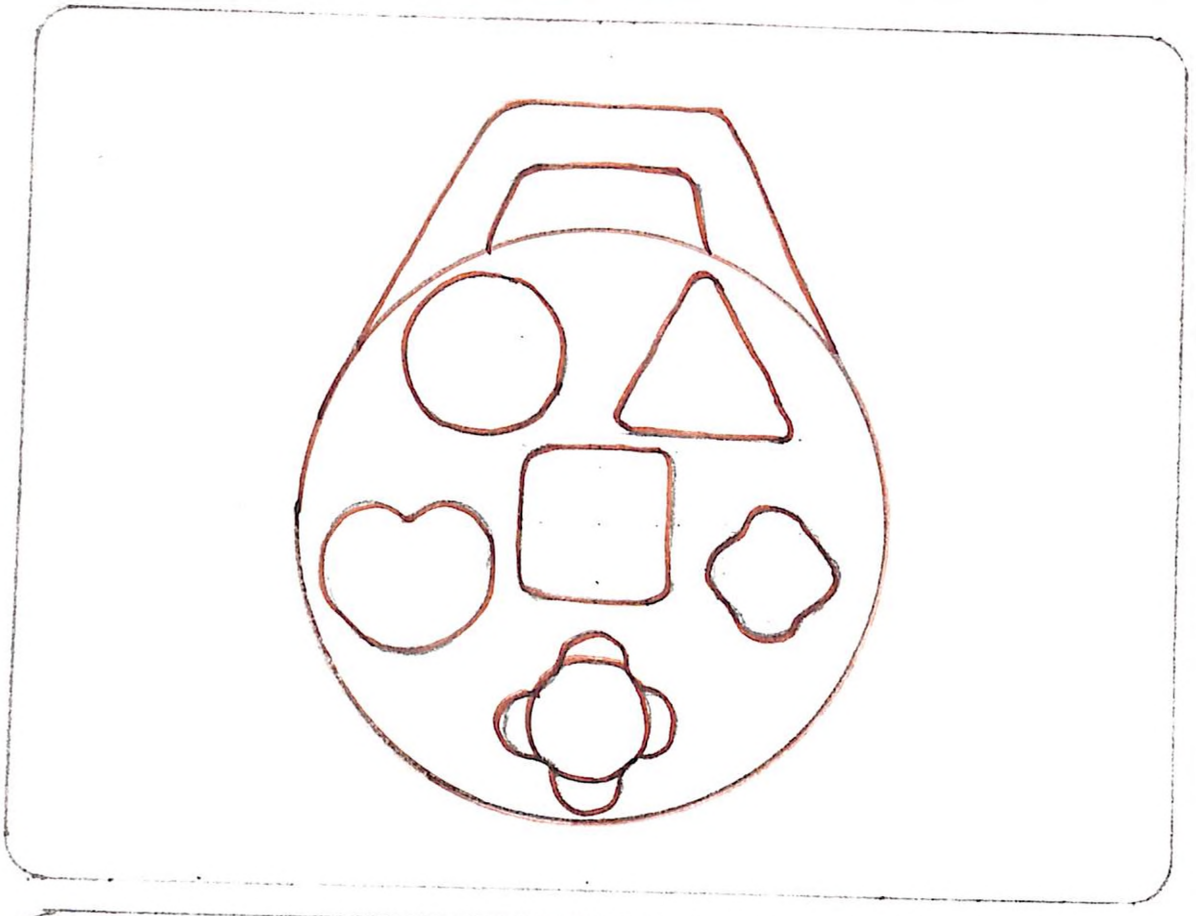
Thick figures matching these holes shapes are provided. All figures are of different attractive colours and one made up of 1/4 inch thick plastic.

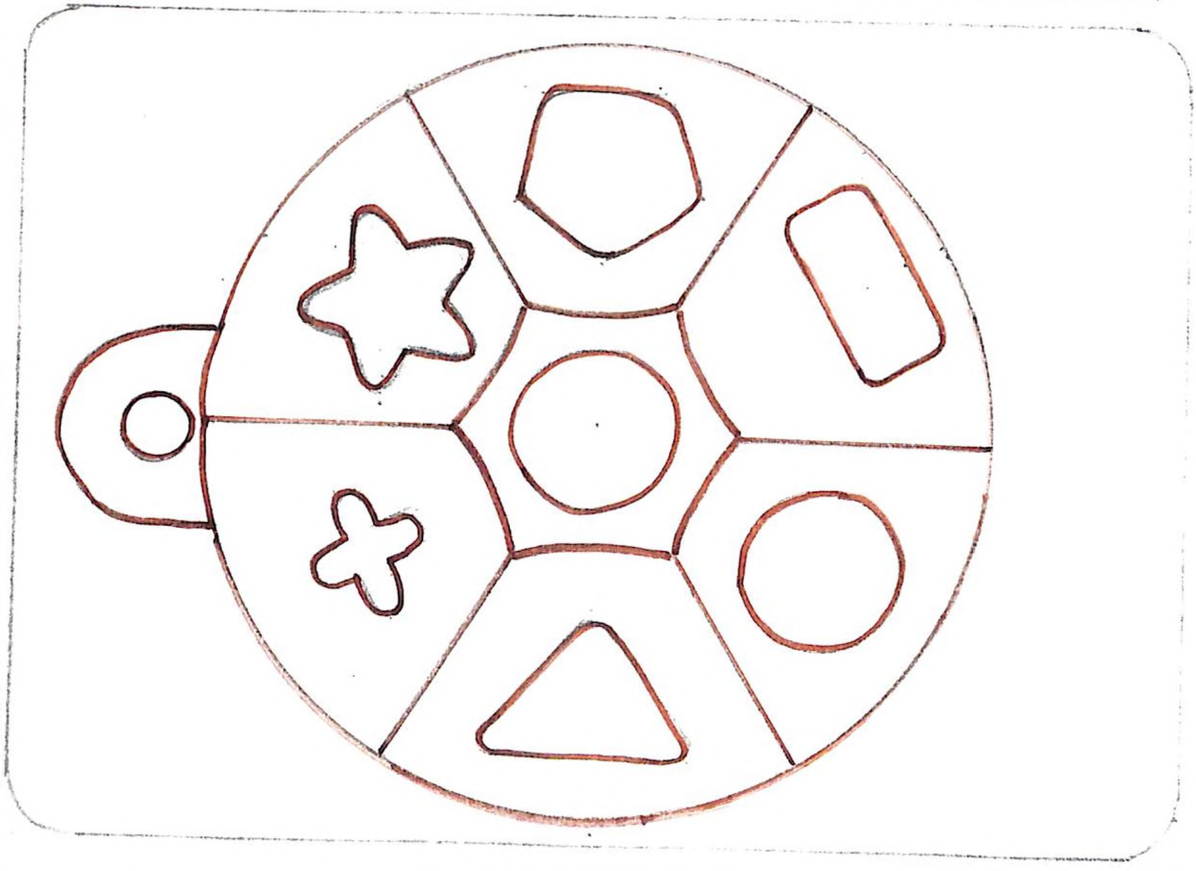
All these figures can be stored in side the hole of the disc where again the child can push then in their respective holes.

HOW TO USE

This is a self learning, self corrective manipulative toy which the child himself can use and learn. The reward for replacing the shapes into the correct hole is either the animal noise or a tune.

MD-13





MD-14

NAME OF THE MODEL : TURTLE SHAPE SORTER

OBJECTIVES

To help children develop the concepts of colour, shape and recognise and name simple geometrical shapes.

LEVEL

Pre-school children.

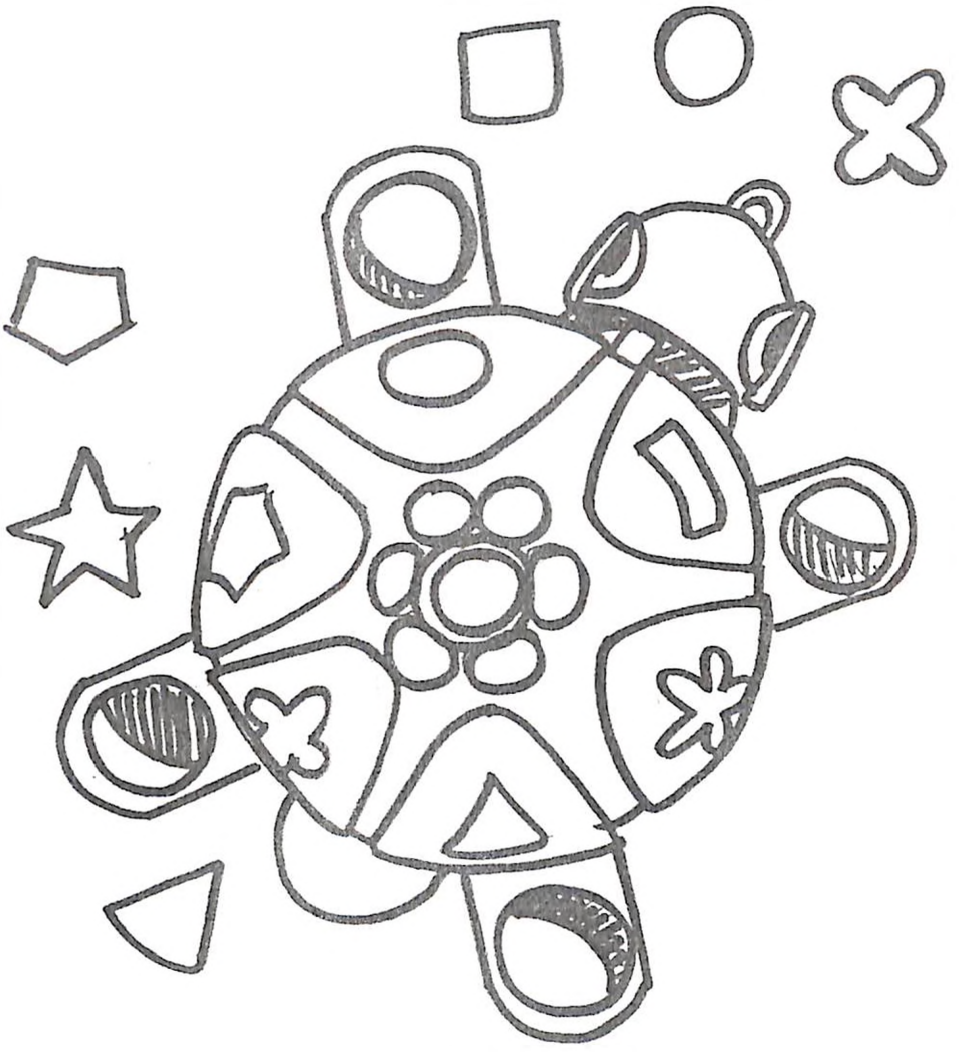
DESIGN

This educational toy has been designed in a turtle shape to attract the child to use it and learn the concepts joyfully. Square, circular, triangular, star holes are cut in the turtle. Thick figures of these shapes are provided in different colours. The material is completely made up of soft colourful plastic.

HOW TO USE

The child himself can sort out various figures and push them through the correct holes and retrieved. This is a self learning and self corrective shape sorter toy.

MD-14



MD-15

NAME OF THE MODEL : ACTIVITY CUBE

OBJECTIVES

To help children develop the concept of colour, shape, size, and to recognise and name various objects.

LEVEL

Pre-school children.

DESIGN

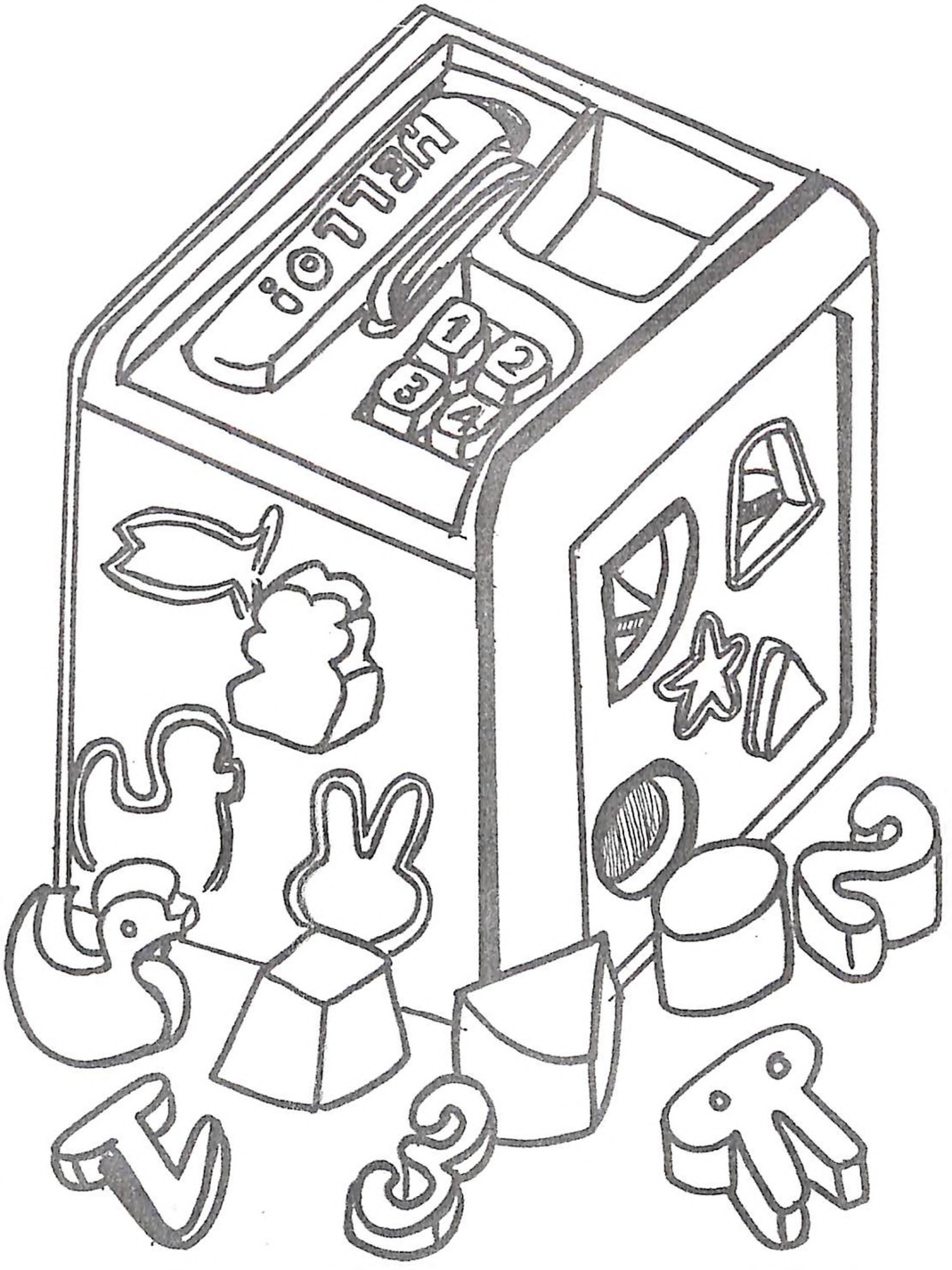
This is a coloured plastic hollow cube of size 15 inch X 15 inch X 15 inch. On each face of the cube holes of different sizes, shapes have been cut.

3-dimensional cut out figures of numbers, geometrical shapes, animals, birds and other familiar objects are provided in this activity cube. These figures/objects are to be fitted by the child into their corresponding shapes, colours & sizes etc.

HOW TO USE

This is a self learning, and self corrective manipulative learning aid. The child learns to recognize, name and manipulate objects and fit them into their respective places first under the guidance of teacher and then by himself.

MD-15



MD-16

NAME OF THE MODEL : "ADDING AND TAKING AWAY" BALANCE

OBJECTIVES

To help children learn and develop the number concepts such as :

i. More, less, equal to

ii. Numbers have various names

iii. Single digit addition and

iv. Single digit subtraction of numbers 1 to 9.

LEVEL

Nursery to Class II.

DESIGN

This is a simple digit weight plastic balance. Brightly coloured will shape Red, Yellow colours. On both ends of the beam of the balance, thick plastic numbers from 1 to 9 can be suspended. The size, colour and weight of these plastic numbers are different but adjusted in such a manner so that their weight increases in the order of numbers. For example the weight of number 1 is 10 gm., '2' is twenty g,, '3' is thirty gram and so on. 3-sets of these plastic numerals are provided.

HOW TO USE

The child can hang any number on one side of the beam of the balance and then puts another number on the other side of the beam. When the numbers balance, the child

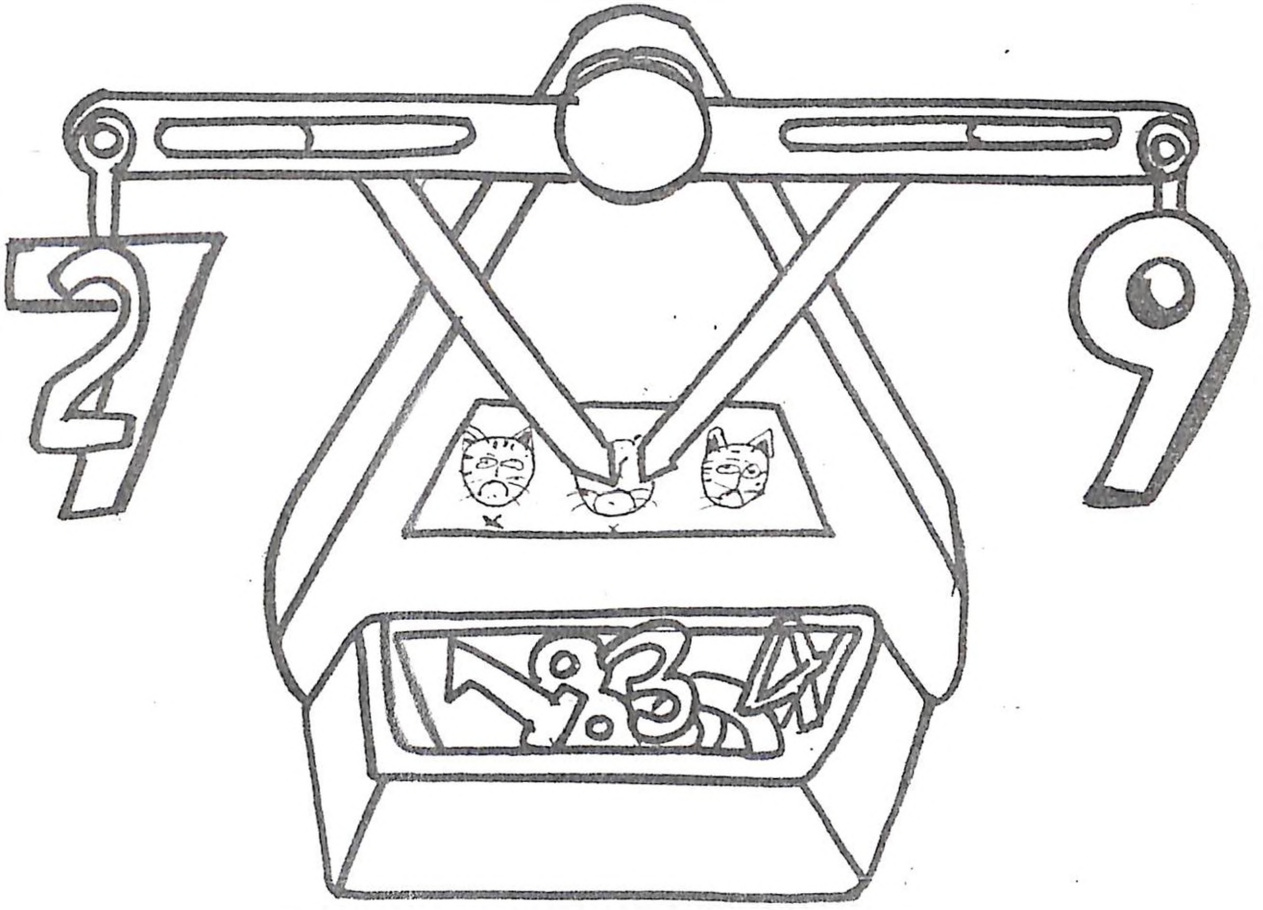
discovers the correct answer i.e. both numbers are same. In case the numbers do not balance, then the number on the side of the beam which is fitted downwards shall be more and the number on the side of the beam which has been lifted upwards is less.

Similarly one child can hang any number on one side of the beam. His partner will pick up plate having figures of objects printed on it. If both balance the beam, they discover and learn matching numbers with objects.

For teaching/learning single digit addition, the child may hang two numbers on one side of the beam and then balance the same by hanging another number on the other side of the beam. For example if the child suspends the number '2' and '7', then '9' will be the only number which will balance the beam. Thus by manipulating their toy balance he himself can discover that 2 and 7 make nine.

Now these numbers '2' and '7' are kept as such on he balance, but the number '9' is replaced by a similar set of numbers i.e., '2' and '7'. The child is asked to take out any number either '2' or '7' from both sides of the beam, the remaining numbers shall be the answers of the operation. That is if the child taken away the number '2' the other side will balance if he takes way the number '2' from that side. So the remaining number '7' is the answer that 9-2 =7.

MD-16



MD-17

NAME OF THE MODEL : LOOK AND LEARN

OBJECTIVES

To help children learn alphabets, identify or count objects. LEVEL

Nursery/Pre-school children.

DESIGN

This is an exciting flip up, look and learn activity toy.

This ia a light weight square plastic frame on which arrangements for learning alphabets, counting objects and identifying objects have been made. Separately through press and reveal action mechanism.

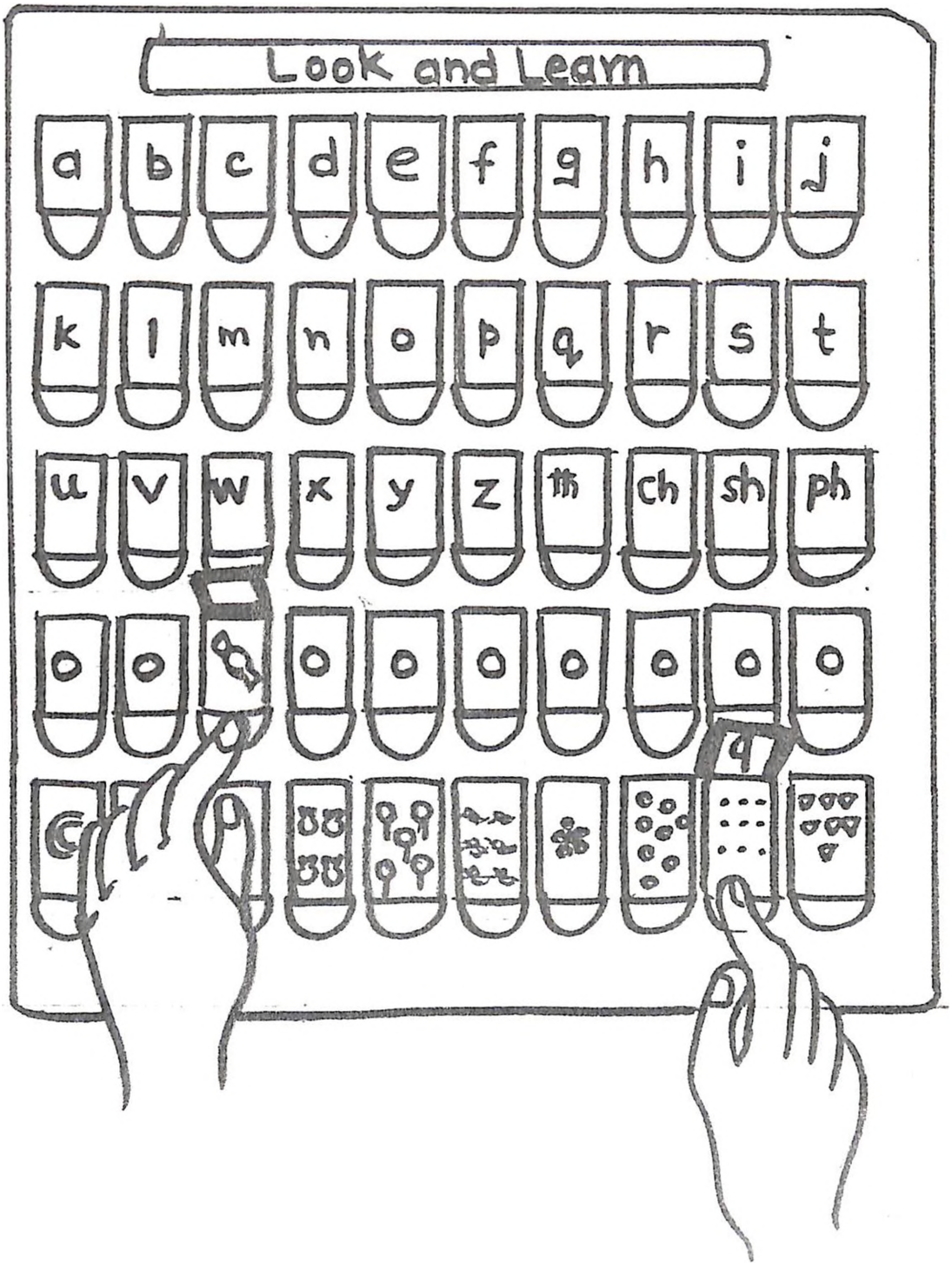
HOW TO USE

There is a simple device to use this toy. The child only presses and reveals the answer. For example if he presses the portion of the flip box below 'a', it will be opened and the child will observe the figure of apple inside. Thus he will learn to match the letter 'a' with the object 'apple'.

The system itself motivates the child to use this toy and learn.

Counting identification of objects can be similarly taught/learnt by the child.

MD-17



MD-18

NAME OF THE MODEL : NUMBER STRIPS

OBJECTIVES

To help child learn and strengthen the following concept of mathematics.

i. Addition : understanding basic addition facts of numbers one to nine.

ii. Single digit additions of 2, 3, 4 & 5 numbers.

iii. Subtraction : understanding subtraction facts of numbers one to nine.

iv. Subtraction of single digit numbers from one to nine.

LEVEL

Class I & class II.

DESIGN

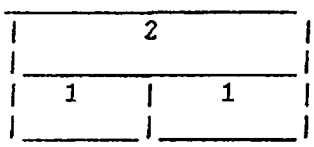
This aid consists of plastic in 9 different colours. Each strip has a number printed on its one side and corresponding number of figures of objects are printed on the other side. Every strip is one inch in width and 1/8th inch thick. The length is in inches as per the number printed on the strips. For example, strip numbered '8' is Eight inches long and strip numbered '7' is Seven inches long and so on.

There are 5-sets of each numbered strip. Thus in all there are 45 strips. Strips are scored so that it appears that they are composed of unit squares.

HOW TO USE

The child is encouraged to use these strips to discover addition & subtraction facts of numbers 1 to nine as follows :

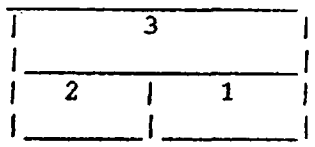
Take one strip say strip numbered '2'. Find out another pair of numbered strips which when placed linearly below this numbered strip '2' exactly match in length unit. In this case it will be 1 and 1 as shown below



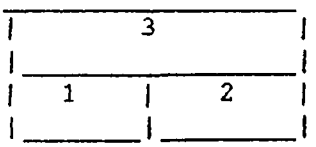
2 is 1 & 1
or
2 = 1 + 1

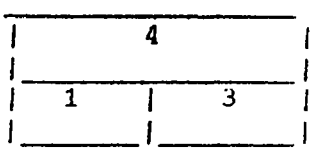
Thus the child will learn that 2 is 1 and 1 or 1 & 1 make two.

Addition facts of other numbers can be discovered in a similar way by the child himself by manipulating these strips. Few examples are shown below :

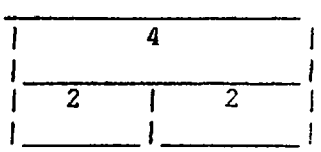


3 is 2 & 1
or
3 = 2 + 1

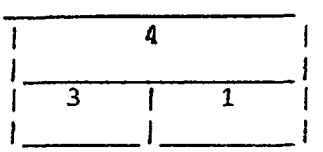




4 is 1 & 3



4 is 2 and 2



4 is 3 & 1

Similarly subtraction facts can also be discovered by following steps given below :

Take one numbered strip say '8'. Place over it any numbered strip which has value less than '8' or equal to eight say '6'. The child is then asked to discover how many unit squares of strip '8' are uncovered?. The child will count and then say '2'.

Similarly the child first may be shown a strip having No. say '7' figures printed on it. cover this strip by placing over it a strip say numbered 4. When the child is asked how many figures he can see now, he may answer '3' i.e. from seven take away four is three.

Similarly subtraction facts of all numbers 1 to 9 can be discovered.

MD-18

MD-18

MD-18

1 2 3 4 5 6 7 8
1 2 3 4
1 2 3 4 5 6 7
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5
1 2 3 4 5 6 7
1

MD-19

NAME OF THE MODEL : MULTIPLICATION AND DIVISION BALANCE

OBJECTIVES

To help child learn

i. The concept of multiplication and tables from 2 to 10.

ii. The concept of division.

LEVEL

Class I to Class IV.

DESIGN

This is a simple plastic balance of height 12 inches. Two beams made of plastic and of size 20 inches X 2 inches X 1/4 inches, one for learning concept of multiplication and the other for concept of division are provided in this model.

Multiplication beam is numbered 1 to 10 on one side with multiplication symbols. Other smaller side of the beam is used for hanging the answer card.

Division beam is also numbered 1 to 10 but without any sign.

There are rectangular plastic strips of size 10 cm X 4 cm X 3 mm thick - 200 numbers. One hundred strips are numbered 1 to 100 and the remaining 100 strips are just blank. Both sets of strips have different colours.

Ten such strips of similar colour but different from other set of strips with numerals 1 to 10 printed separately on them are provided. Which are meant to be hanged on the right hand side of the multiplication/division beams.

Several strips of similar size showing division of single digit, two digit and 3 digit numbers by a single digit number are also given in this model. These are meant to be hanged on the left hand side of the beam.

HOW TO USE

The teacher first demonstrates the use of this model to the children to learn both multiplication & division as follows :

A. i. He picks up a strip numbered '2' (meant to be used on the R.H.S. of the beam) and hangs the same below the numeral I printed on the beam.

ii. To find the answer of 2 X 1 (or two ones) the teacher hangs blank strips on the L.H.S. of the beam one by one till the beam is balanced and exactly horizontal.

iii. He then counts the total number of strips used to balance the beam. The answer in this case will be "2" strips. Thus the child learns to discover that 2 X 1 = 2.

iv. The teacher then changes the position of this strip numbered '2' on the beam from 1 and hangs the same below the numeral '2' of the beam.

v. He follows the same procedure to find the answer of 2 X 2. In this case the child observes that only 4 strips are required to balance the beam. So he learns that 2 X 2 = 4.

The child is now given the opportunity to discover other multiplication facts of this number '2'. After having enough practice and understanding the meaning of multiplication, he himself can discover multiplication facts of other numbers i.e. 3 to 10.

B. i. the teacher picks up one division strip say 8/2 and hangs the same on the L.H.S. of the beam.

ii. The correct answer strip say numbered '4' in this case, when hanged below the similar numeral printed on the beam on the R.H.S. will at once balance the beam this confirming the child that the answer for 8/2 is 4.

Division facts of other numbers 1 to 100 can be discovered by the child himself after observing teacher's demonstrations.

3·1·8
4
1
2
3
4
5
6
7
8
9
10

MD-19

MD-20

NAME OF THE MODEL : METRIC LINEAR MEASUREMENT SET

OBJECTIVES

This linear measurement set gives the child visual and tactile experience of the relationship 1 : 10 : 100 as underlying the metric system and experience with the actual units of length in metric measurement.

LEVEL

Class II to Class IV.

DESIGN

The set contains 84 wooden pieces which are divided into four colour groups. The white pieces show relationship without specific numbers or names of the three coloured groups, each takes a different length as the unit (green - meter; blue - decimeter; red - centimeter), and have their actual lengths printed on one side only, expressed in terms of that unit.

HOW TO USE

The child easily learns the relationship between meter, decimeter and centimeter by comparing their lengths. By manipulating the components of their aid the child discovers & learns that :

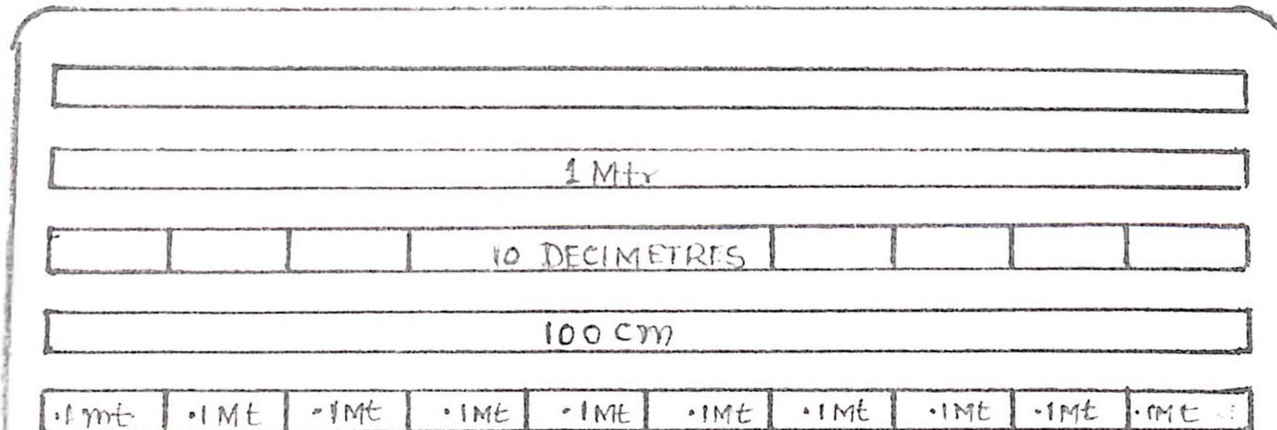
i. 10 pieces of 1 meter make one meter or 10 decimeters or 100 centimeters.

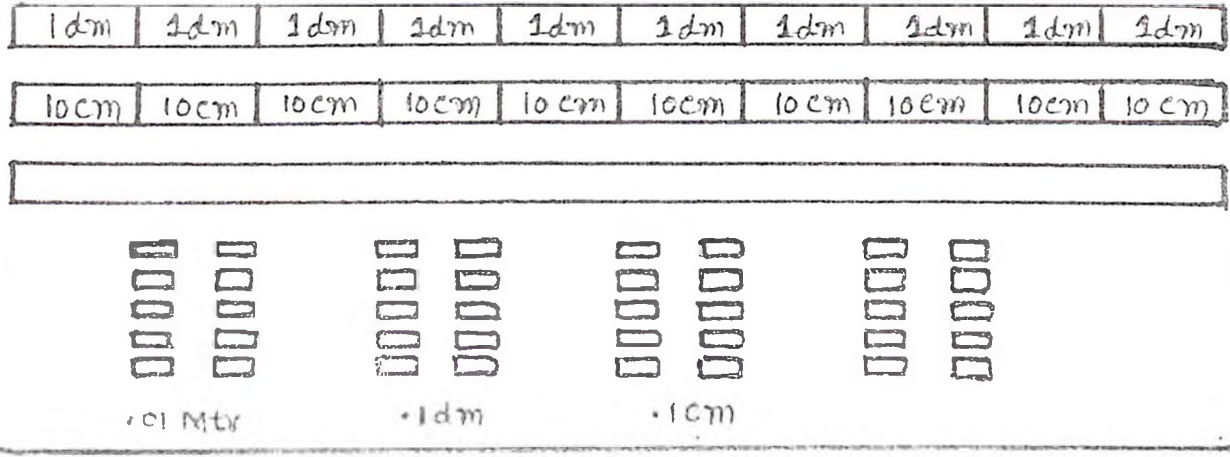
ii. 10 pieces of 1 decimeter each make a length equal to 10 decimeter long piece or 1 meter or 100 cm long pieces.

iii. 0.1 meter, 1 decimeter and 10 centimeter are equal to to each other, when the child compared their lengths.

Several other metric relationships can be discovered by the child himself by manipulating these units of length provided in the kit.

MD-20


1 Mtr
10 DECIMETRES
100 cm
·1mt
·1Mt
·1Mt
·1Mt
·1Mt
·1Mt
·1Mt
·1Mt
·1Mt
·1Mt


1 dm
1 dm
1 dm
1 dm
1 dm
1 dm
1 dm
1 dm
1 dm
1 dm
10 cm
10 cm
10 cm
10 cm
10 cm
10 cm
10 cm
10 cm
10 cm
10 cm
1 Mtr
1 dm
1 cm

MD-21

NAME OF THE MODEL : TRUNDLE WHEEL

OBJECTIVES

This tool has been designed for measuring distance, either straight line or curved by the child.

The teacher can also demonstrate the relationship between the diameter and circumference of a circle.

LEVEL

Class I to Class Vth.

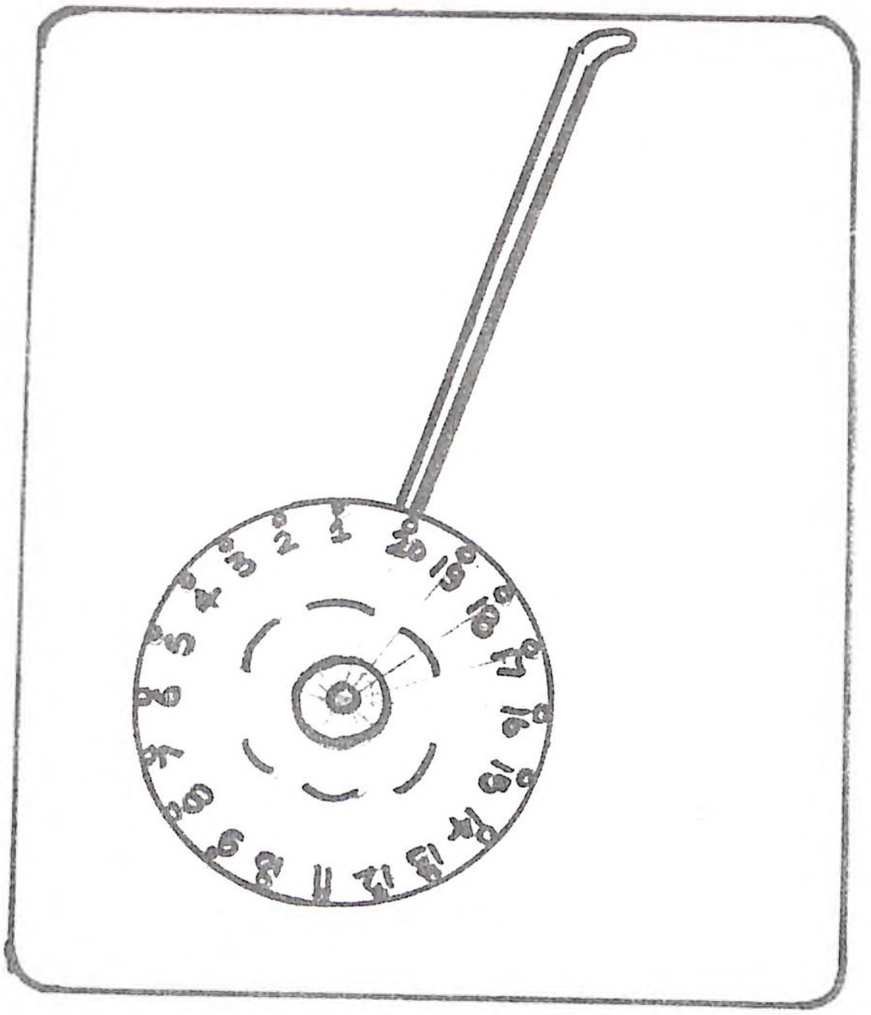
DESIGN

This is a small solid heavy duty plastic wheel of 1' foot diameter and 1/2" thickness. The outer periphery of this wheel is covered with a soft rubber ring. The wheel is marked in centimeters and meter. It is attached with an handle and gives an audible click when the wheel rotates for each revolution.

HOW TO USE

The students holds the handle and counts the revolutions of the wheel as he walks along the distance to be measured. by counting the number of audible clicks and the position of the wheel at the end point of the distance to be measured, the length of the distance can be measured by the child.

MD-21



MD-22

NAME OF THE MODEL : ARITHMETIC BLOCKS

OBJECTIVES

i. to count objects from 1 to 100.

ii. to demonstrate understanding of tens, hundreds & thousands.

iii. to demonstrate understanding of place value of numbers upto 4 and 5 digits.

iv. to understand the concept of measurement of length, area & volume.

LEVEL

Class I to Class V (5 to 9 years).

DESIGN

The kit consists of blocks made of natural soft wood. All dimensions of blocks are in centimeter units. Surfaces of blocks are scored so that pieces appear to be composed of actual unit cubes. Size of each unit cube is 1 cm X 1 cm X 1 cm, of one ten's rod is 10 cm X 1 cm X 1 cm of one hundred flat is 10 cm X 10 cm X 1 cm and of one thousand blocks is 10 cm X 10 cm X 10 cm.

There are 200 unit cubes, 30 tens rods, 30 hundreds and 5 thousand blocks.

Children can learn themselves individually or through working in groups of children.

HOW TO USE

The child can have counting experiences with unit cubes, understand meaning of one ten, one hundred and one thousand by manipulating these blocks. For example by matching 10 unit cues unit one ten rod, the child learns that 1 ten is similar to 10 units or ten ones make one ten. Similarly meaning of hundreds and thousand can be discovered in a similar way.

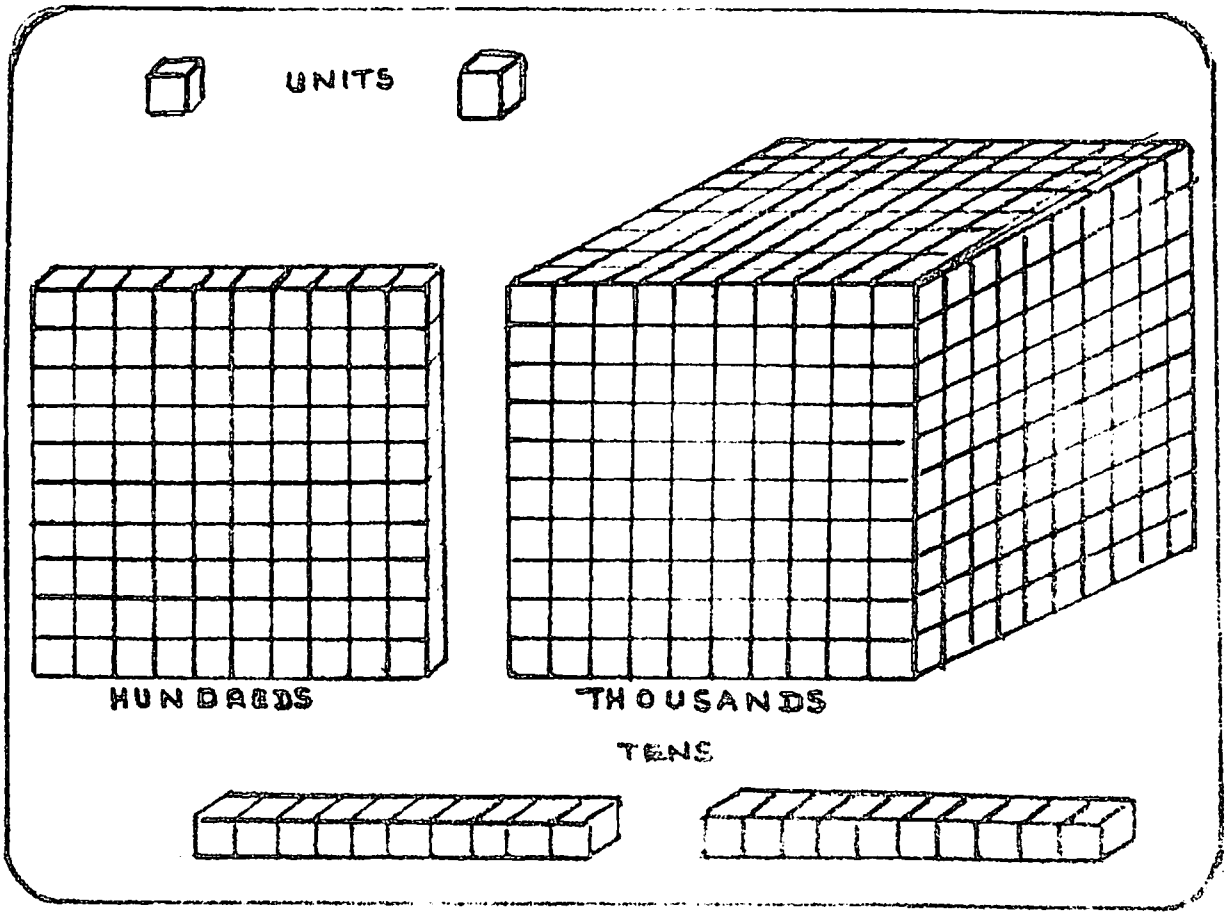
Counting in tens & hundreds can also be learnt by the child by counting tens rods & hundred blocks.

Using tens rods, the child can measure lengths of objects. Children in the class, uses these rods to measure lengths of different objects.

The child is asked to cover the top surface of the table by the unit cubes. While doing their activity he learn that the total number of units covering the top of the table is the area of the table top.

The unit cubes can also be used by the child to find out volume of the objects. For example the empty box whose volume is to be determined is filled up with unit cubes i.e. 1 cm X 1 cm X 1cm cubes. By counting the number of unit cubes the child learns to determine the volume.

MD-22



MD-23

NAME OF THE MODEL : NUMBER CUBES

OBJECTIVES

To help child develop the concepts of numeration systems.

LEVEL

Class I to Class III.

DESIGN

The kit consists of several unit cubes and other items as shown in the figure. Each unit cube is 1 cm X 1 cm X 1 cm. It is the "atom" from which all higher values can be structured by the child. This fact highlights the dual aspect of values, first as discrete collections of units and secondly, as composite units. Every cube has an interlocking device, thus rods of any length can be structured from single cubes and can be taken apart. Kit includes the following items.

i. Unit cubes - 500 no's (50 each of 10 colours)
ii. 1 to 100 operational grid and container
iii. 1 to 10 stair
iv. 1 to 10 value boats
v. 1 to 10 inset pattern boards
vi. 1 to 10 number indicators
vii. One 10 cm X 10 cm X 1 cm number tray

viii. 100 track

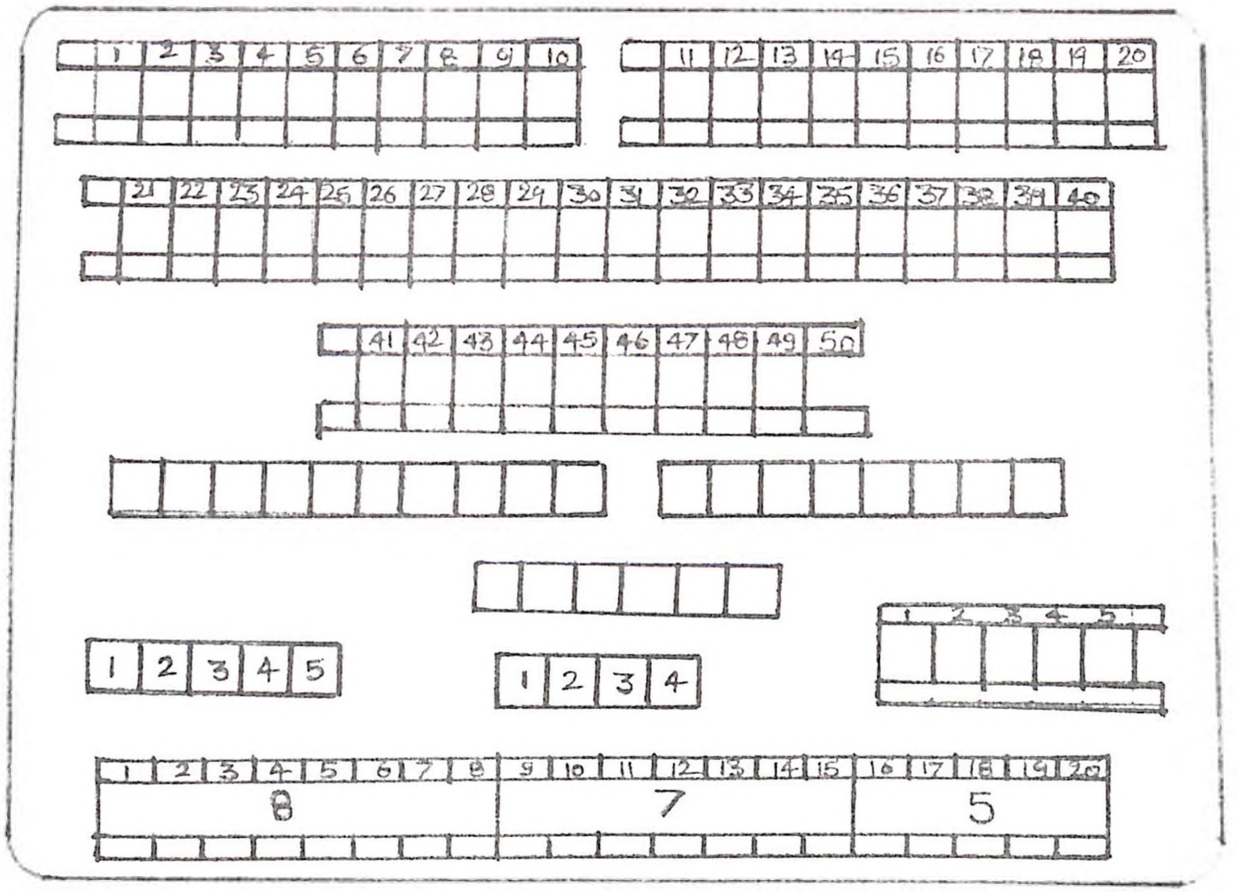
ix. One to 100 operational board 12 cm X 12 cm X 12 cm.

HOW TO USE

The child can learn to structure any value above one by interlocking cubes Counting by interlocking cubes, interlocking of numbered cubes both in ascending or descending order can be manipulated by the child.

The child can insert cubes in the tracks to discover single digit additions and can also determine the basic addition facts of numbers also.

MD-23



MD-24

NAME OF THE MODEL : SLIDE RULE

OBJECTIVES

To help the child learn and review basic addition, subtraction, multiplication and division facts.

LEVEL

Class I to Class II.

DESIGN

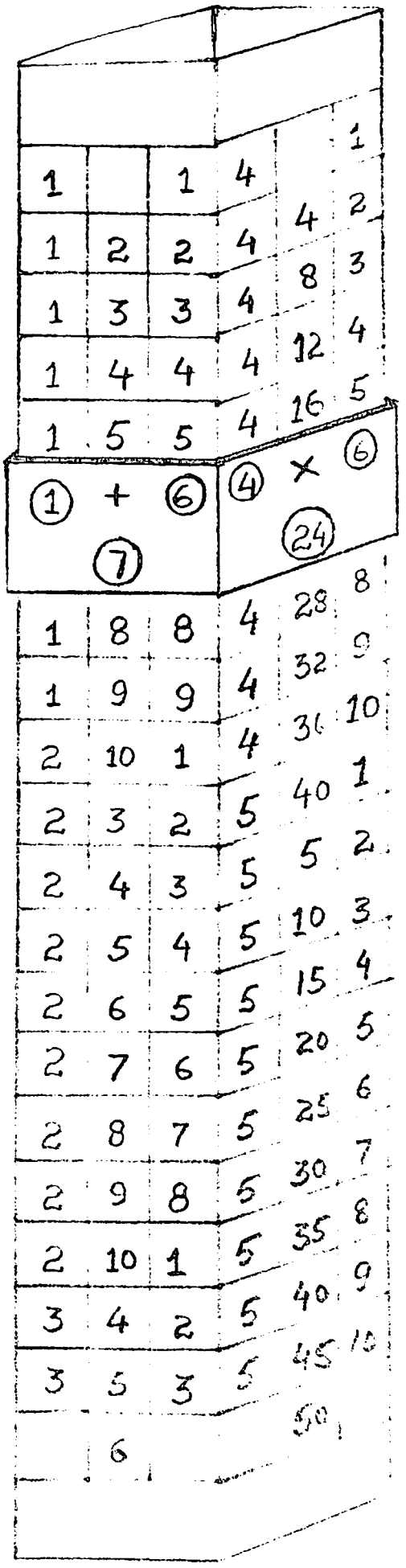
This is a long plastic square pipe, 15 inches long, 2 inches thick and 2 inches wide. All the four long rectangular faces of this pipe, numerals in a specific pattern and order are printed. The numerals on the four faces have been designed to present basic addition, subtraction, multiplication & division facts through a slider having holes as shown in the figure.

HOW TO USE

The child can discover/review the basic addition & subtraction, facts or number 0 to 10, multiplication tables upto 10 and single digit division facts of numbers, simply by pushing the slider in steps and then seeing the numbers under holes. The aid also illustrates that addition & subtraction; multiplication, division are the reverse processes.

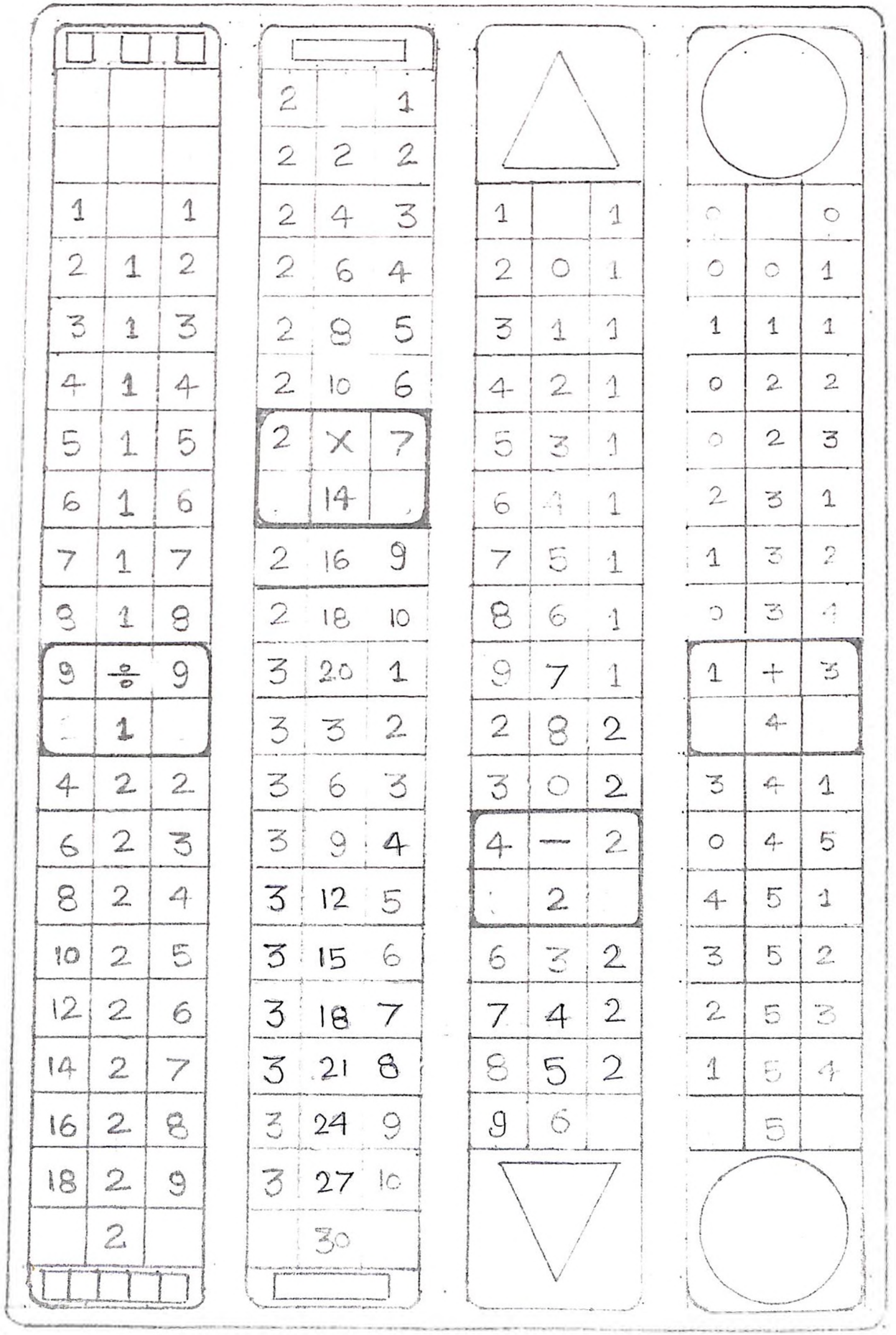
The top two holes in the slider reveal the numbers and the sign between these two numbers indicate that whether the numbers are to be added or subtracted or multiplied or to be divided. The bottom hole reveals the result of the operation.

MD-24


1 1 4 1
1 2 2 4 4 2
1 3 3 4 8 3
1 4 4 4 12 4
1 5 5 4 16 5
① + ⑥ ⑦
④ × ⑥ ㉔
1 8 8 4 28 8
1 9 9 4 32 9
2 10 1 4 36 10
2 3 2 5 40 1
2 4 3 5 5 2
2 5 4 5 10 3
2 6 5 5 15 4
2 7 6 5 20 5
2 8 7 5 25 6
2 9 8 5 30 7
2 10 1 5 35 8
3 4 2 5 40 9
3 5 3 5 45 10
6 50

MD-24

+ − × ÷



1		1
2	1	2
3	1	3
4	1	4
5	1	5
6	1	6
7	1	7
8	1	8
9	÷	9
	1	
4	2	2
6	2	3
8	2	4
10	2	5
12	2	6
14	2	7
16	2	8
18	2	9
	2	

2		1
2	2	2
2	4	3
2	6	4
2	8	5
2	10	6
2	×	7
	14	
2	16	9
2	18	10
3	20	1
3	3	2
3	6	3
3	9	4
3	12	5
3	15	6
3	18	7
3	21	8
3	24	9
3	27	10
	30	

1		1
2	0	1
3	1	1
4	2	1
5	3	1
6	4	1
7	5	1
8	6	1
9	7	1
2	8	2
3	0	2
4	−	2
	2	
6	3	2
7	4	2
8	5	2
9	6	

0		0
0	0	1
1	1	1
0	2	2
0	2	3
2	3	1
1	3	2
0	3	4
1	+	3
	4	
3	4	1
0	4	5
4	5	1
3	5	2
2	5	3
1	5	4
	5	

MD-25

NAME OF THE MODEL : MAGIC MATH BALANCE

OBJECTIVES

To help the child understand the concept of numbers as follows :

i. Matching numbers with objects.

ii. Learning basic addition facts of numbers two to ten,

iii. Comparison of numbers.

iv. Adding two/three single digit numbers whose sum does not exceed ten.

v. Learning basic subtraction facts of numbers one to ten.

LEVEL

Nursery to Class II.

DESIGN

The wooden balance is eleven inches (11") high 3 separate wooden beams of size 2 feet X 2 inches X 1/4" are provided. One of the beams is numbered from 1 to 10 on each side of the center. The second beam is numbered 1 to 10 on one side of the center of the beam and on the other side of the beam, corresponding number of figures are printed. The

third beam is numbered 1 to 10 on each side of the center of the beam but one side of the beam is numbered double one set of numbere 1 to 10 have positive sign the second set of

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 .+0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10
+10 +9 +8 +7 +6 +5 +4 +3 +2 +1 *

numbers have negative sign as shown in the figure.

Apart from the above items, the model has the following components :

i. A set of 50 plastic strips. Each strip is 10 cm long, 3 cm wide and 3 mm thick and have holes at the top. Strips are numbered 1 to 10 (40 no's). Remaining ten strips have figures printed on then from 1 to 10.

ii. There are twenty coloured plastic pegs which can be inserted into the holes provided in each beam. These are used for hanging plastic strips.

HOW TO USE

Matching Numbers with Objects : The child is asked to hang any one of the numbered plastic strip on one side of the beam. When he does this the beam is tilted. He is then asked to pick up the strip which has corresponding number of figures printed on it. If the child picks up the correct strip then hanging of the same on other side of the beam at the right position shall bring back the beam again in the

exact horizontal position. Thus the child himself can explore other numbers.

Basic Addition Facts of Numbers : The child is guided to discover addition facts of numbers as follows :

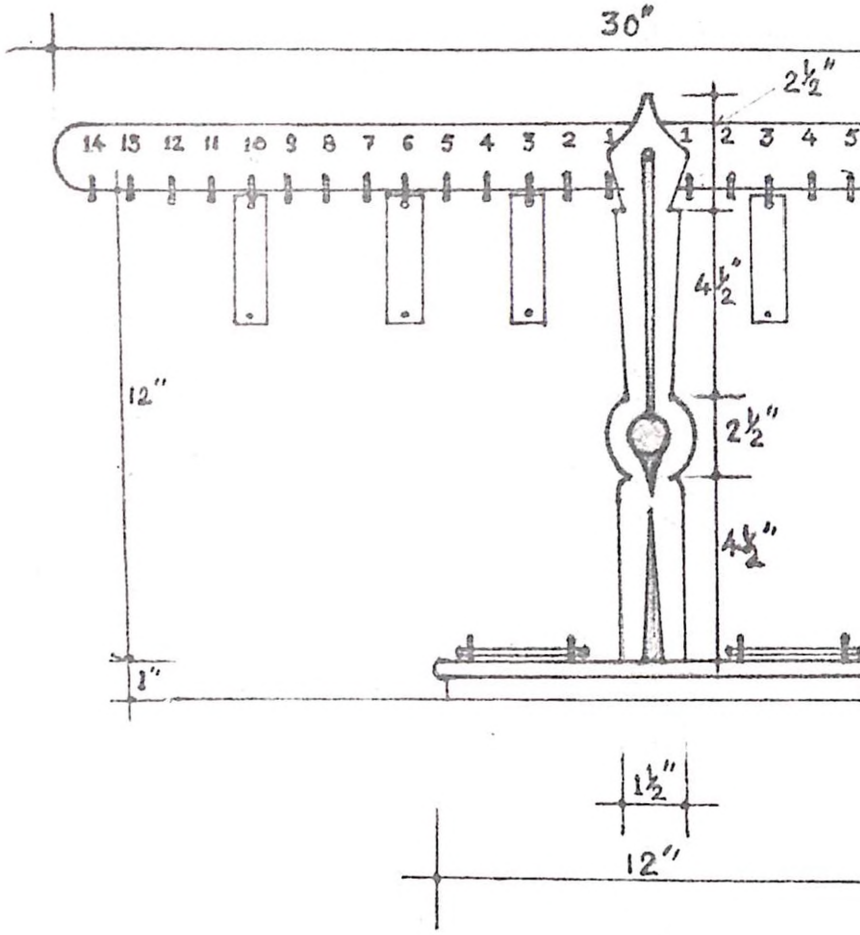
The teacher first hangs the strip number '2' on one side of the beam. To rebalance the tilted beam two strips numbered one each are hanged on the other side of the beam at position no 1. Thus 1 & 1 is one addition pair of the number '2'. Similarly addition facts of other numbers 3, 4, 5 an so on are discovered by the child himself.

Comparison of Numbers : Concepts of 'is equal to'; 'is greater than', 'is smaller than' can be learnt by hanging any two numbers strips, one each on two sides of the beam. If they are same numbered, the beam will be horizontal. If the beam is tilted i.e. unbalanced, the number on the tilted side is greater and the number on the lifted side of the beam is smaller. Thus any two numbers can be compared by the child through this manipulative model.

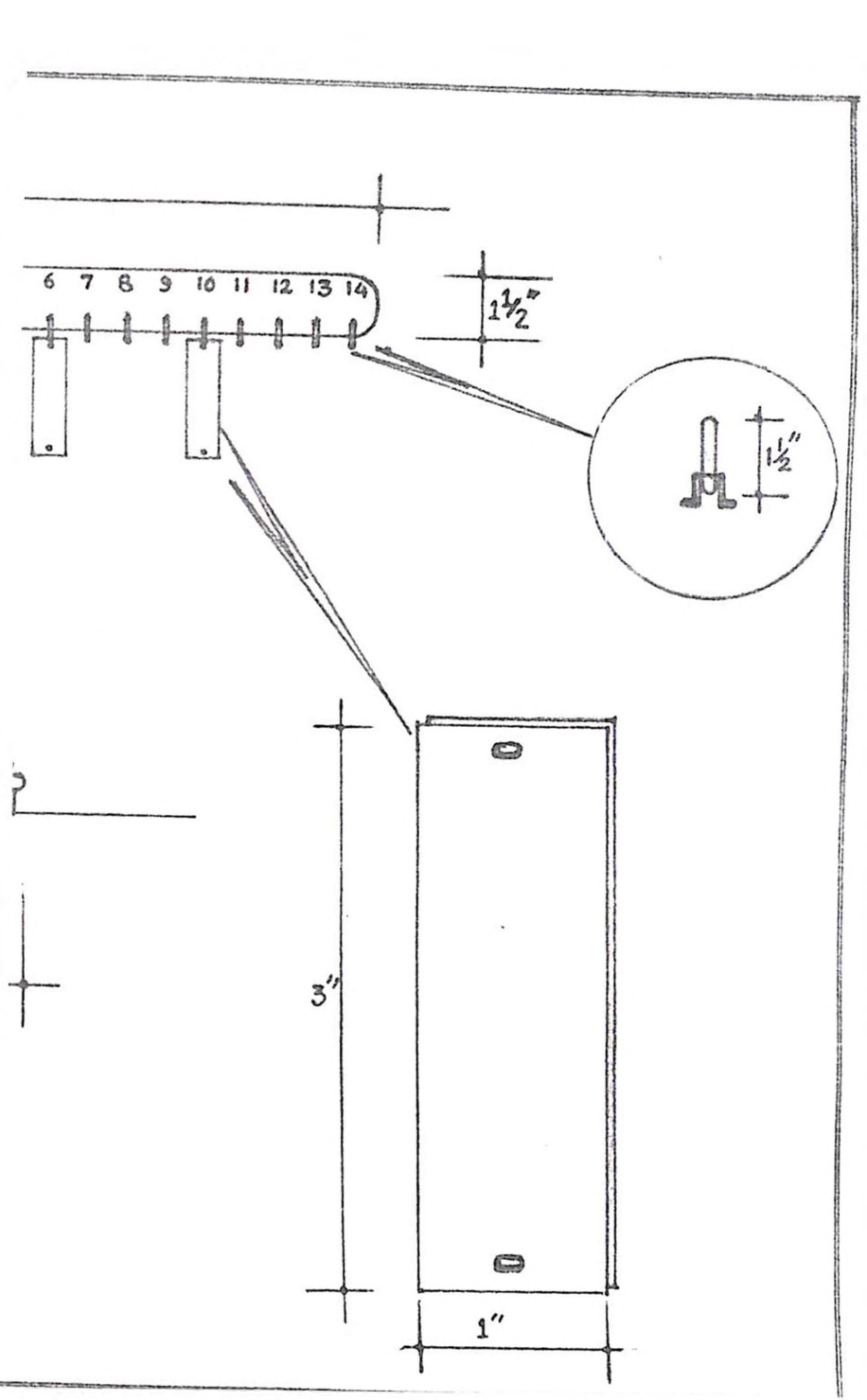
Adding 2/3 single digit numbers : The child is told to hang any numbered strip on one side of the beam. He is then asked to balanced the tilted beam by hanging 3 strips on the other side of the beam. The sum of the number on 3 strips shall be equal to the number on the strip hanged on other side of the beam.

Basic Subtraction Facts : Any one strip is hanged on the positive numbered side of the beam; say strip no '4'. Now if the child wants to subtract '3' from '4' then he hangs the strip numbered '3' on the negatively signed number. To find the correct answer; the beam will be balanced only when the child hangs strip numbered '1' on the positively signed number on the same side of the negatively signed numerals.

MD-25



SCALE : 1"=5"


6 7 8 9 10 11 12 13 14
1½"
1½"
3"
1"

MD-26

NAME OF THE MODEL : NUMBER LEARNING PUZZLE

OBJECTIVES

This device has been designed to help children understand and learn number symbols and their relationship with groups of objects.

LEVEL

Nursery to Class I.

DESIGN

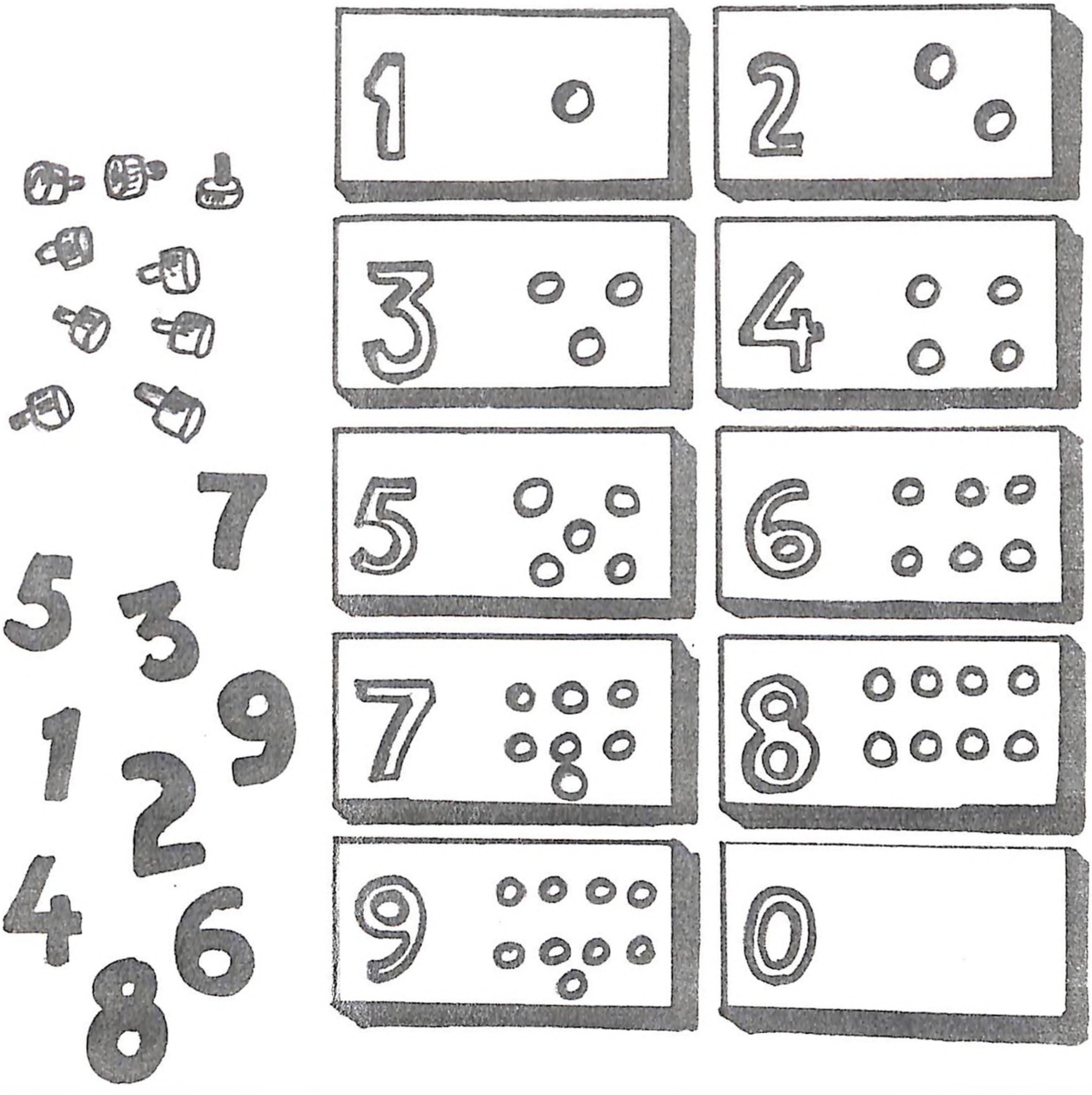
This learning aid consists of 10 rectangular blocks of size 8" X 4" X 1/2" and are made up of soft plastic material. There are soft plastic coloured numbers zero to nine and plastic pegs - 50 no's in the aid. Plastic numbers can be inserted into the corresponding rectangular block having the same number grooved in it. Each block has holes corresponding to the number of the block.

HOW TO USE

This is a self learning and self corrective educational aid.

The child is asked to solve this primary number learning puzzle by fitting plastic numbers zero to nine into the corresponding blocks. When this activity has been

completely done by the child, then he is asked to snap pegs into the hopes made in every blocks. When the child counts the number of pegs in each block, he himself discovers that number of pegs on each block is the same as that of the number symbol on the same block i.e. two pegs in the rectangle where the number '2' fits, three pegs in the rectangle where the number '3' fits. Thus the child relates the number group to the right number symbol while playing with the puzzle.



NUMBER LEARNING PUZZLE

MD-27

NAME OF THE MODEL : NUMBER BLOCKS

OBJECTIVES

This manipulative device has been designed for teaching/ learning the basic addition facts of numbers 0 to 9.

LEVEL

Nursery to Class I.

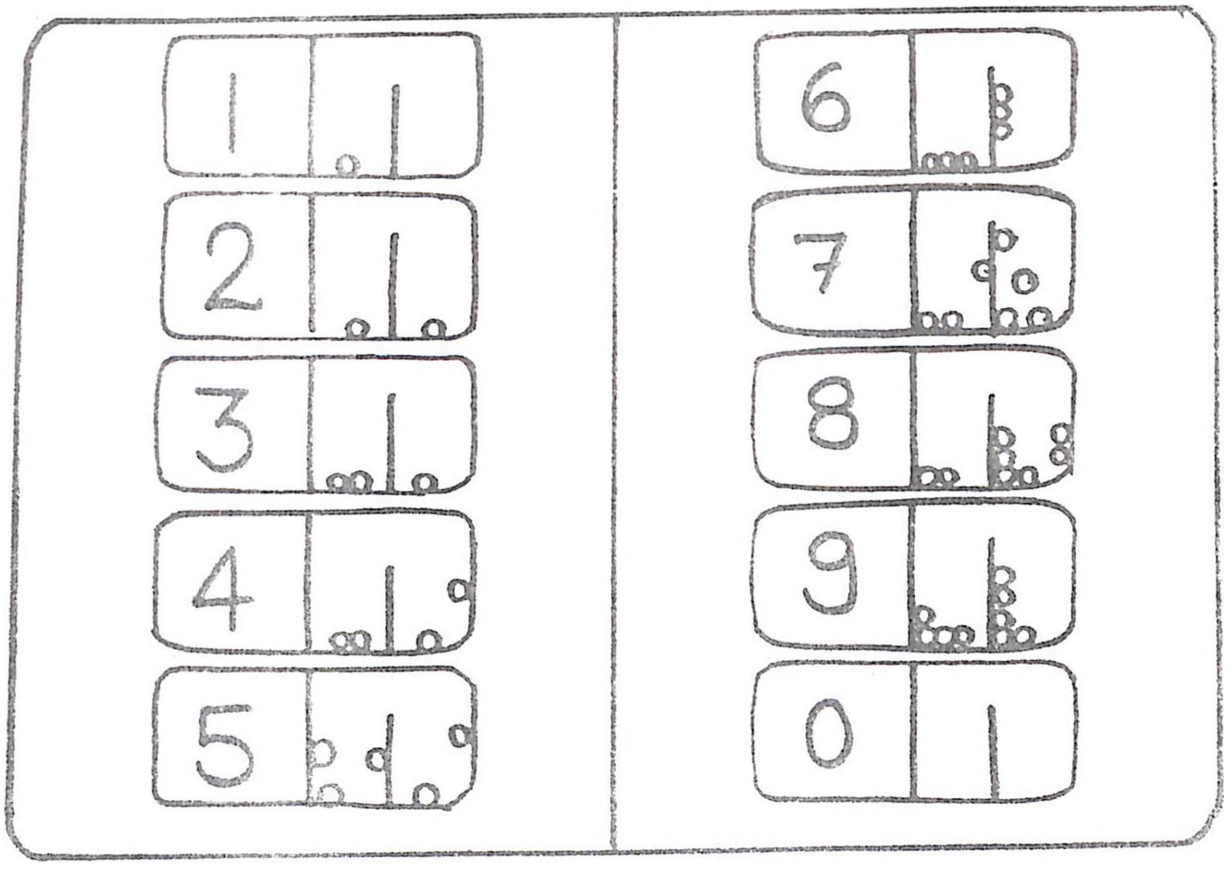
DESIGN

There are ten blocks for numbers '0' to '9'. Blocks are made up of wood and are rectangular in shape of size 8" X 4" X 1/2". One part of each block is numbered and the remaining part is divided into two compartments. Wooden beads of 1/2" diameter are also provided to count & match with the number printed on the block.

HOW TO USE

i. The child is guided to pick up balls and put then into the block with a view to match the number of balls with the numeral printed on the block. The number of ways the child transfers the wooden balls into the two compartments of the block, everytime matching the total number of balls with the number printed on the block shall tell the child, the basic addition facts of that number.

MD-27



MD-28

NAME OF THE MODEL : ADDITION AND SUBTRACTION DISCS

OBJECTIVES

This manipulative device helps the child to learn (i) basic addition/subtraction facts of numbers zero to nine.

LEVEL

Class I & II.

DESIGN

The aid consists of two numbered discs with numerals printed on then and of size 6" diameter each. Both the discs area made up of coloured plastics and have two movable arms with holes. One of them is used for knowing addition facts and the other for subtraction facts.

Disc for Addition Fact : The outer ring of (A) this disc is numbered from 0 to 9. These numerals are printed in the anticlock wise direction. Numbers zero to nine are also printed on the inner movable disc but in clock wise direction. Two movable arms with hopes are pivoted at the centre of the inner disc.

Disc for Subtraction Fact : This is similar in dimensions and other details except that numerals printed on the outer ring and inner disc are in the same direction.

HOW TO USE

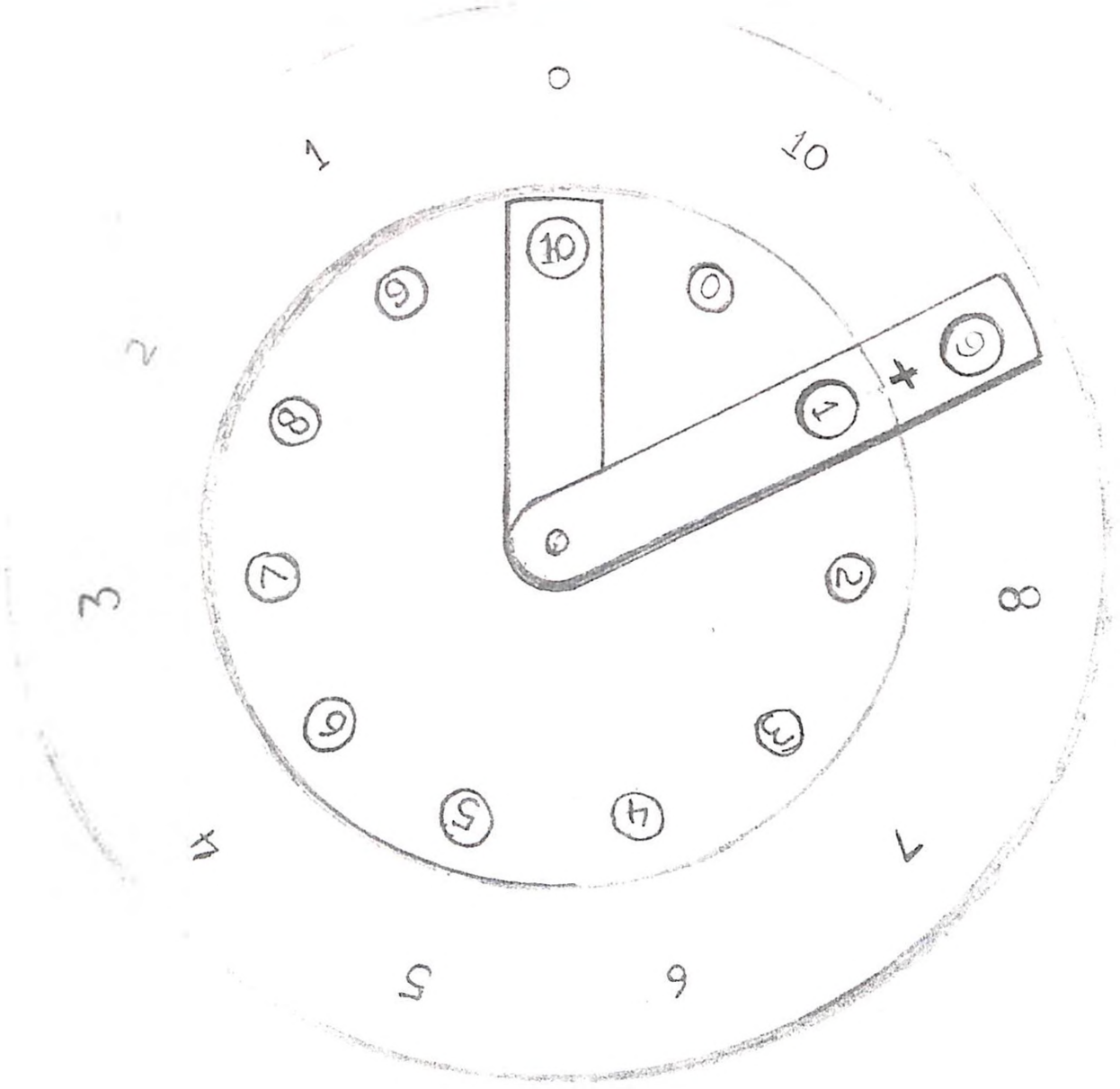
Any number on the inner disc whose addition fact/facts are to be discovered by the child is first set against '0' on the quter sized ring by moving the inner disc. The smaller arm is set on this number. The bigger arm with two holes is now moved stepwise and set on any number pair i.e. one number of the inner disc and one number of the outer ring. This pair of numbers (whose sum equals the number under the hole of the smaller arm) will be the addition fact of that number. In a similar way addition facts of all numbers can be found out by the child himself.

Subtraction facts can also be discovered by following the same method of operation as in the case of addition disc. In this case the difference of two numerals under the holes of the bigger arm shall be equal to the number seen/set under the hole of the smaller arm.

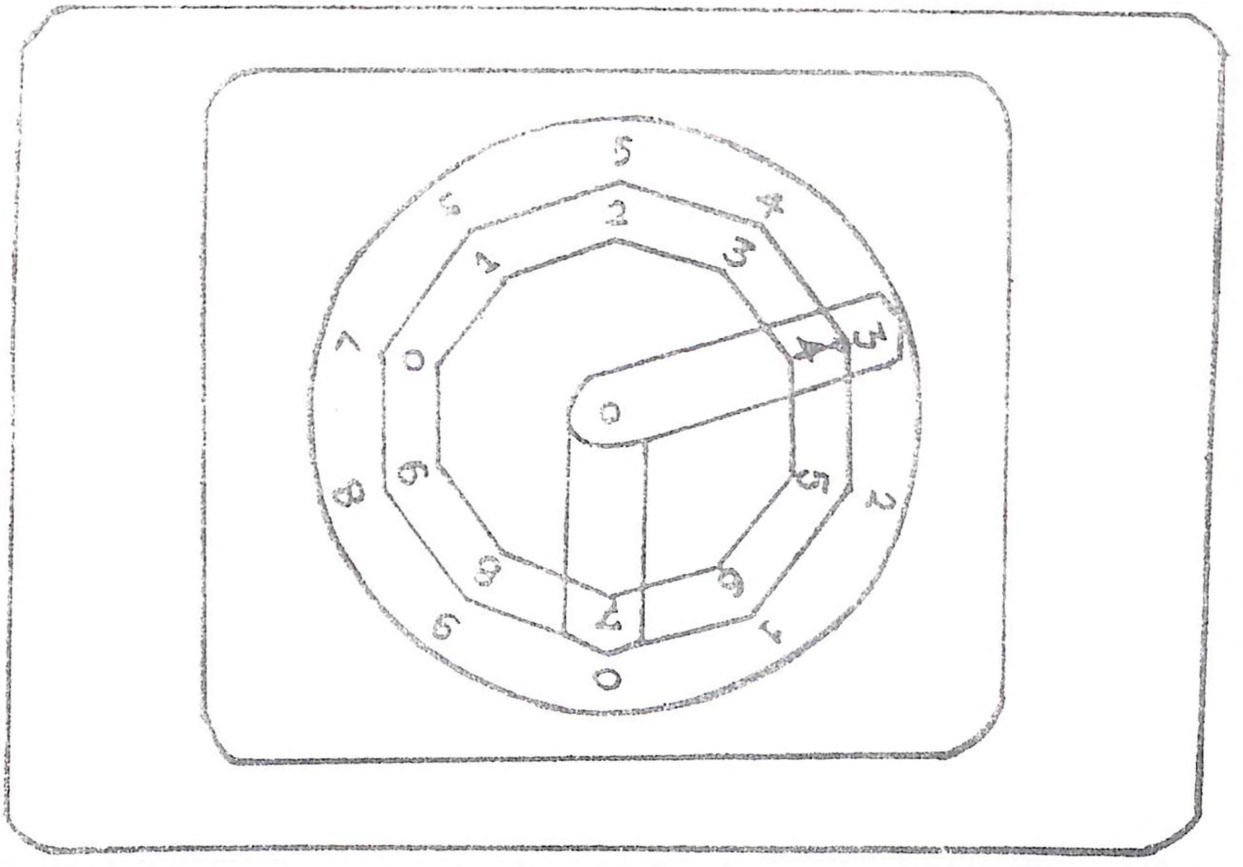
The child once knows the method of use of this aid, then he can himself discover basic addition & subtraction facts easily.

This aid is particularly used to reinforce the similar skills already learnt by the child through some other methods on learning devices.

MD-28



MD-28



MD-29

NAME OF THE MODEL : ADD AND SUBTRACT ROLLING WHEELS

OBJECTIVES

To help the child understand and discover basic addition and subtraction facts of numbers one to 20.

LEVEL

Class I to Class II.

DESIGN

This teaching/learning aid consists of a set of two wooden wheels of diameter 6 inches each and 1/2 inch thick. They are grooved so that they can move on the track provided in the separate wooden rectangular block of size 2 feet X 4 inches X 1/2 inches. The wheel is numbered 1 to 20.The wheel have also holes against each number.

The wooden rectangular track is also numbered from zero to 20 and has a pointer which can be adjusted to any number on the track.

HOW TO USE

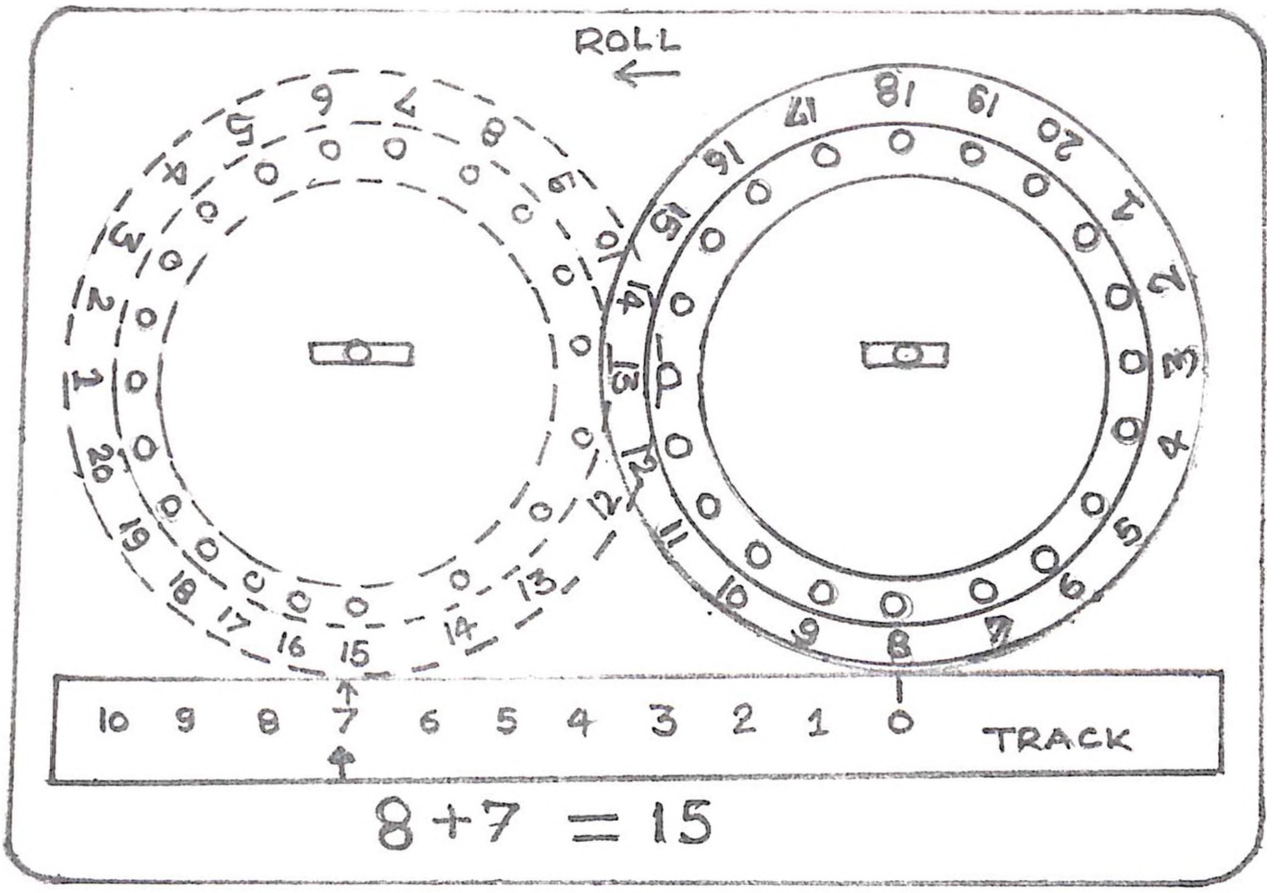
Addition wheel has numerals printed on it in the clock wise direction. If the teacher wants to demonstrate addition of any two numbers whose sum does not exceed 20, say the addition of two number '8' and '7', he sets the number '8'

of the wheel against zero on the track. A wooden peg is inserted in the hole in front of the number '8'. The pointer on the track is set at '7', and tells the child that while rolling the wheel on the track, the number on the wheel which comes exactly infront of the number '7' on the track will be the addition number of '8' and '7'. In this case it will be the number '15' on the wheel. Thus the child will be told that the an seven from 8+7 is 15 i.e. * + & = 15. After showing a few demonstrations with other numbers, the child will be encouraged to use the aid himself and learn himself the answers of addition of other numbers. Everytime the wheel is to be moved on the track in the anticlock wise direction.

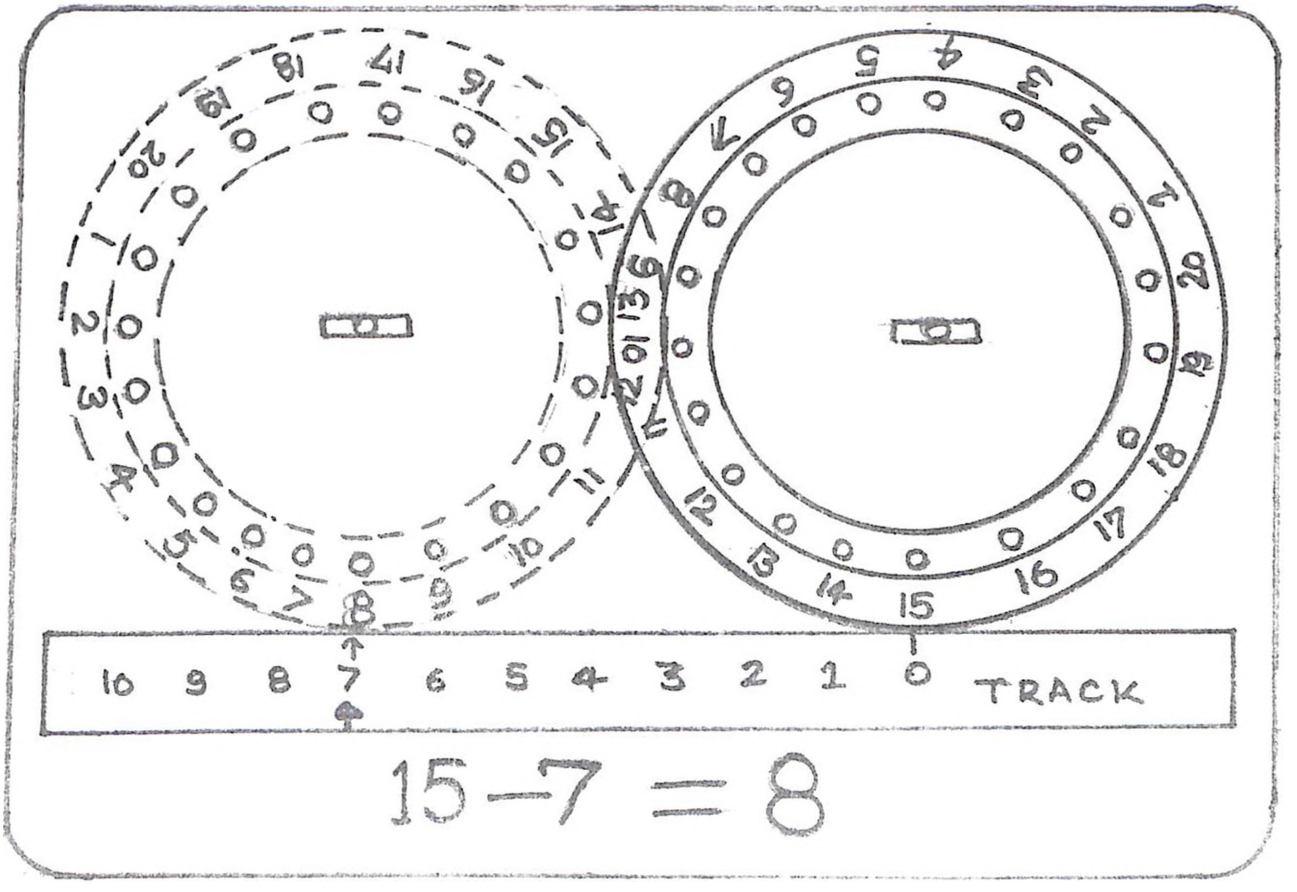
The subtraction wheel has numbers printed on it in the anticlock wise direction.

Procedure to find the difference between the numbers is the same, as mentioned in the case of addition wheel.

MD-29



8 + 7 = 15



15 − 7 = 8

MD-30

NAME OF THE MODEL : COMMUTATIVE BALANCE

OBJECTIVES

To help the child understand the following concepts :

i. The order in which two numbers are added does not affect the sum.

ii. The order in which two numbers are multiplied does not change the product.

LEVEL

Class II to Class III.

DESIGN

The instrument shown in the figure on has two numbered beams. One beam there are two differently coloured sliders with holes on each side of the center of the beam. One beam is used to discover commutative property of addition and another is used to verify the same for multiplication.

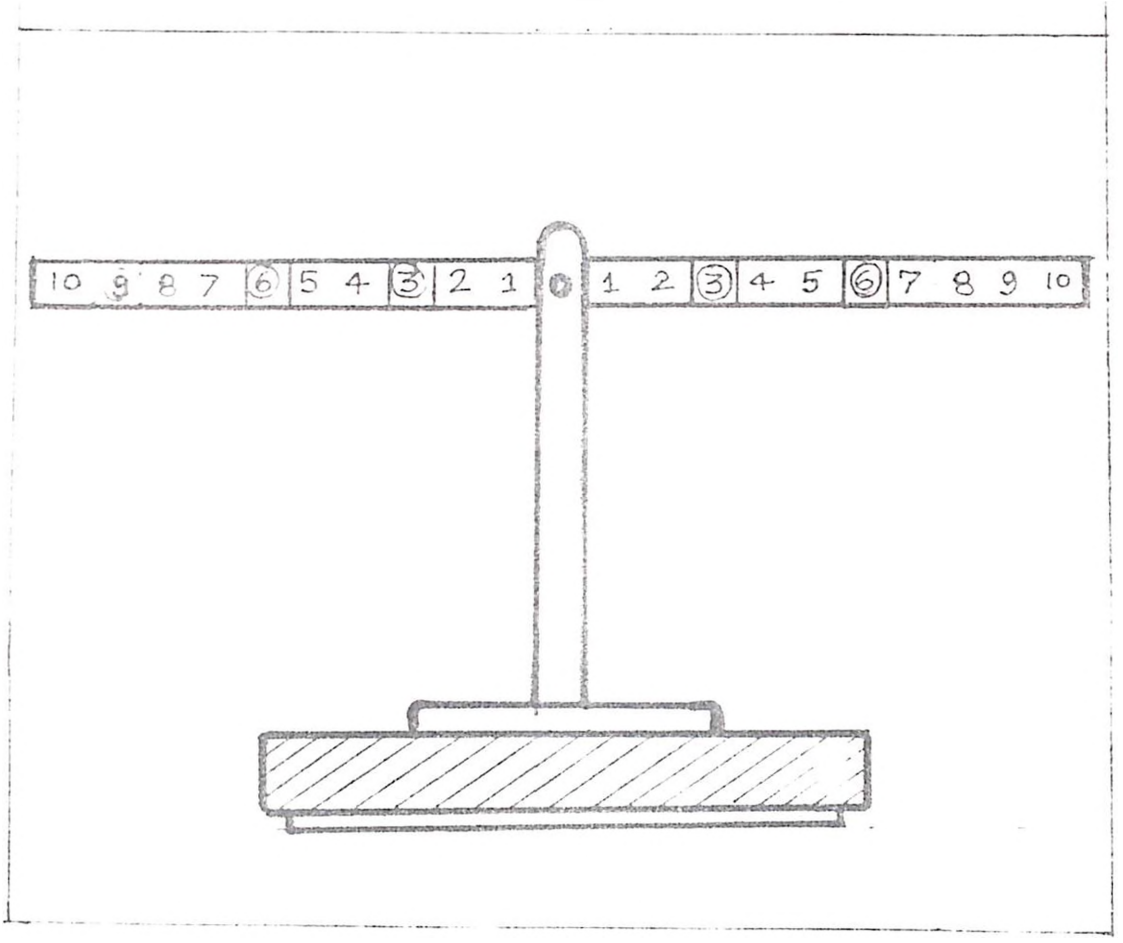
HOW TO USE

As shown in the fig, the child can adjust the sliders on the beam on any two similar sets of numbers, say the numbers 6 & 3; on the R.H.S. of the beam and the numbers 3 & 6 on the L.H.S. of the beam.

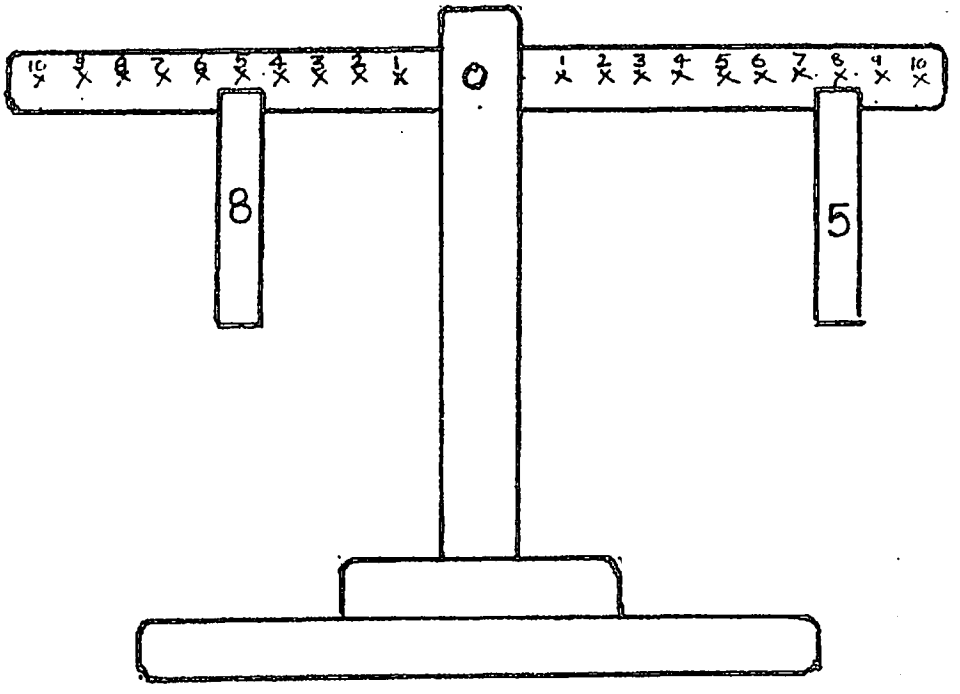
Let the child say 6 & 3 is equal to 3 & 6 with other number sets the child confirm the commutative property of addition.

Now let the child hang any one number strip say 5 against any number on the beam say '8'. The beam will be balanced only when the child hangs the strip numbered '8' against the number '5' on the beam. Thus the child verifies that 5 X 8 = 8 X 5 i.e. he is learning and verifying the commutative property of multiplication.

MD-30



MD-30



MD-31

NAME OF THE MODEL : ADDITIVE BALANCE

OBJECTIVES

To help the child discover number facts.

LEVEL

Class I to Class II.

DESIGN

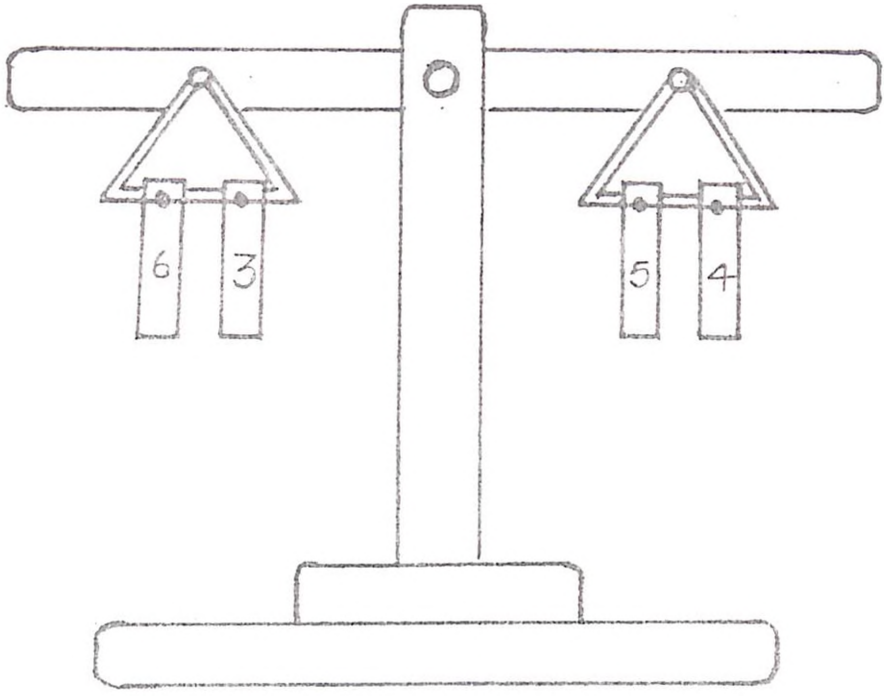
It is a simple wooden balance. There is a provision for hangings numbered plates on both edges of the beam of the balance. Dimensions of the balance and the numbered plates are the same as described in other such balance using aids.

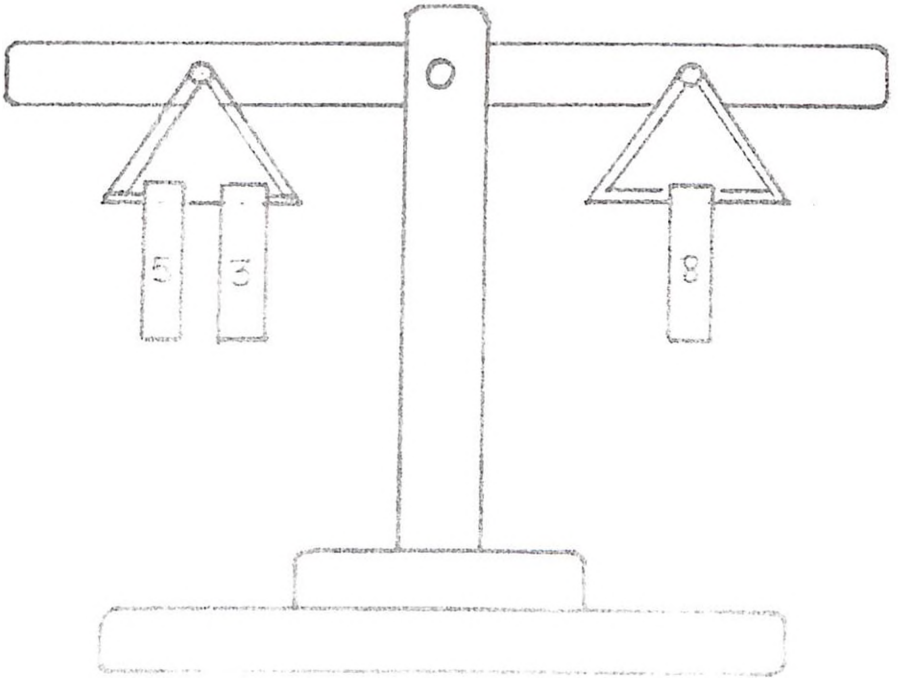
HOW TO USE

The number plate whose number facts are to be discovered, is hanged on the R.H.S. of the beam. The set of any two numbers hanged on the other side, if balance the beam, will tell the child that this paid of numbers is one of the number fact of that number hanged on the R.H.S. Similarly number facts of other numbers can also be discovered by the child himself.

A paid of two number sets which correspond to the same number can also be discovered as shown in the figure . This 5 & 4; 6 & 3 when added give the same result i.e. 9.

MD-31





MD-32

NAME OF THE MODEL : SOUND BOXES

OBJECTIVES

To develop the ability to discriminate between various sounds.

LEVEL

Pre-school children.

DESIGN

The aid consists of tins and plastic boxes. These are filled separately with different materials in the environment such as sand, pebbles, grains, marbles etc.

HOW TO USE

Ask the children to match any two tins or paid of tins which produce a similar kind of sound.

MD-33

NAME OF THE MODEL : ALPHABET BALANCE

OBJECTIVES

i. Learning Alphabets and numbers.

ii. REcognition of various objects in the environment.

LEVEL

Pre-school children.

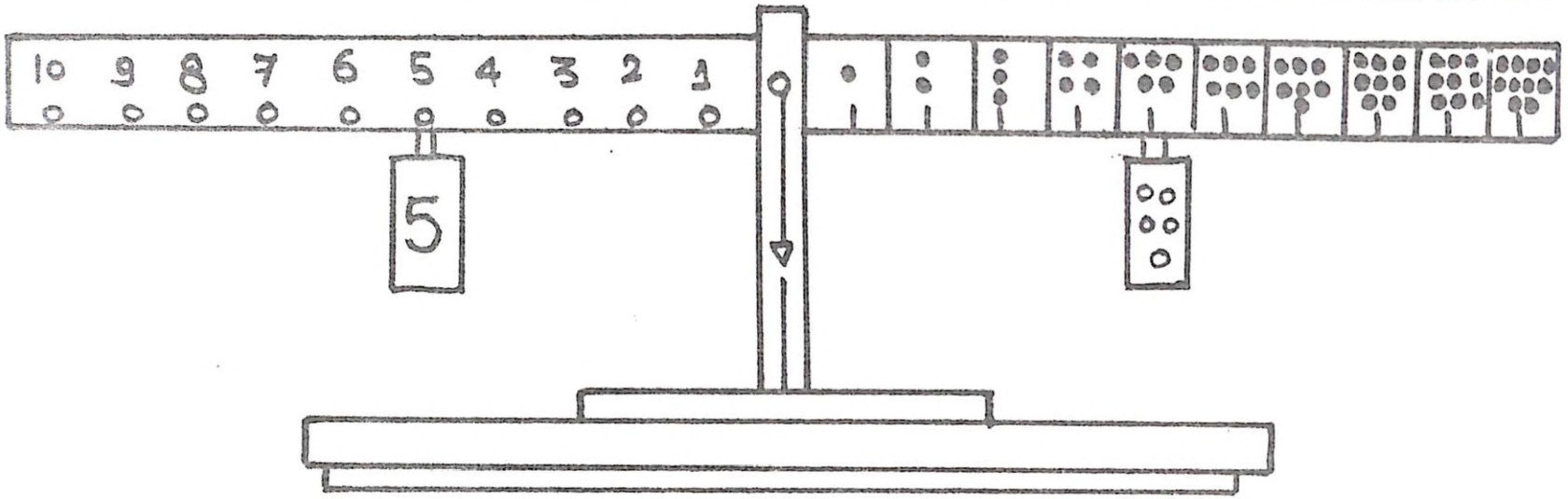
DESIGN

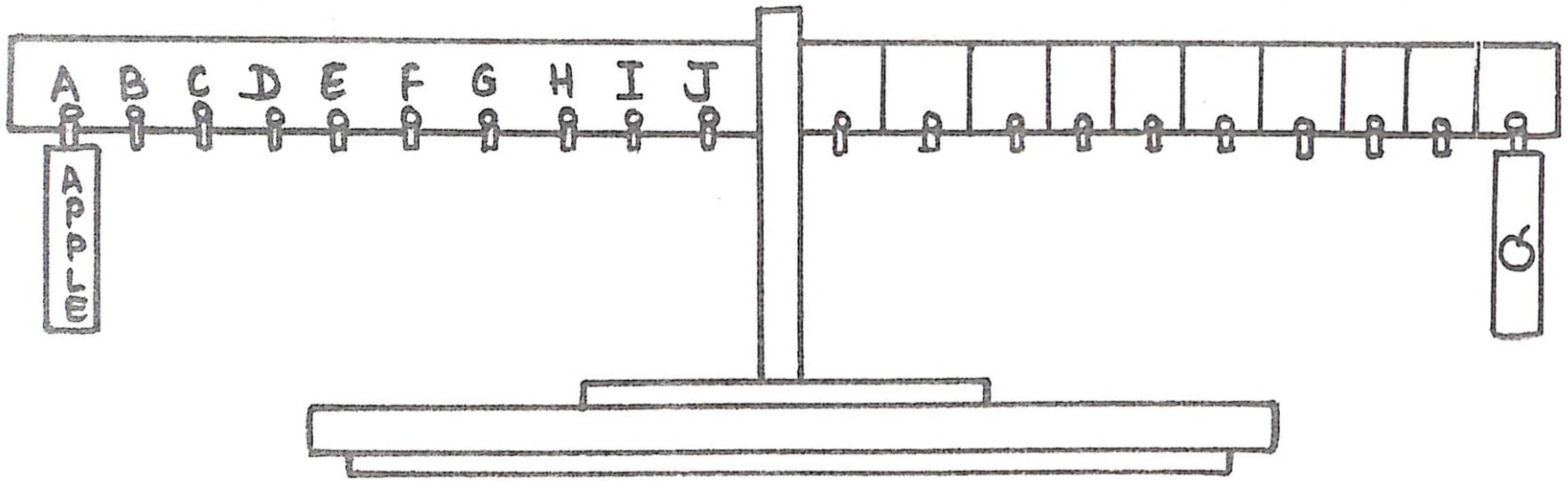
This is a simple balance. There are two sets of plates, one is for alphabets and the other set has plates with various figures of objects printed on them. There is another set of plates for learning numbers. This set consists of number plates from 1 to 10; and object plates having figures printed on them on both the sides. Number of figures on each side of the plate is same.

HOW TO USE

This is a self learning and self corrective educational aid. When the child hangs the plate 'A' on one side of the beam, it will be balanced only if he hangs the plate having the figure of apple. This by matching alphabets with objects, he can learn & remember the alphabets. Similarly the child can match the number plate with the one having the same no. of objects.

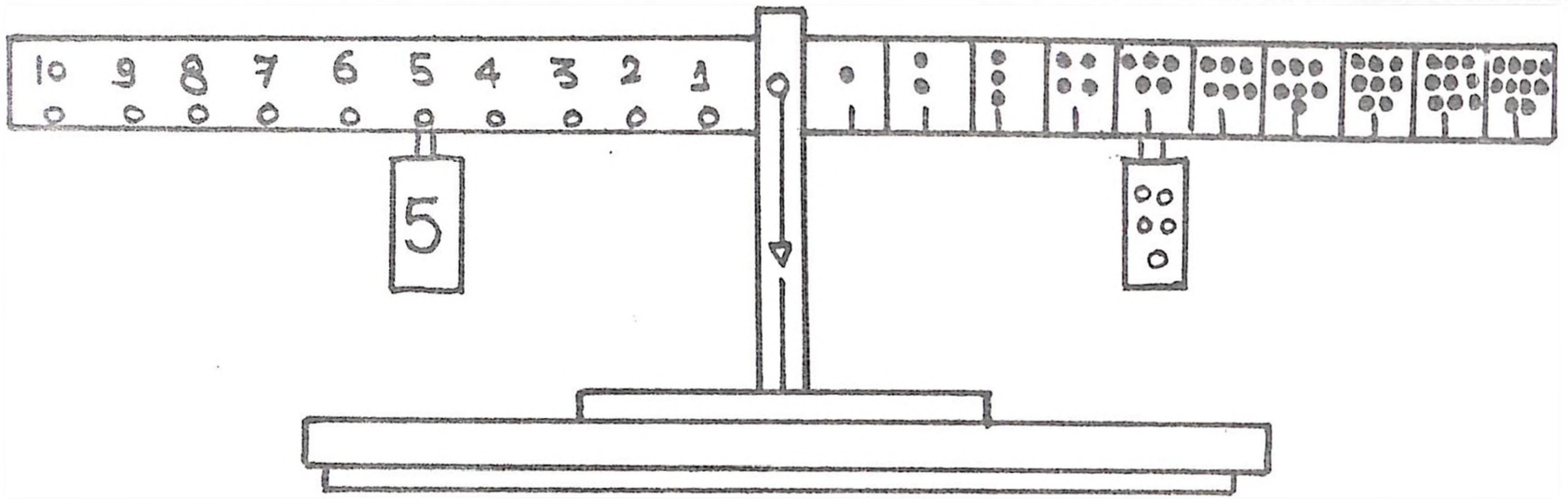
NUMBERS AND ALPHABET LEARNING BALANCE

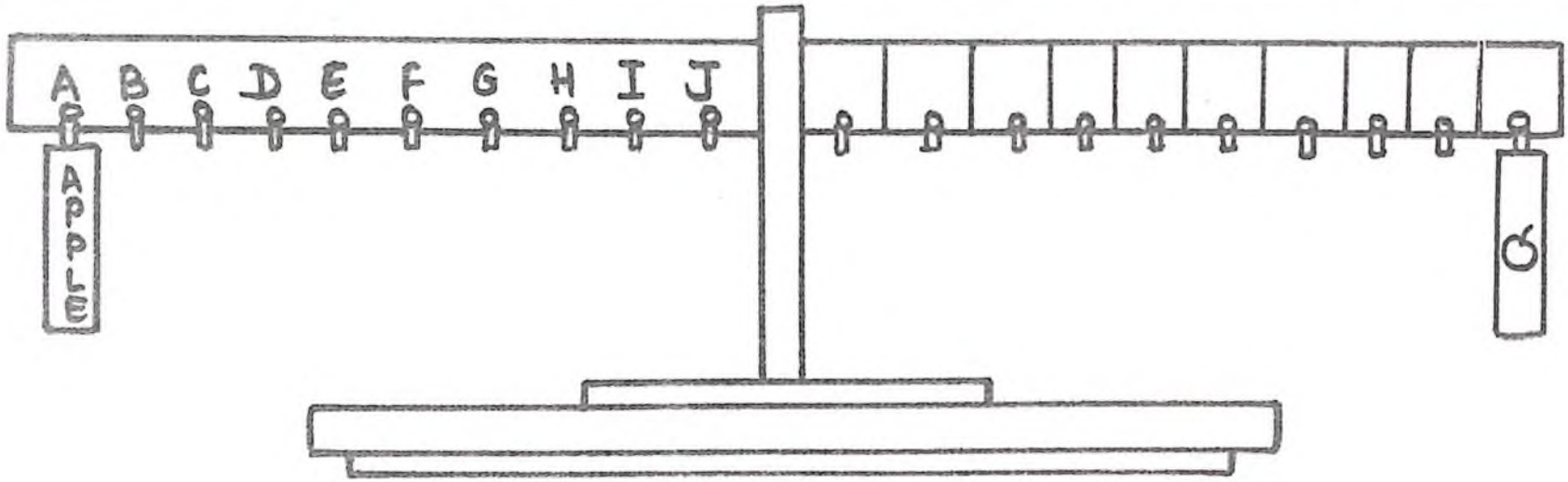




MD-33

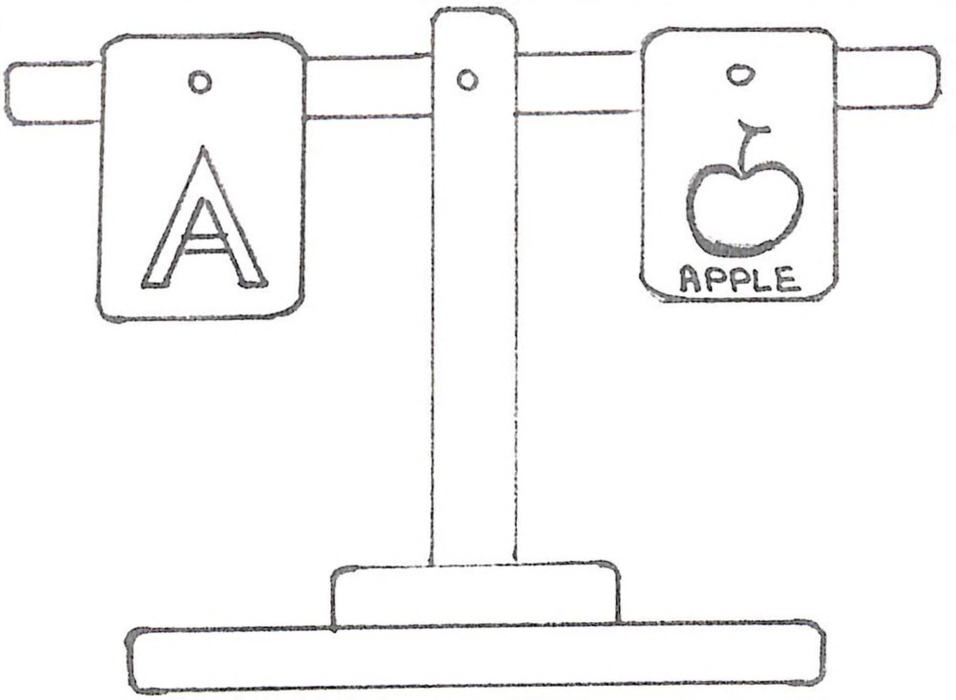
NUMBERS AND ALPHABET LEARNING BALANCE





MD-33

MD-33



MD-34

NAME OF THE MODEL : NUMBER CONCEPTS

OBJECTIVES

To develop the concepts of before, after and between the number 1 to 20.

LEVEL

Pre-school Children..

DESIGN

This is a simple rectangular wooden board of size 20 inches X 3 inches X 1/2 inch. Numbers from 1 to 20 are printed on it. There is a provision in the slider fitted in this board to cover/expose two numbers or 3 numbers at a time as shown in the figure.

HOW TO USE

The child can learn himself the concept of before, after and between any two numbers, from 1 to 20 simply by covering/exposing the numbers as shown.

MD-34

1
2
3
4
5
9
10
11
13
14
15
16
17
18
19
20

1
2
3
4
5
9
10
13
14
15
16
17
18
19
20

MD-34

1
3
4
5
8
9
10
11
12
13
14
15
16
17
18
19
20

1
3
5
8
9
10
11
12
13
14
15
16
17
18
19
20

MD-34

MD-34

MD-35.

NAME OF THE MODEL : FRACTIONS LEARNING SLIDER

OBJECTIVES

To learn basic addition, subtraction, multiplication and division facts of fractions by the children.

LEVEL

Class III to Class V.

DESIGN

This is a long hollow square plastic pipe, of size 15" X 3" X 3". Each face of the pipe is numbered with fractional numbers as shown in the figure (A). There is a plastic slider around this square pipe which has a hole as shown in the figure. There is another kind of slider as whose in the figure (B). This has 4 hopes.

HOW TO USE

This is a self learning material. The child can push the slider to any position. Addition, subtraction, multiplication & division of any two fractions can be discovered simply by looking through the single hope in the slider. It the child wants to know these operations & their relationship, he can use the slider with 4 holes.

MD-36

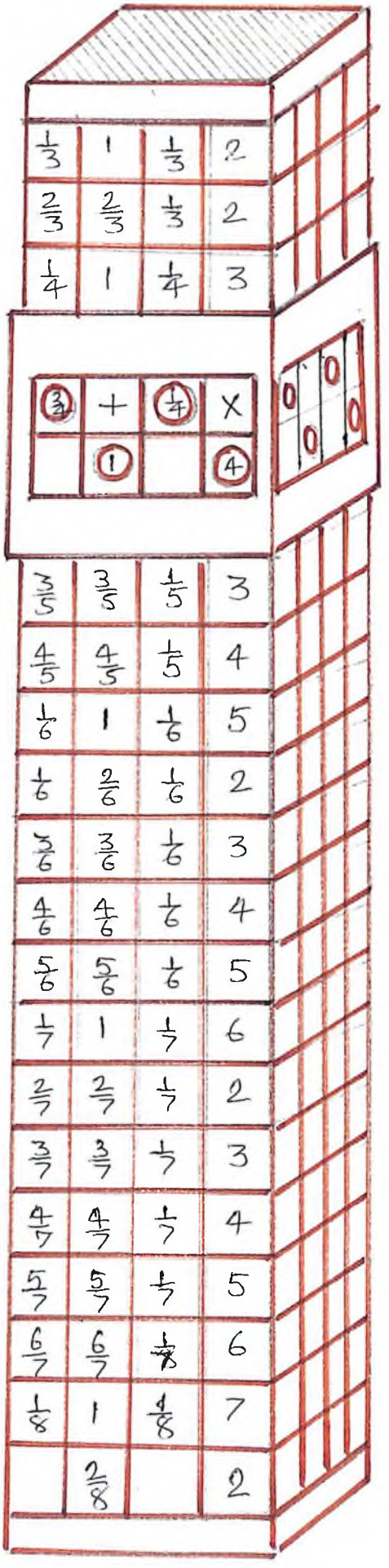
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6	7	8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11	12	13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19
10	11	12	13	14	15	16	17	18	19	20
11	12	13	14	15	16	17	18	19	20	21

2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11
0	1	2	3	4	5	6	7	8	9	10
-1	0	1	2	3	4	5	6	7	8	9
-2	-1	0	1	2	3	4	5	6	7	8
-3	-2	-1	0	1	2	3	4	5	6	7
-4	-3	-2	-1	0	1	2	3	4	5	6
-5	-4	-3	-2	-1	0	1	2	3	4	5
-6	-5	-4	-3	-2	-1	0	1	2	3	4
-7	-6	-5	-4	-3	-2	-1	0	1	2	3
-8	-7	-6	-5	-4	-3	-2	-1	0	1	2

3	4	5	6	7	8	9	10	11	12	13
2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11
0	1	2	3	4	5	6	7	8	9	10
-1	0	1	2	3	4	5	6	7	8	9
-2	-1	0	1	2	3	4	5	6	7	8	9
-3	-2	-1	0	1	2	3	4	5	6	7
-4	-3	-2	-1	0	1	2	3	4	5	6
-5	-4	-3	-2	-1	0	1	2	3	4	5
-6	-5	-4	-3	-2	-1	0	1	2	3	4
-7	-6	-5	-4	-3	-2	-1	0	1	2	3

4	5	6	7	8	9	10	11	12	13	14
3	4	5	6	7	8	9	10	11	12	13
2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11
0	1	2	3	4	5	6	7	8	9	10
-1	0	1	2	3	4	5	6	7	8	9
-2	-1	0	1	2	3	4	5	6	7	8
-3	-2	-1	0	1	2	3	4	5	6	7
-4	-3	-2	-1	0	1	2	3	4	5	6
-5	-4	-3	-2	-1	0	1	2	3	4	5
-6	-5	-4	-3	-2	-1	0	1	2	3	4

MD-35


1/3 1 1/3 2
2/3 2/3 1/3 2
1/4 1 1/4 3
3/4 + 1/4 X
1 4
3/5 3/5 1/5 3
4/5 4/5 1/5 4
1/6 1 1/6 5
1/6 2/6 1/6 2
3/6 3/6 1/6 3
4/6 4/6 1/6 4
5/6 5/6 1/6 5
1/7 1 1/7 6
2/7 2/7 1/7 2
3/7 3/7 1/7 3
4/7 4/7 1/7 4
5/7 5/7 1/7 5
6/7 6/7 1/8 6
1/8 1 1/8 7
2/8 2

PART-VI : FUTURISTIC DESIGN

CHAPTER 17

SHAPE AND STRUCTURE OF SCHOOLS IN THE 21ST CENTURY

17.1 INTRODUCTION

In recent decades the tempo of change in the home, the society, and the school has speeded up, and all evidence point to greater changes as we move into the 21st century with all of its potentialities for great social progress. Education has no choice but to strive to keep abreast of the times; otherwise it will fail to keep pace with the society which supports it and is dependent upon it. It is rightly said "School is the hope of society".

The information presented in this chapter is based on the research done in Education Technology and the opinions given by academicians associated with school education, during 4th National Conference of Sahodaya School Complexes held at Madras in Nov' 1994 and published by Central Board of Secondary Education - Delhi in 1995.

17.2 THE SIGNIFICANCE OF THE TEACHER'S PHILOSOPHY OF EDUCATION

Teachers teach differently because they think differently. To a typical teacher the responsibility of the school is primarily to see that the children learn what adults think children should know about history, geography,

CHAPTER 17

SHAPE AND STRUCTURE OF SCHOOLS IN THE 21ST CENTURY

17.1 INTRODUCTION

In recent decades the tempo of change in the home, the society, and the school has speeded up, and all evidence point to greater changes as we move into the 21st century with all of its potentialities for great social progress. Education has no choice but to strive to keep abreast of the times; otherwise it will fail to keep pace with the society which supports it and is dependent upon it. It is rightly said "School is the hope of society".

The information presented in this chapter is based on the research done in Education Technology and the opinions given by academicians associated with school education, during 4th National Conference of Sahodaya School Complexes held at Madras in Nov' 1994 and published by Central Board of Secondary Education - Delhi in 1995.

17.2 THE SIGNIFICANCE OF THE TEACHER'S PHILOSOPHY OF EDUCATION

Teachers teach differently because they think differently. To a typical teacher the responsibility of the school is primarily to see that the children learn what adults think children should know about history, geography,

arithmetic, language, and the other subjects of the school and that they master the skills of arithmetic, writing, spelling, and reading necessary for earning a living and for communicating with others. The school is interested in the children's becoming good citizens, but this is to be accomplished chiefly by precept. Children become good citizens by learning to obey, by learning to follow directions, by learning the history of the world, by studying about the great leaders of India and by learning to read, write, spell, and solve arithmetical problems.

17.3 CONCEPTS BASIC TO 21ST CENTURY TEACHING

1. There is now general agreement among modern teachers and psychologists that desirable ways of thinking and acting can be developed best by guiding the learner into situations in which he will gain satisfaction from these desired ways of behaving.

2. The schools must strive to educate each child so that his fullest potential growth is secured along socially desired lines.

3. The curriculum of the school must grow out of the needs of the individual and the needs of society.

The school should accept responsibility for contributing to all aspects of human growth and

development, not to the intellectual alone. This does not mean that the school is usurping the rights and functions of the home and the society. Rather, it means that the school is recognizing that the best job of educating children can be done only by all interested institutions working and planning together for such an education. It is a further recognition of the psychological fact that the child cannot be divided into the "home child" for certain learnings and the "school child" for the development of certain other capabilities. The child who is emotionally stable at home, for instance, will carry over this behaviour tendency in school. On the other hand, if he suffers continual emotional upset either at home or in school, his behaviour in both places will be affected.

4. The modern school has to be a community-centered school. Teachers today should understand that the school is only one of the agencies of the community responsible for the education of youth, and not necessarily the most important one. They also should realize that youth will be better served if these institutions work and plan together in the educational process rather than operating independently within defined limits. The child is what he is at any given time because of his total environment, which includes the school, the home and other agencies of the

community. It is only as all interested agencies concern themselves with the total development of the child and work co-operatively towards the same ends that optimal learning situations can develop.

5. Learning is a process of experiencing. Teachers should realize more and more that there is substitute for experience in the learning process. It is obvious that a child can learn to read only by experience in reading; it is not always so obvious that a child can learn to be a good citizen of a democracy only as he has real experiences in democratic living, or that he mature emotionally by experiencing emotional situations in which satisfactions are gained by emotionally mature behaviour. The child develops creativeness in writing and in painting by being stimulated to express his ideas and his feelings in prose and poetry and with oils and water colours. Creativeness does not result from mere drill on the techniques of writing and painting, or from imitation of the works of the masters.

Direct experiences make vicarious experiences meaningful. The child who has never seen a cow milked and who has never experienced the thrill of actually making butter from cream can never quite gain the understanding of dairying and its importance to life.

That is possible only for a child who has had direct experiences with cows and dairies.

When direct experience is not possible, there are ways and means of adding reality to learning situations. Certainly the advent of television opens up a whole new world of possibilities for bringing the outside world to the teacher and class.

6. Each child differs within himself in learning potential in the several areas of the school curriculum. Each child is unique into himself. Ram may have a potential for gaining insight into mechanical situations far in excess of his comparative potential for music or for linguistic accomplishments. Radha may have a degree of neuromuscular co-ordination, combined with a fine physique and a sense of timing, which will make possible the performance of physical skills not possible by many in the class; yet, she may be of just average ability in mathematical reasoning or spelling. Rama may have the ability to learn very rapidly in the language arts, including reading, and get excellent in mechanical and mathematical thinking; yet; she may be physically immature and have great difficulty with writing or rhythmic activities. Kamal may be physically very mature, yet socially immature for his age. And so one could go on through all the members of the class.

The teacher who realizes that it is the natural thing for a child to differ within himself in his social, intellectual, emotional, and physical maturation, and in his potentials for learning in the several curricular areas, will avoid many of the pitfalls of conventional education, which strive for a general level of achievement in the child rather than for differentiated achievement.

7. The learner is a goal-keeping organism. It is now generally recognized that learning is not effective when the learner is proceeding towards goals which he has not accepted as desirable goals for himself. A person, whether child or adult, who sees something as worth doing because of the satisfaction to himself will work with more effectiveness and become discouraged less easily than will one who is working on assigned tasks for which the reward, if any is extraneous to the learning itself. In school, learning is more apt to persist after the completion of a cause if the pupil is studying because he wants to escape the punishment of low grades and the sensure of the teacher and parent or to secure the rewards of high grades, and commendations from his parents and school.

8. The child reacts as an integrated whole a given situation. This principle has many implications for

classroom teaching. Teachers should become more and more concerned with the state of mind of a given child at a particular time. They should realize that they must give as much attention to the attitudes, study habits, appreciations, and to other behaviour patterns of the children, as to the specific information or skills to be mastered. The child at any given time is reacting to the total stimulating pattern, including his own state of being.

9. Successful achievement is essential to good mental health. 'Nothing succeeds like success' is an old saying, the significance of which we have not always understood in teaching. One also could say that 'nothing is so discouraging as continual failure;' psychologists and psychiatrists are well aware of the devastating effects of continual failure upon an individual, yet many schools continue to force children into situations in which failure is all but inevitable for many.

The old argument that this is a competitive world, and that children must learn to become successful competitors, is not adequate justification for the psychological damage wrought within those who have little or no chance of success. Competition among equals may be desirable, but competition between the

superior child and the slow-learning child is good for neither. Continuous failure drives the slow learner into undesirable ways of behaving; easy success leads to poor study habits on the part of the capable child and often to erroneous evaluation of his own capabilities.

True, a child must learn to accept failure' but he should react to failure by a rearrangement of his goals, or by a determination to succeed in spite of difficulties and failures. He will react in this manner, however, only if he can see possibilities of success, or can readjust his goals in a satisfactory manner. If he sees nothing but continuous failure ahead, he soon develops a failure complex; he either rationalizes his failures, develops an avoidance technique to keep from getting hurt unnecessarily, or compensates for his failures by putting undue time and effort on those things which will bring successful achievement.

10. Security and prestige are necessary for the development of good mental health. Self-esteem and social prestige are of great importance in the development of a mentally healthy individual. A child or an adult who feels that he is respected by his peers has an outlook on life far different from one who feels that he is not

respected by his peers. It becomes apparent that prestige and success are closely related factors. Prestige with one's peers often comes from respect for the quality of one's work or efforts. Security is equally intertwined with success and prestige. A child gains acceptance by the peer group partly through the quality of his achievements in various learning activities. He gains considerable prestige in the group in the same manner. There are, of course, many other factors which contribute to the feeling of belongingness (security) that the child carries into the classroom : the teacher's friendliness or lack of friendliness, the extent to which children include him or exclude him from their little cliques, the suitability of his clothes or manners-all these greatly affect the child's attitude in school. Inability to read as well as the others in class, inability to do the arithmetic of the grade, inability to play games well enough to be wanted on teams - all these and many other factors may create feelings of inferiority and of not being wanted which affect a child's whole attitude towards the school. Illustrations are legion of children who have overcome reading and arithmetic difficulties through proper remedial procedures and sympathetic treatment by teacher and class and who have thereby lost their fear or their dislike of the school.

Slow-learning children under a highly competitive system generally develop undesirable attitudes and ways of behaving, but with sympathetic guidance and a curriculum adjusted to their abilities and needs they like school and profit greatly from it.

Children who feel unwanted in the home often carry this feeling of insecurity into the school and require an understanding teacher if they are to develop into well-adjusted individuals. Children who feel that they are not respected in the home often develop a belligerent or a defeatist attitude which carries over into the school. In the same manner, similar attitudes developed in the school situation greatly affect the child's home behaviour.

CHAPTER 18

DISCUSSION & RECOMMENDATIONS

The standard of education is complained to have been going down day by day. Educationists in a large number are deeply concerned for irrelevance and inadequacy of education in our country. Many portions in the curriculum are becoming out-dated very rapidly; many contemporary issues are also not properly dealt in the programmes and practices of schools. Unless the students are made thoroughly familiar with the burning problems of the society (including their career planning and made sufficiently capable of teaching them successfully, they will fail to be true and happy citizens of the country in future and their education will be deemed to be failure.

In this context educational technology will be of immense importance. Because successful teachers will be able to influence and motivate a large number of pupils with the help of mass media expertise of a limited number of persons can be made available to innumerable students; and inadequacy of physical facilities like laboratory expensive materials and many other things can be made up through the use of modern technologies. Consequently, the quality of education will improve. But we have not yet done this upto the mark. Seth Spaulding (1970, p. 10) has, therefore, said, "Although education has shared in the creation of

technological age, education itself has not learned how to use quality of its own institution. In attempts to 'catch up' quantitatively, education has usually attempted to multiply what has gone on in a pre-technology system of schooling.

Thus, the teaching-learning process will be improved to a great extent with the help of new media and materials through clarification of concepts, stimulation of groups and individual activities, development of critical awareness, changes of attitudes and encouragement of originality and creativeness. The role of educational technology both for quantitative and qualitative improvement of education has been very clearly stated by Henri Dieuzeide (1970, p. 15), Director of the Division of Educational Methods, Materials and Techniques UNESCO "Educationalists in the developing countries will be more inclined to see educational technology as a means of rapid dissemination of urgently needed education on a massive scale to large groups, whereas the developed countries will see it as a means of increasing the effectiveness of education by making learning a more individual process".

The present study was done on the topic **'Conceptual Development of Teaching and Learning Aids for Childhood and Primary Classes'**

The detailed study on the following aspects of education has been done:

1. Educational Scenario in India.
2. Government Policies on Education
3. Real Situation.
4. Concepts of Education
5. Approach for Education
6. Educational Technology
7. Futurists Design.

and concepts and designs have been developed for the educational models for the selected subjects as described in the earlier listed chapters.

The findings of this study are interesting and will help in the further study in this area and will also provide opportunity to new entrepreneurs for designing and manufacturing educational materials.

Although lot of information has been gathered as given in the earlier chapters but for the critical analysis only the following selected topics have been discussed.

a. Educational Scenario
b. Development of Curriculum
c. Training of the teachers
d. School environment
e. Educational Technology and

f. Design for the future educational system and recommendation based on the N.P.E. 1986 have been given in the Chapter.

It is estimated in the world as many as one-third of the children of school going age have not yet been in the school. If at all they enter the schools only less than one-third of them will be able to complete primary education. It is also said that as many as fifty percent of the student population are only repeaters. Thus, wastage and stagnation also lead to the increased number of illiterates and semi-illiterates. Many developing countries including India inspite of their maximum investment on education are finding it difficult to reach the quantitative targets like physical facilities, provision of teachers and enrolment of students.

Our country is a Sovereign Democratic Republic. Education is intended to prepare the youth of this country for effective citizenship. Suitable Elementary Education, i.e., education of children between 6 to 14 years of age is expected to make them intelligent and responsible citizens. That is why the fathers of our constitution desired to make this education universal. But more than four and half decades are now over and we have not yet been able to achieve the target even for the age group 6-11 years. We are all aware of the reasons for this. The poor economic conditions, social superstitions and natural barriers like

forests, hills, rivers, deserts, etc. stand on the way to realise this Constitutional Directive. Moreover, the percentage of wastage and stagnation as told by the Education Commission and N.P.E. is about 59 and 28 respectively at the Primary School Stage.

Johann Friedrich Herbart (1776-1841), developed the first modern systematic psychology of learning to harmonize with a TABULARASA theory of mind. His speculative thinking developed from his dealing with problems of education. To him, morality was the supreme objective of education; he wanted to make children good. Thus he developed a psychology to achieve this good.

"Learning through unfoldment" - This outlook on the nature of learning logically from the theory that man is naturally good and at the same time active in relation to this environment. Early development of this point of view usually is associated with Jean J. Roussean (1712-78). Later, the Swiss educational reformer Heinrich Pestalozzi (1746-1827) and the German Philosopher, Educationist and founder of the kindergarten movement, Friendrich Froebel (1781-1852) used this outlook as a basis for their pedagogical missing. The overall philosophical framework of the natural unfoldment position often is labelled as 'ROMANTIC NATURALISM'.

Johann Friedrich Herbart (1776-1891) developed the first modern systematic, psychology of learning to harmonize with a TABULARASA theory of mind. His speculative thinking developed from his dealing with problems of education. To him, morality was the supreme objective of education, he worked to make children good. Thus he developed a psychology to achieve this goal.

Herbart and his followers have been convinced that the learning process proceeds through an ordered series of steps which a teacher should understand and follow. Accordingly, effective teaching regions... regardless of obstacles, the proper succession of steps be followed Harbart's four steps, Clearness, association system and method was expantal to five by Amerciate Herbartiam clearness became:

1. Preparation and
2. Presentation; Association became
3. Comparison and abstraction; system became
4. Generalization and method became
5. Application

What was the Herbastrum Doctrum of intera?

The importance of student interest held a prominent place in the theory of appreciation. Present day policy of "making subject matter interesting" probably as an important post in appreciation. Where a follow of faculty psychology saw no

point in interest even scup it as a determent to developing will power a Harbastion gave it a central place in his system.

Seth Spaulding (1970, p.11) has very rightly observed that one of the reasons for current students unrest throughout the world is the fact that curriculum reform has not been continuous and the curriculum has not been entirely relevant, neither to what the student brings to it, not to what the student expects from it. The student is today's secondary school and university is a very different kind of person from the student of a generation or two ago. The information explosion has enormously affected the younger generation. The secondary school student has probably learned more out of school than he has in school and the university student often feels much closer to the problems of his nation than does the professor who lectures to him. Yet the curriculum has changed little to reflect the changing nature of the students and the society in which education exists.

It is estimated that although in many countries of the world only one out of every ten students entering primary school does not have a chance to go for secondary education, the curriculum for primary school is mainly intended to prepare students for secondary schools. But it should be made useful and interesting however, long may be period of

study in primary or secondary school. Similarly, which subjects, constitute the curriculum for secondary school? Many of the subject matters may be outdated or irrelevant. But it must be agreed that we should teach our students to know, do, think and feel about democracy, population problems, pollution problems, and so on for future development of the country.

On the basis of broad objectives, curriculum planning should be done and suitable subject content, behavioural outcomes and other learning experiences be put in for making curriculum comprehensive. It should be based on the findings of curriculum research and be enriched by inter-disciplinary collaboration among experts on different subjects. All this would contribute to the design of a total school curriculum that is complementary as well as comprehensive. Spaulding has added, "This kind of curriculum building processes would begin to make use of the technology available to us. It would represent a scientific approach to the applied art of teaching. It would make possible a 'systems approach' to curriculum planning (or at least a systematic approach) whereby various goals as seen by different sectors of society are considered and a matrix of goals agreed upon". These broad goals are then spelt out into behavioural goals in concrete terms. Suitable methods, strategies and materials would be suggested and tried out and then improved upon.

Prof. R.M. Kalra (1994) in his book 'Technology of Teaching Elementary School Science for 21st Century' has suggested the following method for developing science curriculum for primary level.

In majority of developing countries most people act as members of communities rather than as individuals. Under normal conditions all people should work in these communities. And this work is practical. There are many problems of sanitation, health and hygiene and of water pollution. This implies the designing of work experience in the curriculum which is related to the real problems of community life. This approach may also bring the school out of its isolation and connect it with the worthwhile aspects of community life.

If school curriculum remains as theoretical as it is at present and does not cater to the needs of the local community, it will fail to get any support, much less enthusiastic support, from it. Thus, if we want to impart meaningful science education to the children and youth of the developing countries, to help them meet the variety of needs felt in any changing society, the science curriculum should be related to the problems which the students face in their community. The above approach increases public understanding of schools and also improves the quality and

relevance of education to community needs. This may encourage creative thinking, decision making and balanced science relevant to the community requirements.

The second factor to be taken into consideration while designing the curriculum is the need of adolescents in economic relationships consistent with the community structure.

The third factor to be taken into consideration is the educational level of the students. The designed curriculum may be based on the science education which the students have received earlier.

The fourth factor for curriculum design is the availability of materials, library and laboratory tools. The designed curriculum should emphasise the utilisation of local resources.

The fifth and the last factor for curriculum design is the knowledge of the basic concepts in the discipline of science. Unless the students know the fundamentals of any knowledge (Information), they will find it quite impossible to transform it for use in a variety of situations.

18.1 ORGANISATION OF A SCIENCE PROGRAMME

Listed below are some of the guiding principles which should be followed in the development of a science programme at the elementary level focussing on the "Open Competence"

approach:

1. The curriculum should be organised into units, each of which may be related to some significant aspect of the environment.

2. The unit should be essentially a major problem of everyday life to which science may contribute an intelligent basis for human adjustment.

3. Each unit should include only a few principles of generalisation of science.

4. The organisation of the courses in part at least, should be in the form of problems or projects to ensure education.

5. The distribution of time and emphasis of various units should be determined by the total functional and social values, the "teachability" and "learnability", the teachers' and pupils' interest in the unit; the local significance of the unit, and its value to other units of the course.

6. Laboratory work should be included as an integral part of problem solving and should, therefore, have the characteristics of experience and should de-emphasise illustrative or conformatory work.

7. The organisation of the course should be such that it

may lead to the attainment of its immediate and ultimate objectives.

Practical Strategies for Developing a Unit in a Science Programme

In order to develop a unit in a science programme, the following strategies are generally desirable:

Strategy I

What do we want or need to do in a unit?

This strategy involves the concept of needs assessment which may include the following items in general terms.

What do we know?

What can we do?

What valuable experience have we had?

To be more specific in the context of science teaching, the above points can be summarised as follows:

What area or topic are you going to focus on?

Write down the students' need, community needs and the school needs that relate to the area or topic chosen.

The following points should also be taken into consideration while discussing the concept of needs assessment.

How many students need this unit?

How urgent is the need?

Are there any possible substitutes?

Does this unit have a reasonable educational

significance?

Strategy II

Where are we going?

This strategy involves the setting up of specific objectives with reference to community needs. These objectives express the need in learning outcomes.

After setting the objectives, a unit may be designed in the following manner:

Unit

Learning Outcome	Student Activities	Teacher Involvement	Resources - Financial - Human - Material - Community

Strategy III

How will you know when you have done it?

Evaluation

In order to evaluate a unit, the most important point is to see whether the content in the unit satisfies the needs (as mentioned in Strategy I) or meets the specific objectives (as mentioned in Strategy II). The concept of evaluation has been discussed in a detailed manner at a later stage.

The distinguished historian-philosopher Henry Adams once said that "the teacher affects eternity, he can never tell where his influence stops". The very purpose of teaching to bring about changes in students behaviour is

served to a great extent through teachers activities in the classroom. That is why the Kothari Commission (1964-66) have aptly said in the opening sentence "The destiny of India is being shaped in the classrooms".

The challenge in education today is to improve the quality of teaching. Quality of teaching implies learning by all pupils in the classroom including those with special needs arising from the interactive effects of several factors. In seriousness of the challenge increase further due to the class size, multigrade teaching and heterogeneity in the classroom. The teacher are to provide quality teaching to all children within these constraining factors coupled with the limited physical facilities. The scene is marked by despondency in the whole sector of education and the community. Doubts are expressed about teachers capabilities to provide effective teaching.

The present study of the working of the Anganwari training centre at Pilani and B.Ed. College, Bagar showed that:

The approach of training, curriculum and the effort of the trainers is good. The participants during three month training period have enthusiasm and actively participate in learning of all the aspects of E.C.E. required for running the Anganwari centres in the villages. But the field study of the Anganwari centres in the villages around Pilani gives

very poor experience. The space, facilities, and environment in these centres is below the specific standard. The Anganwari workers are not regular and do not follow the fixed schedule. Attendance is poor and a few children come to the centre only for the so-called nutrition meal provided to the children. In one of the Panchayat of the district, Juhunjhunu, it was found that the wheat provided by the district supply department was insect infected and was not good for human and even animal consumption. Government has a machinery for monitoring the project but most of these workers/officers are not mission oriented and in some cases they are corrupt and are interested in collecting their share from whatever funds are made available at different levels. The total effort looks as if this project has been launched by the Government only for the political objectivity and not for the real cause of human resource development.

The present study of the mode of training given to the student teachers in Teachers Training Institute at Bagar shows that the approach towards training is more theoretical and less practical. Very little emphasis is being given to train teachers with the help of appropriate technology and learning aids for their future use in the classroom teaching. The Training Institute also lacks the properly qualified teacher-trainers and the proper technological materials in the field of Audio-visual technology. The

conventional methods of training teachers through the lecture/self-study method and use of blackboard and chalk for the teaching practical will produce only the old-type of teachers who will not be able to motivate and prepare the new generation for taking up the new challenge.

18.2 SCHOOL ENVIRONMENT

NIEPA Estimates (I): 1990-91

In 1992, NIEPA undertaken a UNESCO sponsored study on 'Use of Sample Survey Techniques in Educational Statistics' in four States of India, namely, Haryana, Gujarat, Rajasthan and Uttar Pradesh. The main objective of the study was to review the existing system of educational statistics and to find out the gaps and to bridge the gaps so identified by employing sample survey techniques. Age-grade matrix was one of the many variables found to be non-available. In the present context, the results of Rajasthan and Gujarat will further throw insights with respect to over-age and under-age children. In Rajasthan, two districts, namely, Jaipur - educationally advanced and Barmer - educationally backward districts were selected in the sample. The general apprehensions of 20 to 30 percent grossness at primary level of education has been amply supported by the findings of the study. However, keeping in view the size of the sample, the results cannot be generalised at the state level. In Jaipur district, the incidence of under-age children was 25 percent

of the total enrolment as against 11 percent for Barmer district. Compared to this, in Jaipur, the incidence of over-age children is only 9 percent as against 13 percent in Barmer district. Total grossness at the primary level worked out to be 34 and 24 percent respectively for Barmer and Jaipur districts. It has also been observed that girls share in underage is more than that of boys but the situation is just reversed when we look at the incidence of over-age. The results reveal that about 26 percent of total students enrolled in Grade I aged more than 7 who must have either started schooling late or must have been stagnating in the same grade or both. As against this, about 41 percent of total students enrolled in Grade I are under-age, they must have been enrolled before the attainment of the minimum prescribed age. In Gujarat, two districts, namely, Gandhinagar and Panchmalahs were selected in the sample. In Gandhinagar district, the majority of (about 80%) students at primary Grade I-IV conform to the prescribed pattern. However, there is a complete reversal of the normative pattern at the upper primary stage of education as only 30 percent of all students in Grades V-VII conform to the prescribed age-grade pattern. Compared to Gandhinagar district, Panchmahals is considered to be an educationally

Table 18.1

Districtwise Estimates of Over-age and Under-age Children at the School Level: Rajasthan

NIEPA Estimates (I): 1990-91

(Figures in Percentage)

District	Primary Level			Upper Primary Level			Elementary Level		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Barmer									
Under-age	23.75	26.18	24.70	0.37	0.31	0.35	19.66	22.90	20.89
Over-age	11.69	4.88	9.01	30.29	28.44	29.74	21.33	0.73	1.10
Total Grossness	35.44	31.26	33.71	30.66	28.75	30.07	20.99	23.63	21.99
SC	27.53	40.61	50.59	41.56	76.75	44.26	20.32	23.85	21.67
ST	55.40	38.92	61.40	35.65	12.63	28.62	21.03	26.34	22.88
Jaipur									
Under-age	11.78	13.48	10.57	0.51	0.00	0.43	9.58	11.78	8.84
Over-age	15.25	6.16	13.21	42.02	44.98	42.54	3.38	2.79	3.30
Total Grossness	27.24	19.64	23.78	42.60	44.98	42.97	12.96	14.57	12.14
SC	20.47	30.70	23.24	51.37	58.83	52.00	13.15	22.90	14.63
ST	19.92	29.83	21.81	58.57	0.00	58.57	15.76	8.79	35.23

Source: Report of UNESCO Sponsored Project on Use of Sample Survey Techniques in Eduational Statistics, NIEPA, New Delhi 1992.

backward district where around 55% of total children enrolled in Grade I are older than their prescribed age for the grade (UNESCO 1993). The relative share of relevant age children in different grades is also very low ranging between 31 percent to 38 percent for Grades II to IV and between 22 to 29 percent for Grades V to VII.

Table 18.2

Districtwise Estimates of Over-age and Under-age Children at the School Level: Gujarat

NIEPA Estimates (I): 1990-91

(Figures in Percentage)

District	Grades						
	I	II	III	IV	V	VI	VII
Panchmahals							
Under-age	0.00	3.05	4.72	6.31	5.12	5.03	29.64
Total Grossness	54.16	61.41	68.46	65.82	77.40	72.61	70.39
SC	51.58	60.83	62.06	63.71	72.32	65.81	80.39
ST	59.26	67.97	76.84	73.58	80.25	78.32	77.24
Gandhinagar							
Under-age	0.00	1.33	3.50	3.55	0.60	1.23	1.57
Total Grossness	16.41	18.79	21.45	19.73	71.61	70.22	69.11
SC	21.30	20.00	22.61	22.54	79.91	69.68	56.90
ST	14.29	15.39	20.41	22.80	94.12	81.58	95.83

NIEPA Estimates (II): 1990-91

The results of the study on 'National Sample Survey for

Monitoring of UEE' (NIEPA, 1992) also revealed high incidence of over-age and under-age children in Grade V. Of the total 5127 and 3357 educational blocks in rural and urban areas, 11.25 percent (577) and 11.20 percent (376) blocks respectively were selected in the sample. The estimates are based on more than 9146 (21.2 percent) of total 4,31,648 schools covering 29 states and union territories. December 31, 1990 was taken as the date of reference. The results are presented in Table below. The estimate of over-age and under-age children in Grade V in 1990-91 at the national level indicates that boys share (45.62 percent) was higher than girls (43.78 percent) and the same is also true for rural and urban areas. Also, it has been observed that more under-age children were there in Grade V than over-age children and it was more in case of urban areas than in rural areas. They survey results also reveal that the average age of boys and girls in Grade V was 11.00 and 10.92 years respectively and no significant difference was noticed in rural and urban areas. The results further indicate that a large number of children of age 9 were in Grade V which was as high as 21.19 percent for boys and 22.88 percent for girls compared to 32.22 percent and 34.56 percent boys and girls of age 10. A large regional variation has been noticed when results at the state level

Table 18.3

Estimate of Over-age and Under-age Children in Grade V: 1990-91

(Figures in percentage)

	Rural		Urban		Total	
	Boys	Girls	Boys	Girls	Boys	Girls
Under-age	23.82	24.34	25.79	26.44	24.95	25.19
Over-age	22.87	20.50	17.60	15.75	21.17	18.59
Total Grossness	46.69	44.84	43.39	42.19	45.62	43.78

Source: Report of National Sample Survey for Monitoring of UEE: 1990-91, Phase I, NIEPA, New Delhi, 1992

are analysed for rural and urban areas. The highest grossness in Grade V in girls enrolment is noticed for Meghalaya (66.71 percent) followed by Tripura (58.43 percent), Arunachal Pradesh (56.02 percent), Dadra & Nagar Havelli (55.55 percent), Sikkim (53.74 percent), Kerala (50.86 percent) etc. which shows that in most of the smaller states and union territories where the base population is comparatively small, the incidence of over-age and under-age children is high compared to large states which is also supported by the GER. Further, it has been noticed that in these states, the number of over-age children was more than that of under-age children. In some states, the amount of grossness noticed was less than at the national level (43.78 percent), such states are, Assam (20.46 percent), Karnataka

(29.73 %), Haryana (32.46%), Himachal Pradesh (36.10%) and Maharashtra (38.65%). In Kerala, of total grossness (50.86%), under-age children amounted to 43.85 percent compared to 7.01 percent over-age children which is just reversed to the general trend and is also highest amount of under-age children in Grade V in India. For few states, percent of pupils in Grade I who do not conform to age 6 in 1991-92 is also available. The results reveal that similar to Grade V, a large number of over-age and under-age children were in Grade I and their percentage ranges between 41.49 percent in Haryana to 83.15 percent in Sikkim. Also smaller states, such as, Dadra and Nagar Havelli (69.12%), Arunachal Pradesh (68.78%), Manipur (68.14%) and Goa (60.81%) had high amount of over-age and under-age children. Rajasthan, which is considered an educationally backward state also had very high amount of over-age and under-age children (69.38%) in Grade I compared to 47.67 percent in Grade V which means a large number of children join education system every year but since nothing attract them in classrooms they heavily dropped-out from Grade I and II and subsequent grades. As mentioned, Kerala also had high percentage of over-age and under-age children, but since the drop-out rates are comparatively low, it does not severely affect the efficiency of the system. Quite similar trend has been noticed for boys enrolment and enrolment in rural areas.

Table 18.4

Statewise Estimates of Over-age and Under-age Children in Grade V

NIEPA Survey (II): 1990-91

States/UTs	Rural Area					
	Boys			Girls		
	Under age	Over age	Total Gross-ness	Under age	Over age	Total Gross-ness
Andhra Pradesh	29.64	17.74	47.38	28.22	17.23	45.45
Arunachal Pradesh	6.64	53.39	60.03	4.92	52.80	57.72
Assam	22.19	19.76	41.95	2.03	17.56	19.59
Goa	17.77	33.24	51.01	19.68	30.43	50.11
Gujarat	13.66	37.35	51.01	16.83	28.85	45.68
Haryana	9.35	21.62	30.97	8.83	19.19	28.02
Himachal Pradesh	10.76	30.27	41.03	9.27	27.81	37.08
J and K	1.59	35.63	37.22	1.45	45.59	47.04
Karnataka	5.51	24.46	29.97	7.74	21.35	29.09
Kerala	36.93	10.33	47.26	43.22	6.74	49.96
Madhya Pradesh	11.33	35.34	46.67	16.33	27.97	44.30
Maharashtra	12.76	29.63	42.39	13.33	27.53	40.86
Manipur	14.03	37.65	51.68	9.90	45.68	55.58
Meghalaya	2.24	76.30	78.54	2.03	65.81	67.84
Mizoram	11.16	3.08	14.24	6.44	33.71	40.15
Orissa	30.91	20.14	51.05	31.05	19.31	19.31
Punjab	10.00	19.42	29.42	12.37	14.52	26.89
Rajasthan	21.29	27.27	48.66	26.13	24.34	50.47
Sikkim	2.63	74.83	77.46	1.23	74.32	75.55
Tamil Nadu	40.34	11.10	51.44	40.91	11.53	52.44
Tripura	0.82	63.90	64.72	0.51	62.66	63.17
Uttar Pradesh	47.17	8.22	55.39	45.58	9.58	55.16
A & N Is.	14.13	35.45	49.58	17.59	32.27	49.86
Chandigarh	14.37	19.45	33.82	19.77	16.69	36.46
D&N Havelli	22.44	36.53	58.97	33.76	23.69	57.45
Daman & Diu	22.33	27.47	49.80	28.65	16.49	45.14
Delhi	32.54	13.99	46.53	27.91	16.65	44.56
Lakshadweep	4.30	58.61	62.91	5.31	43.47	48.78
Pondicherry	28.32	15.22	43.54	31.89	11.83	43.72
All India	23.83	24.34	48.16	22.87	20.50	43.37

Contd....

States/UTs	All Areas						Pupils who who do not conform to age in Grade I (All Ages)
	Boys			Girls			
	Under age	Over age	Total Gross-ness	Under age	Over age	Total Gross-ness	
Andhra Pradesh	30.39	15.79	46.18	27.81	14.37	42.18	NA
Arunachal Pradesh	7.41	50.37	57.78	5.94	50.08	56.02	68.78
Assam	2.80	20.09	22.89	2.86	17.60	20.46	NA
Goa	18.87	32.25	51.12	24.59	24.63	49.22	60.81
Gujarat	19.66	27.84	47.50	24.67	21.27	45.94	60.88
Haryana	11.99	20.53	32.52	16.17	16.29	32.46	41.49
Himachal Pradesh	10.38	25.27	35.65	10.10	26.00	36.10	NA
J and K	3.56	30.69	34.25	2.69	39.52	42.21	NA
Karnataka	6.78	23.15	29.93	9.86	19.87	29.73	NA
Kerala	37.47	10.81	48.28	43.85	7.01	50.86	NA
Madhya Pradesh	23.27	34.87	58.14	16.88	28.08	44.96	NA
Maharashtra	14.58	27.29	41.87	15.40	23.25	38.65	50.14
Manipur	30.25	16.17	46.42	33.37	15.86	49.23	68.14
Meghalaya	4.01	68.86	72.87	7.30	59.41	66.71	NA
Mizoram	6.27	41.65	47.92	4.65	36.49	41.14	NA
Orissa	34.72	18.14	52.86	36.18	16.73	52.91	NA
Punjab	14.17	17.59	31.76	18.12	13.35	31.47	46.32
Rajasthan	22.07	25.77	47.84	24.55	22.95	47.50	69.38
Sikkim	2.55	71.77	74.32	1.18	52.56	53.74	83.15
Tamil Nadu	40.19	10.04	50.23	40.68	10.10	50.78	NA
Tripura	1.63	58.94	60.57	0.63	57.80	58.43	68.15
Uttar Pradesh	47.54	8.32	55.86	43.82	10.44	54.26	68.87
A & N Is.	15.10	31.48	46.58	18.11	26.53	44.64	NA
Chandigarh	18.28	13.20	31.48	20.51	13.50	34.01	53.10
D&N Havelli	23.07	31.42	54.49	33.27	22.28	55.55	69.12
Daman & Diu	29.51	19.36	48.87	35.10	13.29	48.39	62.14
Delhi	26.02	10.75	36.77	25.64	13.74	39.38	NA
Lakshadweep	4.30	58.61	62.91	5.31	43.47	48.78	NA
Pondicherry	23.48	16.28	39.76	30.18	11.71	41.89	NA
All India	24.45	21.17	45.62	25.19	18.59	43.78	NA

NA: Not Available

Source: Report on National Sample Survey for Monitoring of UEE: 1991-92, Selected Indicators, NIEPA, New Delhi 193 (Draft).

The analysis of the educational environment in the selected schools of Pilani and nearby village shows that the enrolment and registration in the privately managed schools at Pilani is good and failure and dropout percentage is low, while in the Government schools of the village the condition is not satisfactory. The teachers in Government schools are better paid but are not sincere and are irregular for duty. The teachers in both type of institutions are well qualified but have to handle different type of students and subjects and therefore, they don't have time, energy and motivation for planning and developing materials for the classes. Schools have sufficient rooms but do not have the facilities for teaching. In government schools even the seating facility for the students was not available.

The analysis for the registration/dropouts is based on the study of initial registration of the students in class one and further change in the population. It has been noticed that the children of backward classes or illiterate parents had little motivation in studies and dropout percentage was more in this group.

The age related enrolment also shows the national pattern in village schools, while the private schools do not have this constraint because the admission in classes is also related to the entrance age of the child. Failure percentage is also low in private schools because there is

administrative control on the performance of the teachers. Due to the continuous pattern of evaluation there is proper monitoring of the preparation of the student.

It was also noticed that Pilani also has very large number of commercially oriented privately managed schools. The schools charge higher fees, teachers are qualified but poorly paid, the facilities are insufficient but still large number of students from rural areas join these institutions, because those are called English medium public schools.

The present study shows the same pattern in relation to the agewise enrolment in various levels of education as has been discussed in the earlier part of this study.

Provision of free and compulsory education to all children until they complete the age of fourteen, is a directive principle of the constitution. While adopting the constitution in 1950, the goal was to provide free and compulsory education to all children upto the age of fourteen within the next ten years. Keeping in view the educational facilities available at that time in the country, the goal was too ambitious to be achieved within a short period of ten years. Hence, time and again the target date to achieve the goal of universalisation of elementary education (UEE) had to be revised. During the period 1960-65, no official pronouncements were made regarding UEE for

the children in the age-group 6-14 years. However, in 1965-66, the target date was revised to 1975-76. The working group set up by the Planning Commission then revised the target to achieve UEE by the end of seventh plan. The Kothari Commission (1966) had suggested that it be achieved latest by 1986. The National Policy of Education (NPE 1986) envisaged that all children who would attain the age of about eleven years by 1990 would have had five years of schooling or its equivalent through the non-formal stream and by 1995 all children will be provided free and compulsory education upto fourteen years of age. The focus was diverted from mere quantitative expansion of educational facilities to universal enrolment and universal retartion of children up to fourteen years of age with a substantial improvement in the quality of education. Also, the 'World Conference on Education for All' (EFA) held at Jomities, Thailand (March 1990) called upon all the countries and agencies of the world to take effective steps for achieving EFA by the turn of the century. The forty-third meeting of the National Development Council (1991), while identifying the objectives for eighth plan, also envisaged early realisation of universal elementary education and complete eradication of illiteracy among the people in the age group of 15 to 35 years. The meeting of the Consultative Committee (1992) while identifying the thrust areas in Human Resource Development for Eighth five year plan, emphasised that the

target of UEE should no longer be set for the country as a whole. It also stressed that all children including girls and children belonging to scheduled casts/scheduled tribes up to the age of fourteen be provided free education. The Human Resource Development Minister, while presenting the revised NPE (1986) in the Parliament (1992) emphasised three aspects namely, universal access and enrolment, universal retention of children upto fourteen years of age, and a substantial improvement in the quality of education to enable all children to achieve the essential levels of learning. The revised Programme of of Action (1992) further envisaged that 'free and compulsory' education of satisfactory quality should be provided to all children upto fourteen years of age before the commencement of the twenty-first century by launching a national mission. In its historical judgement the Supreme Court of India (1993) further ensured free and compulsory education to all children upto the age of fourteen as a fundamental right. The EFA Summit of Nine High-population Developing Countries (1993), in its Delhi Declaration suggested priorities and strategies to achieve goal of EFA by the 2000 AD. Recently, the Government reiterated in the parliament that goal of UEE would be achieved by the end of the century and the beginning of the 21st century would usher in a 'Literate India' (TOI 1994).

Do the quantitative expansion of educational facilities and the recent official pronouncements imply that the target of UEE/EFA will be achieved by the turn of the present century or if the past trend is any indication, will these targets be further revised? The official estimates of enrolment give reasonably sound reasons to believe that India will achieve UEE as the exercises of enrolment projection and the additional population needs to be enrolled are bared on the past trends and present status of elementary educators in India. Also, it is interesting to note that in year 1986-87 (NSSO 42nd Round), except for the age-group 0-5 and 6-15 years the proportion of illiterates steadily goes on increasing with age. This also certainly indicates that there is increasing trend in the children getting access for learning. However, if the official estimates are refixed with respect to the children outside the prescribed age-group and the age-specific population is also refined, there are enough indication to believe that the stipulated targets cannot be achieved by the turn of the century.

Eric Ashby has described four revolutions in education over the years related to teachers. Two of these are, the first revolution, according to him, accrued when the task of educating the young was transferred partly from parents to teachers and from home to school. The second revolution took place when the written word was adopted as a "tool of

education" in addition to oral instructions.

The Ministry of Education document, "Challenge of Education: A Policy Perspective" has mentioned, "Teacher performance is the most crucial input in the field of education - whatever policies may be laid down by governments at the national and state levels, in the ultimate analysis, these have to be interpreted and implemented by teachers as much through their personal example as through teaching-learning processes" (1985, p. 154).

The National Education Policy (1986) has aptly observed "The Status of the teachers reflects the socio-cultural ethos of a society; it is said that no people can rise above the level of its teachers. The Government and the community should endeavour to create conditions which will help motivate and inspire teachers on constructive and creative lines. Teachers should have the freedom to innovate to devise appropriate methods of communication and activities relevant to the needs and capabilities of and the corners of the community" (p.25)

The NPE, 1986 has, therefore, suggested that the entire system of teacher education should be overhauled and the new programmes of teacher education would emphasize continuing education and the need for teacher to meet the thrusts

envisaged in the policy. It has also added that educational technology should be employed inter alia in "the training and retraining of teachers, to improve quality, sharpen awareness of art and culture inculcate abiding values, etc. both in the formal and non-formal sectors". Thus, teachers should be provided with pre-service and in-service education by means of various media methods, materials constituting educational technology.

Prior to this century teaching was considered as a rigid, formal and stereotyped process of transmitting knowledge, facts and figures. Education was foreseen as a bipolar process with teachers at the giving and students at the receiving end. Teachers were deemed to be the only source of knowledge, many be through manuscripts and printed materials. Schools were the knowledge shops and teachers the information managers or vendors. Methods of teaching were logical, sequential and routine without the best attention to the psychological needs and conditions of learner - their interests, curiosity, freedom and flexibility. Emphasis was laid on rigid discipline, blind memorisation and hard reinforcement. Verbalism was enforced and no audio-visual aids or materials were utilised in the field of education.

The learner was always kept at the receiving end and was considered as an empty vessel to be filled with knowledge and information, facts and figure. At the advent

of the 20th century a child is considered a tender plant whose growth is facilitated by the teacher as a gardener. The child is taught according to his abilities, attitude, interests and aptitudes. He is helped to learn and to grow. Now "to teach is to nourish or cultivate the growing child or to gave him intellectual exercise or to train him in the horizontal sense of directing or guiding his growth". Children are motivated to search and experiment, together facts and information. They learn by doing and learn how to learn both individually and in groups. Various media and materials are used for making learning more interesting and effective.

Recently, learning has assumed more importance than teaching. It has been rightly observed by the International Commission on the Development of Education, (1972, p.150), that there has been a change in the learning process which is tending to displace the teaching process. New theories of learning highlights the principle of continuity and the importance of needs and motivations, of choice of content of the hierarchic nature of learning, the inter-relationship between educational content and environment, etc. Multi-media systems have now acquired more significance and educational technology has been popularly used for effectiveness.

Now stress is laid on the mathetic principle of

learning rather than on the traditional pedagogic principle of teaching. Mathetic the science of the Pupil's behaviour has recently got more importance than pedagogy, the science of the teacher's behaviour. The term 'mathetics' is derived from the Greek root signifying the learner and the process of learning is given high priority. The mathetic principle is now used for designing various programmes for individual learning by pupils. Thus, pedagogy has given place to mathetics and teaching to learning.

With the advancement in industrial and technological fields, the process of education has become more complex and technical. The industrialized countries of the west have tried to adjust their educational systems according to the needs of the technological and scientific developments and have invested huge sums of money in research. The findings in the field of psychology also have led to changes in the techniques and methodology of teaching.

The concerns for getting a regular supply of scientific and technological manpower, the societies of west have modified the methods of teaching. The new concern is reflected by the new methodology popularly called as educational technology.

What will learning mean in the future? It will comprise many things, varying from student to student. In general, it will be characterised by an understanding of the ways of

knowing proper to each of the standard fields of knowledge, a capacity to derive emotional as well as intellectual satisfactory out of knowing and a fluency in using all the available personal resources of intelligence, creativity and perseverance in the pursuit of knowledge.

Learning becomes effective when students are actively involved in the teaching-learning process. To the extent their different senses are related, their learning becomes meaningful and successful to that extent. For using various senses different media and materials are utilised in the classroom and the learning experiences are made quite relevant and effective. That is why, the media and materials are called multi-media materials". "Multi-sensory materials", or "instructional aids" or "instructional materials". These materials mainly being of two kinds auditory and visual, they are known as "audio-visual aids or AV Media and materials". As these materials are to be used as an integral part of the entire learning situation and are not just ancillary or supplementary, many educators are not happy with the terms 'aids'. Therefore, the terms media, materials and aids are used simultaneously or exclusively to show their applications and implications in education.

18.3 TYPES OF AV MEDIA AND MATERIALS

The Audio-visual media materials may be divided into three categories: (i) visual, (ii) audio, and (iii) audio-

visual. The materials which appear only to sight are of the first category. Examples of these materials are slides, film, strips, transparencies, silent motion pictures and projections with the opaque, the over-head projector, etc. Other materials traditionally used in the schools are textbook, illustrations, photographs, prints, graphs, charts, maps, globes, etc. which may be taken as visual aids. The chalkboard, felt board and bulletin board are also visual materials appealing only to the sense of "sight". Displays and exhibits like specimen, mock-ups, electric maps, dioramas and some dramatizations like pageants, pantomimes, puppetry and dancing are regarded as successful visual materials.

Radio, gramophone, tape-recorders and different magnetic recordings provide audio materials which are appealing to the sense of hearing only. The television programmes, tape-slide programme, video tape recordings and films are materials which appeal both sight and sound and vary effective audio-visual materials. Dramatic plays, role playing, socio drama, verse, choirs, etc. are a few types of dramatization that can be used with satisfying results.

These three types of materials either audio or visual or audio-visual cannot be exclusively categorised. There is no distinct compartmentalisation and the list of such materials is not exhaustive. Imaginative and resourceful

teachers can invent, explore and discover various sources of collecting and developing these materials. It has rightly been remarked by Kinder (1959) "Any device which can be used to make the learning experiences more concrete, more realistic, most dynamic can be considered audio-visual materials. (p. 11).

Audio-visual aids and materials are also divided into: (i) projected, (ii) Non projected, and (iii) Activity aids. When aids are projected on screens or even against white washed walls to give an enlarged image of the materials are called projected aids. Projected aids include slides, film strips, films transparencies which bring about better results and are more effective. The darkened room reduces distractions and the bright image on the screen secures the attention of learners. By the use of different colours, the aids become more attractive and impressive.

Non-projected aids are generally still materials including maps charts, models, display boards, bulletin boards, etc. These aids are not so costly and no sophisticated aids are required for their use. Therefore, non-projected aids can be easily used with good results.

Lastly, the activity aids include field trips, excursions, exhibitions, museums, demonstrations and dramatisation. Organisation of various activities in and outside the campus make the programmes effective as well as

interesting, planning, execution and evaluation of these activities ensure better effects and help improving these aids to bring about quality in education.

The pioneering work in education today fall into three categories: First, there is the harnessing of modern technology to education. The tools and facilities of schooling are being transformed. Like so much of the current revolution in education, this industrialization of the schools seems inevitable in retrospect. A highly industrialized society, transformed from home to factory by such things as television, automation, and computers, simply cannot afford to drag behind it an inefficient educational system still dependent on the blackboard and the slide projector.

Second, the conventional pattern of education - the way it trains, organizes, and uses teachers and students - is undergoing radical revision. The egg-crate school, composed of identical, self-enclosed classrooms, is giving way to a more flexible, functional arrangement. Teaching is frequently done in teams rather than solo, with each team member concentrating on his strongest technique or speciality. The system of grades has begun to disintegrate, with students permitted to progress at their individual rates in each subject. Our teachers are beginning to assume a new look, too, owing to programmes of training which

stress broad liberal education, meaningful practice teaching, sophisticated professional courses, and training in the use of technology.

Third, the basic process of learning is slowly being altered by new ideas about how students acquire knowledge and understanding. We increasingly recognize the varieties of human ability unmeasured by IQ tests, and by taking steps to motivate the student from within rather than by outside rewards and punishments.

The present research work is based on the information educational available in literature and also contains information about the concepts of designing educational materials/aids for various subjects of pre and primary level education. This information will be useful for planning further research in Educational Technology areas and will also help the properly qualified entrepreneurs to plan new industries in the field of Educational Technology.

The following write-up based on the article in Times of India, dated 29th August 1992 also structures the above opinion about the potential for the development of new specialized industries in this area.

In all article; Learning to Play', in Times of India, dated 29th August 1992 E. Jayashree Kurup gave information under the title, 'Toying with Ideas' based on the NCERT

publication : Early Childhood programme', as a basic guide on what skills a three to four - year - old is expected to mater.

18.4 TOYING WITH IDEAS

A basic on what skills a three to four-year-old is expected to master.

Physical and Motor Development

Should be able to put a stiff wire or thread through large holes; to trace the shape of a diamond or star thought not with much accuracy; to paint with brushes using different colours with large circular movements; to do printing in simple way with adult guidance; to do simple folding activity using palm and fingers to form a square or rectangular piece; to beat or pat clay.

Listening Skills

Should be able to listen to a study undisturbed for 5-10 minutes; to recall the major highlights of a short and simple story; to match pictures/objects that are alike from a set of pictures/objects.

Cognitive Skills

Should be able to compare objects by feeling their surfaces, and to use the vocabulary hard and soft or rough and smooth appropriately; to observe and recall immediately

3-4 objects shown to them at a time; to identify a missing part of a picture of a familiar object; to do simple classification on the basis of any one concept or dimension, for example, shape or colour; to repeat a given pattern involving 3-4 objects; to match, identify and then name initially the basic colours, i.e. red, blue, yellow, black and white and later green also; to be able to identify circle, square and triangle; to draw a circle.

Should be able to differentiate between big and small objects and match objects of the same size; to differentiate between and name common animals and birds and to classify them accordingly; to identify and name some common fruits and vegetables' to differentiate and identify trees, grass, flowers and fruits.

She also compiled information on the 'Expert Comments' - what players whose views affect the toy industry feel about it.

18.5 EXPERT COMMENTS

What players whose views affect the toy industry feel about it

"Never force a toy on a child. Play can be the best medium of education but the child should be allowed to explore the toy first. If he is forced to understand the principles it demonstrates, it kills his enthusiasm". -

Anupam Ahuja, head, department of special education at the NCERT.

"Toys also help to build the concentration of a child. If a parent can spend even an hour with the child and teach him how to appreciate thee toys the child will benefit greatly. These are not the sort of toys you can buy and leave with your child and then expect him to derive full benefit from it". -- Shirley Machavankutty, principal The Magic Years.

"Parents' attitudes will change only when schools stop putting pressure on them to get the child proficient in these toys". -- Venita Kaul, reader, department of education, NCERT.

"Admission tests to school are only to check the child's preparedness to enter school as we want well-settled children who can enjoy the school without feeling any distress". -- Shyama Chona, Principal, DPS, R K Puram.

"The minute you start forcing a child to master skills so that he can get into a good school and car admission tests which vary from school to school he is gong to be infected with the parent's anxiety. This can prove detrimental to his development". -- V Khosala, Headmistress, DPS Infant School.

"At the time of admission, the child is assessed on his basic skills like identifying colours, shapes, sizes,

matching related objects and also elementary skills like tying laces and doing up buttons and so on. It does help if the child has previously been to a pre-school as they usually know what we are looking for and focus on those activities". -- Noreen Chopra, teacher, Modern School, Humanyun Road.

"Single idea games which most toy manufacturers are making are good for schools but not for homes because once the child has mastered the concept behind it he gets bored and leaves". -- Renu Khosla, NIPCCD.

"Manufacturers often put different colours on aids like alphabet boards to make it attractive but it only serves to confuse the child". -- G W Pina, principal, Mongrace Montessori School.

"Most parents are impulsive buyers. They buy toys to keep up with the Joneses rather than for their educational value. Most of the time I am discouraging parents from buying the wrong kind of toy". -- Satish Sundara, proprietor, Ram Chander and Sons.

Her articles also contains some interesting information about the educational toy industry as mentioned below :

Keybee School Equipments, Hyderabad

Maria Montessori introduced famous mosher's play and

learn method of education to India way back in 1939 this has made the primary education more holistic. Keybee school equipment manufacturing company in Hyderabad started manufacturing toys and education materials and Association Montessori International, Amsterdom has given license only to this company for the supply of materials to the Montessori schools in Europe.

Pneumatic Control

Anjana Batra, owner of pneumatic controls, started the concern in 1979 with the collaboration of Vikram Sarabhai. Design centre, Ahmedabad, manufacturing teaching aids in maths and science. Now her company makes wooden blocks and puzzles, alphabet boards and science aids.

Creative Educational

Rajkumar, a teacher for 25 years started manufacturing flush cards and jigsaw puzzles in relatively inexpensive cards in 1987 and now produces materials like - discover the world and discover India.

Leo Mettle and Funskool

V.K. Dixit, Regional Sales Manager, mentioned about the types of equipment company manufacturers. He also stated that India required toys & equipment worth 2250 crores but Indian manufacturers could supply material worth Rs. 150

crores only.

The experts in this area say that the quality of India toys is poor, and these rarely match international standards. The prescribed use of non-toxic paints isn't available in India and therefore, over toys are not lead face.

Futuristic Approach

The general aims of education must be translated into specific objectives if we are to know that to strive for in the behaviour of observable activity of students. This behaviour is roughly of three kinds: (i) thinking, (ii) feeling, and (iii) doing. Which are technically known as cognitive, affective and psychomotor objectives. Cognitive objectives involve the learner in thinking processes like remembering, recognizing, analyzing, evaluating and problem-solving. Affective objectives involve the learner's feelings, interests and attitudes. Psychomotor objectives involve the learner in various kinds of muscular activities and skills.

Many objectives are a combination of cognitive, affective and psychomotor. For example, preparing a model or a graph may be taken as psychomotor objective, but it involves knowledge of the principles and conceptions about the model or a graph and also the attitude and interests of

the learner. Of course, according to the importance of a particular objective in a specific situation we designate the work as cognitive, affective or psychomotor and this categorization helps us to recognise a given objective and treat accordingly. Our decision about the emphasis lies in our teaching-learning system.

In our existing conditions we give more emphasis on cognitive objective and neglect affective and psychomotor objectives. Benjamin Bloom, (1956), with his co-workers has produced two handbooks offering taxonomies of educational goals in the cognitive and affective categories or domains. In the cognitive domain, Bloom identified six levels of objectives: (i) Knowledge, (ii) Comprehension, (iii) Application, (iv) Analysis, (v) Synthesis, and (vi) Evaluation. In this hierarchy of objectives knowledge is the lowest level and evaluation the highest. In the affective domain, Bloom identified five levels: (i) Receiving/attending (ii) Reponding, (iii) Valuing, (iv) Organisation, and (v) Characterisation by a value or value complex.

Now the question arises: What are the benefits of these behavioural objectives? According to Derck Rowntree (1974) there are mainly four kinds of benefits: communication, contact and structure, teaching and learning methods, evaluation and assessments. First of all, objectives enable

us to communicate about the intentions of the teaching and learning. That is, the teacher can start communicating with his students, who learn faster and contribute more if they are aware of the goals. As Robert Mager, (1962), puts it, "If you do not know where are you going, you are liable to land up some place else." Self-awareness of objectives leads to more purposeful teaching and insofar as the student is teaching himself, to more purposeful learning.

A second benefit of objectives is that they help us to select and structure the content of your teaching. Thirdly, objectives help us decide on appropriate learning activities and teaching media. Different objectives will be realized through different learning activities and media. The fourth and final value of objectives is that they help us decide on appropriate means of evaluation and assessment, on ways of testing the effectiveness of teaching and on criteria of judging the success of failure of the course.

The school of the future, recognizing that formal education is in large part a process of communication, will harness every kind of modern technology to its purpose. With complete control over various media - television, audio tapes, projectors or various kinds - teachers will design lessons for different groups of students and even for individual students, drawing upon and extensive repertory of sight and sound materials. Teachers and school

administrators will use technology as readily as businessmen or journalists use it. Nowadays if you walk through a factory with an industrial engineer you will see him wince every time he sees a worker performing some task which could be done far better and more cheaply by machine. In the school of tomorrow there will be the same aversion to having highly trained teachers deliver uniform lectures to different groups or run drill sessions - necessary tasks which can be done perfectly well by machines. As has happened in industry, the human being will be jacked up to truly skilled work by the use of machines for routine labours. "Any teacher who can be replaced by a machine," as B.F.Skinner has said, "should be."

The school of the future will be organized along lines which would today seem anarchic to most schoolmen. They are accustomed to the "necessity" for dividing students into groups which are monogeneous along some dimension or other: age, intelligence, ability. These groups then tend to remain fixed; one must, after all, know where the students are. The school of tomorrow will be so flexible that a student will proceed at his own rate in each subject, and, indeed, our idea of what constitutes a "subject" may change with the changing needs of each student. There will be so many ways of learning that students will think of themselves not as members of classes,, but as colleagues of other students, working together to learn specific aspects of the various

"subjects." And certainly the teachers will not generally gear their instruction to groups or classes, but to individual students.

Lloyd Trump, of the National Education Association, suggests that students in tomorrow's secondary school will spend 40 percent of their time in independent study, 40 percent in large groups, and the remaining 20 percent in small group or tutorial sessions. Another educator, Jack Frymier, of Ohio State University, envisages a school in which students will see a master teacher for only one half-hour every two weeks, working the rest of the time under the tutelage of less trained instructors or on their own. The master teacher would function as a physician does, analyzing the students learning problems with the aid of full diagnostic reports and prescribing "treatment" to be administered by the lower-echelon teachers. We need accept neither of these images as the last word, but they are useful in stimulating our thinking about totally new ways of relating human beings to formal education. There is no self-evident reason for assuming that our current procedures, inherited from the one-room schoolhouse and the nineteenth-century urban school, are necessarily the best. In fact, it would be quite extraordinary, in the light of our new knowledge about the way human beings learn and the way they relate one to another, our new technology for instruction,a

and the new demands on the schools, if our traditional modes of education were the optimum ones for the second half of the twentieth century.

The school of the future will base its instructional strategy on new ideas about how children learn. Under the impact of findings in the social sciences we should come to view the school not as the place where students are taught a set body of knowledge, but as a place where every resource enhances their desire and competence to learn. Eventually we can probably leave much of the actual learning to the student himself, abetted by a wide range of materials and media which need not be provided by or at the school.

18.6 RECOMMENDATIONS

The following recommendations are based on the N.P.E. 1986. These cover most of the aspects studied in this research work. These recommendations will also be helpful for the further research in various aspects of educational-planning, training, development and use of educational technology in teaching/learning process or any other relevant area related to education..

18.6.1 SIGNIFICANT OF ECCE

Since ECCE is a cross-sectoral progrmme, addressing the intersecting needs of children, women and girls, ECCE as a

component should receive due attention in all dimensions and states of education, such as women's education, education of Scheduled Castes and Tribes, elementary education, vocational education, content and process, teacher training, higher education etc.(NPE 1986, p. 114)

THE GAP BETWEEN NEED AND PROVISION

ECCE should be included in the Minimum Needs Programme.(NPE 1986, p. 144)

EARLY CHILD CENTER EDUCATION

ECCE need not be narrowly understood as an institutional programme confined to the four walls of a classroom or the framework of a centrally worked out scheme, such as ICDS. It could be in the home or in the community, family-based or institution-based, linked to school or linked to farms, factories or construction sites, state-funded, employer-funded or parent-funded or any mix of these, half-day or full-day, according to the needs and resources of each community. There is scope for immense variety in strategies, models and structures, responding to the vast diversity and complexity of our pluralistic society. For example, ECCE for infants (below three) must preferably be home-based, small-scale and attuned to the specific socio-cultural or geographical settings, and to women's work-styles and timings.

It is reported that not all children in a given habitation, not even from the vulnerable sections, respond to an Anganwadi; on an average one-fourth may not be covered. A recent study revealed that, while 80% of the organisations operating Early Childhood Education (ECE) Centres reported an average attendance of over 60%, 20% of the organisations had an attendance range of 41-60%. It is expected that this limitation.(NPE 1986, p. 116)

MONITORING ECCE PROGRAMMES

i. The Department of Women and Child Development in the Ministry of HRD at the Centre (and the Departments of Social Welfare in the States) should be held accountable for the implementation of ECCE in all aspects of its operational design, as recommended in the POA. ii. This Department must also accept the nodal role of stimulating, co-ordinating and monitoring the ECCE work undertaken by other agencies/departments, such as Labour, Works & Housing, Tribal Welfare, Agriculture, Irrigation, Rural Development, Forest etc. iii. The Department of Women and Child Development (and its counterparts in the States) should seek the setting up of an Inter-Ministerial Committee (and its equivalent in the States), comprising of representatives of the Departments of Labour, Health and Education to assist it in planning, co-ordinating

and monitoring the ECCE programmes.

iv. At the same time, the Department of Education cannot, under Article 45, give up its basic responsibility for the education of children from birth to six years, and must ensure that this continuing concern is reflected in action in all dimensions and stages of education.(NPE 1986, p. 116)

COMPULSORY EDUCATION FOR ALL THE CHILDREN

The scope of the Constitutional directive (Article 45) of providing, within a specified time-frame, free and compulsory education for 'all children until they complete the age of fourteen years', should be enlarged to include ECCE.(NPE 1986, p. 113)

The Curriculum in Schools should Include

* Increase in the visibility of women and projection of a positive image of the role of women in history, their contribution to society in general and the Indian contest n particular. For instance, social history should project the contribution that women have made in the national movement. All such issues should be carefully incorporated in the training and orientation of teachers, educators and administrators.

* Special efforts should be made to strengthen

mathematics and science education among girls. Girls' schools should give greater importance to mathematics and science than at present.

* Undifferentiated curriculum for boys and girls.

* Elimination of negative stereotypes and biological and social concepts which have a sexist bias. This has been dealt with in greater detail in the section that follows.

* Outmoded traditions and myths that hinder positive development of women and their role in national life should be objectively discussed in the classroom in a gender perspective. Similarly, the portrayal of women in our epics and mythology needs to be critically examined in the classroom.

* Basic legal information including protective laws regarding women and children and extracts from the constitution to make the children aware of the fundamental rights and other basic concepts therein.

* Specific measures to improve the participation of girls in physical training and sports should be undertaken.

Stereotypes in Textbooks and the 'Hidden Curriculum

Given The everyday social reality in which children

continuously imbibe gender-biased messages, the school further reinforces these in terms of both the hidden curriculum' (teacher's attitudes, daily activities, peer influence, etc.) and the official curriculum'. Examples of the hidden curriculum' in a primary school :

(a) "Boys you must study, the girls will get married anyway."

(b) "Chattan (a boy), if you continue to trouble, you will be made to sit with the girls".

The above examples reflects a gender-bias rooted within the attitudes and behaviour of teachers (this will be dealt within the section on the training of teachers).

Several examples of sex stereo-types' even in recent NCERT textbooks have been reported. Reflecting on the image of women that the education system is projecting through textbooks, the Shramshakti Report observes that girls and women are rarely portrayed in roles associated with economic activity. By and large, even mere references to women are minimal, and poor women projected even less. Although the POA affirmatively states that the NCERT Women's Cell should take active help of all persons', the role of Women's Studies Centres and women activist groups in eliminating sexist bias in school textbooks in left vague and undefined. Many educational institutes are not even aware of their

possible role.

It is important to introduce a note of caution regarding recommendations that give institutions a blanket responsibility for preparing the component of the core curriculum relating to women's equality' (POA, Para 5 g). It would be useful to review the work done by such institutions in the area of elimination of gender bias in text-books. In 1992, for instance, NCERT designed Teacher's Handbooks entitled Status of Women Through Curriculum'. An example from one handbook given in Table III suggests that mere mechanical changes infact reinforce existing gender roles in sophisticated' ways. (NPE 1986, p. 45 to 46)

TRAINING OF TEACHERS AND OTHER EDUCATIONAL PERSONNEL

i. Teacher training programmes in general require a critical evaluation and re-orientation within which the incorporation of the women's perspective should be a key dimension. This would include sensitivity to women's issues and awareness of the problems in the education of girls.

ii. Teacher educators, Women's Studies researchers in universities and institutes including those in the Women's Cells, as well as representatives of women's organisations and development groups, and not just a handful of Central or State level agencies, should be

involved in this process of evaluation and re-orientation of teacher training programmes.

iii. The Core' elements of a restructured teachers' training programme should emerge from the above exercises. Subsequently at the level of the State (or region), the DIETs and Educational Complexes along with educational institutions, Women's study Centres, educators and grass root-level organisations should participate in evolving the actual curriculum of the teacher's training programme. This kind of decentralisation in curriculum planning, and later even in its implementation, allows for greater flexibility and meaningfulness.

iv. Teachers' training institutes should adopt the revised curriculum so that all teacher trainees, make and female, are exposed to the restructured training programme.

v. A separate training and sensitisation programme for the teacher educators would have to be undertaken on a priority basis.

vi. Simultaneously in-service training programmes should be conducted to sensitize teachers who are already in schools. The DIETs in consultation with the Education Complexes should take the initiative in organizing

these in-service programmes.

vii. The actual form that the in-service training programmes will take, should be left to the DIETs in consultation with the Education Complexes. For instance, one school can serve as the training school' where teachers' training will include practice teaching. The internship model' referred to elsewhere can be explored.

viii. Administrators and planners in education (including Heads of institutions) can be sensitised to women's issues through the diffusion of information, holding of workshops and frequent interaction with resource persons in the area of Women's Studies. This is particularly crucial when exercises involving decision making in education are undertaken.(NPE 1986, p. 51 to 52)

IMPROVEMENT OF CAPABILITY AND EDUCATIONAL ENVIRONMENT

i. The scheme of remedial coaching should be re-organized such that on a phased basis, majority of the schools introduce the same. Instead of coaching being confined to two or three months or pre-examination periods, the same should be offered in a sustained way throughout the academic session in the concerned classes.

ii. A strategy to enrich learning environment and the socio-economic conditions in the tribal regions as

distinct from mere remedial coaching should be evolved and brought under implementation.

iii. In the backward areas including SC, ST habitats, a network of school linked libraries should be established. For reaching our to smaller habitations without schools, a dynamic programme of bicycle-borne mobile libraries or para-school-based libraries should be brought under implementation. These libraries need to be enriched with creative children's literature. While the children's literature would be primarily in the regional languages, efforts should be made to increase the availability of children's books in the local dialects or languages spoken in educationally backward areas.

iv. In order to nurture all kinds of talents and aptitudes in children, ranging from academic subjects to co-curricular and socio-cultural spheres as may be identifiable. Educational Complexes should organise a wide-ranging programme of specific theme-based workshops/work camps, using the best available resource persons in the area. This programme should encourage school drop-outs as well to join and contribute in this collective endeavour towards excellence.

v. In the curriculum of the educationally backward the

following should be emphasized at all stages of education :

(a) Science and Mathematics;

(b) Expression, both oral and written, and creative writing;

(c) History and sociology of the Scheduled Castes, the Scheduled Tribes and other backward sections of society;

(d) Contribution of these communities to national life and development, including the freedom struggle; and

(e) Role played by women belonging to these communities in national life and development.

(In fact, matters covering under (c), (d) and (e) should also be included in the National Core Curriculum).

vi. Above all else, in order to bring about universalisation of Elementary education among girls in backward areas, including those belonging to SC/ST communities, a network of ECCE centres should be established on a priority basis, with linkage to primary schools. (This has also been dealt with in the Chapter on ECCE).(NPE 1986, p. 75 to 76)

INFRASTRUCTURE AND QUALITY OF EDUCATION

* Provision of significantly increased outlay for elementary (particularly primary) education. This would help in the building up of the required levels of infrastructure and quality of education, thereby transforming Government, local-body and aided schools into genuine neighbourhood schools.

* Provision of special allocations for improvement of school system in backward areas, urban slums, tribal areas, hilly tracts, desert and marshy areas, drought and flood-prone zones, coastal belts and islands.

* Ensuring instruction for all in the medium of mother tongue at the primary level, particularly for linguistic minorities; active encouragement of teaching in the regional languages at the secondary level; and discontinuance of State aid to the schools imparting education otherwise than in the medium of mother tongue/ regional languages.

* Phased implementation of the Common School System within a ten year time frame; and essential minimum legislation, particularly to dispense with early selection process, tuition fee, capitation fee etc.

* Exploring ways of including the expensive private

schools into the Common School System through a combination of incentives, disincentives and legislation.(NPE 1986, p. 92-93)

OPERATION BLACKBOARD

The NPE recommended the launching of a phased drive symbolically called Operation Blackboard, as a Centrally Sponsored Scheme aimed at bringing about substantial improvement in the facilities of primary schools run by Government, Local Bodies and Panchayati Raj and recognised aided institutions. It has the following three interdependent components :

* "Provision of a building comprising at least two reasonable large all-weather rooms with a deep verandah and separate toilet facilities for boys and girls;

* At lest two teachers in every school, as far as possible, one of them a woman; and

* Provision of essential teaching and learning materials including blackboards, maps, charts, toys and equipment for work experience".

(Annual Report, 1989-90, Part I, Ministry of HRD, Dept. of Education).

While central assistance to the extent of 100% is to be provided for the appointment of the second teacher in the single teacher schools and for the purchase of materials, the State governments were expected to find their own resources for the building. Regarding the cost of construction of buildings, the POA recommended that school buildings be the first charge on the funds of the National Rural Employment Programme (NREP) and the Rural Landless Employment Guarantee Programme (RLEGP), now known as the Jawahar Rojgar Yojana (JRY).

The scheme as was designed to cover the primary schools in all the blocks/municipal areas in a phased manner. The target was set at the level of 20% of blocks/municipal areas during 1987-88, 30% of them during 1988-89 and 50% during 1989-90. Tables 19 and 20 present data on the projections made for Operation Blackboard and the extent of it's implementation. From these data, it is clear that the targets were not fulfilled, with only 33% of the schools receiving equipment and less than 25% of the schools completing their construction programme. About three-fourths of the sanctioned posts for the teachers were filled up. A total amount of Rs. 373.32 crores has been spend under the scheme during the past three years. (NPE 1986, p. 172-173)

INCENTIVE SCHEMES

A series of studies should be instituted to investigate into the impact that the various incentive schemes implemented in different states have had on enrolment and retention of SC/ST children in the schools. (The evidence of overall relative deterioration of literary levels of Scheduled Castes and Tribes reflected in Table 4 and figure 1 would further underscore the need for these impact studies). Community profiles of educationally backward communities should also be prepared based on study of their profiles and the findings of the impact studies, on a disaggregated basis, appropriate and logical strategies should be established for the educational.

COMPUTER EDUCATION

i. Computer education, of course, is important because computerization has become part and parcel of technologies contributing to development in every sphere. However, a cautious approach should be followed in the expansion of computer education. The simple reason is the serious resource constraint and the need for priority being given in the deployment of available resources for universalisation of elementary education. (The Committee itself recognises that at school stage computer awareness is necessary but computer aided

learning requirements (CAL) as such is to be carefully evaluated before introduction).

ii. Computer learning should be made in integral part of the time table. Emergent and meaningful steps for the production of computer software in regional languages should be taken. The resource centres which are expected to train teachers and provide necessary support should be streamlined. The time gap between teacher training and computer hardware supplies should be minimized. The project not having been very successful consequent on having been tied down to CMC, the Government should bring about involvement of diverse agencies, at the same time going in for computers other than BBC micros, apart from these equipment being improved for facility of operating software in regional languages.(NPE 1986, p. 286-287)

EDUCATIONAL TECHNOLOGY

The Educational Technology Programme as a whole should be reviewed by the Government n the light of the above experience. Specifically :

i. Status of utilisation of the RCCPs and TVs already provided to the various States should be quickly studied in detail, closely involving the States themselves so that their proper utilisation is ensured.

Where it is obvious that these equipment cannot be used on account of difficulties in providing the required infrastructure, they should be transferred to schools where such infrastructure exists. In the class room situations obtaining in the majority of the schools which are indifferently provided with infrastructure, there are serious problems in using TV. The TV programmes cannot also be a substitute for normal teaching. (The printed material used by the teacher still remains the most potent tool for imparting of instruction). Priority should rather be for use of audio and video cassettes for educational purposes. The reason is that the teachers will have the facility of playing them in a regulated way at the time they consider suitable for the students.

ii. Within the Education Department, in the monitoring of the implementation of this programme, there should be very close coordination between the Schools Bureau which handles the scheme and the Elementary Education Bureau which deals with the problems of the children of the relevant age group. In fact, use of education technology hardware as well as software should be made part of monitoring of UEE.

iii. Teacher training in the use of these equipment should be organised. The emphasis in teacher training should

be on instructional designs suitable to local needs. Techno aids should be made available to the teachers only if and when needed.

iv. Already, infrastructure and capability are available in existing institutions in the country for the production of educational software. The UGC, NCERT, the Central Institute of English and Foreign languages, Central Institute of Indian Languages, and the kendriya Hindi Sansthan are the organisations which have facilities and experience in this area. While the creation of education media foundation may be worthwhile, simultaneously with this, the modalities of utilising the exiting institutions should be laid down by the Government. These Institutions themselves could tap talents from the open market for production of educational software.

v. Immediate steps should be taken for properly manning the technical and professional posts in the State Institutes of Educational Technology so that their capacities are fully utilised and the present situation of their apparent under utilization altered.

vi. Early steps should be taken for implementing the programmes to have a channel of the Doordarshan dedicated for education, care being taken to ensure that distance learning at all levels is facilitated.

(It is worthy of mention here that the Indira Gandhi national Open University has been pressing for separate TV time for its programmes). Reportedly, Doordarshan has been demanding commercial rates for telecasting education programmes. In the context of educational development which is the basic minimum human need, it is not appropriate to apply commercial rates for educational programmes - particularly, as they are designed for providing access to education for the disadvantaged sections of the society. The Government should fund the costs involved - I & B Ministry meeting the capital cost, and the running costs being met by the Department of Education, Ministry of Human Resource Development on no loss, no profit basis.(NPE 1986, p. 284-285)

NPE 1986 has considered various aspects use of Educational Technology for the improvement of school education but has failed to recognize the use of play materials/educational models etc. NCERT 1991 in their publication 'Early Childhood Education Programmes' has made an effort to identify the different types of educational designs for ECE requirement and in this research work effort has been made to develop models for different aspects of learning of mathematics & with the same approach models for other courses can also be designed in future.

BIBLIOGRAPHY

1. Anderson, Richard, C, "Can First Graders Learn an Advanced Problem-Solving Skills?" Journal of Educational Psychology, Vol. 56, 1965, pp. 283-294.

2. Arnold, Magda B., "Motivation and desire to know" Educ, 1956, 77, 220-226.

3. Arthur Carin & Robert B. Sund, 1966 Discovery Teaching in Science. Ohio : Charles G. Merril Publishing Co., p. 131.

4. Bhatt, B.D. and S.R. Sharma, 1992 Educational Technology, Krishka Publishing House, Delhi.

5. Bloom, B.S., Human Characteristics and School learning, Harper, New York, 1976.

6. Bloom, B.S. et at., Taxonomy of educational objectives, the classification of educational goals handbook 1. Cognitive domain and handbook 2. Affective, New York, Mackay 1975.

7. Briggs, L.J. et.al., : Instructional Media, Pitsburg, American Institute of Research, 1966.

8. Brownell, W.A. Readiness and the Arithmetic curriculum". Elem. Sch. J. 1938, 344-354.

9. Bhatia, Kavita., CML Materials catalogue of children's media laboratory materials, NCERT, 1992.

10. Chaube S.P. & A Chaube, Foundations of Education, Vikas Publishing House, New Delhi 1994.

11. Census of India (1984). Population projections for India, 1981-2001, office of the registrar general of India, New Delhi, Government of India.

12. Central Institute of Educational Technology, NCERT : A study of the Impact of the ETV programme on the utilization, New Delhi, 1983.

13. Constance Kamii and Rheta De Vries, 1978 Physical knowledge in Pre school education - Implications of Piaget's theory (Engle Wood Cliffs. N.J. : Prentice - Hall.

14. Desai, D.M. (1953), Universal Compulsory and primary education in India, Institute of education, Bombay.

15. Duth, Sumitee, Learning process, NCERT, New Delhi, 1960.

16. David L. Silvernail, 1986 What research says to the teacher teaching styles a related to student achievement, 2nd ed. (washington D.C. National Education Association.

17. Dave, P.N. and Daljit Gupta (1987) Operational Blackboard : Minimum Essential facilities, department of pre-school and elementary education, NCERT, New Delhi.

18. David Ausubell, J.D. Novak, and H. Hanesian, Educational psychology : A cognitive view, 2nd ed (New York : Holt, Rinehart and Winston 1978).

19. Frandson, A.N. How Children Learn, New York : McGraw Hill, 1957.

20. Gore, M.S. (1994). Indian Education : Structure and Process, New Delhi : Rawat Publications.

21. Gajraj, Suren (1992), The impact of primary education on literacy, UNESCO Statistical Issues, STE-8 February, Paris.

22. Govinda, R and N.V. Varghese (1991), quality of basic educator services in India. A case study of primary schooling in M.P. NIEPA, New Delhi and IIEP, Paris.

23. Govt. of India : Programme of Action, 1986, Ministry of Human Resource Development (Education), New Delhi.

24. Government of India : National Policy on Education, Ministry of Human Resource Development (Education) 1986, New Delhi.

25. Government of India, Report of the working groups on Educational Technology, Ministry of Education, 1978.

26. Gagne, R.M., : The conditions of learning, New York, Holt Rinehart and Winston, 1965.

27. Govt. of India, Ministry of Education, The Education Commission, 1964-65, New Delhi.

28. GuilFord, J.P., "Creativity" American Psychologist, 1950. (5)

29. Hemlata Singh, 1996 - Scientific Temper and Education, Common wealth publishers, New Delhi.

30. Howkins, D, "Messing About in Service," Science and Children, vol. 2, 1965, p. 5.

31. Inhelder, B., H, Sinclair, and M. Bovet, learning and the Development of cognition, London : Routledge & Kegan Paul, Ltd., 1978 p.28.

32. Inhelder, B., and J.Piaget, The Growth of Logical thinking : From Childhood To Adolescence. A. Parsons and S. Milgram, trans; New York : Basic Books, Inc. 1958.

33. Indian Association of Programmed Learning and Educational Technology, and News letter, Vol. 1, No. 2, Surat, July 1978.

34. Jallaludin. A.K. et.al. (1990). Basic Education and National Development :The Indian Science. UNICEF, New Delhi.

35. J.W. Osburn, 1931 Enriching the curriculum for gifted children, New York, The Macmillan Co., p. 37.

36. Joseph P. Riley, "The effect of Teachers' Wait-Time and Knowledge comprehension Questioning on Science Achievement", Journal of Research in Science Teaching, 23, No. 4 (April 1986): 335-342.

37. Jangira, N.K. & Pimci Jamstra (1995), Effective Teaching - Child centred Approach. National, New Delhi.

38. Kalra, R.M. 1994, Technology of Teaching Elementary School Science in the 21st Century, Sterling Publishers, New Delhi.

39. Koenker, R.H., 1948, Arithmetic Readiness at the Kindergarten level". J Educ. Res., 42; 218-223.

40. Kulkarni, S.S.: Introduction to Educational Technology, Oxford, Lott Publishing Co., New Delhi, 1986.

41. Kulkarni, S.S., : Teaching learning process : A System Analysis, (UNESCO) Regional Office for education in Asia, Bangkok, 1975.

42. Kurrien, John (1983). Elementary Education in India : Myth, Reality and Alternative, New Delhi : Vikas Publishing House.

43. Kochar, S.K., : Methods and Techniques of teaching, Sterling Publishers Pvt. Ltd., New Delhi, 1978.

44. Kothari, D.S., : (1986) Education and Values in school education in India : Present status and future needs. NCERT, New Delhi.

45. Kothari, D.S. et.al., Report of the Indian Education Commission, 1964-66, New Delhi, 1966.

46. Linn, M.C., and R. Peterson, "The Effect of Direct Experience with Objects on Middle Class, Culturally Diverse and Visually Impaired Young Children" Journal of Research in Science Teaching, Vol. 10, 1973, pp. 83-90.

47. Levine, M., "Scientific Method and Adversary Model," American Psychologist, Vol. 29, 1974, pp. 661 - 677.

48. Linn, M.C., and H.D. Thier, "The Effect of Experiential Science on Development of Logical Thinking in Children, "Journal of Research in Science Teaching, Vol. 12, 1975, pp. 49-62.

49. Lovell, K., "A Follow-up Study of Inhelder and Piaget's The Growth of Logical thinking", British Journal of Psychology, Vol. 51, 1961, pp. 143-153.

50. Linn, M.C., B. Chen, and H.D. Thier, "Teaching Children to Control Variables : Investigation of a Free Choice Environment," Journal of Research in Science Teaching, in Press.

51. Linn, M.C., B, Chen, and H.D. Thier, "Individualizing Science : Can we Teach Children to Interpret Experiments?" Instructional Science, Vol. 5, 1976, pp. 227-252.

52. Literate India by Century-end", Times of India, May 3, 1994.

53. Lakshmi, S. (1992); Challenges in Indian Education, New Delhi; Sterling Publishers Pvt. Limited.

54. Lockheed, Marlaine E and Adriaan M verspor (1990), Improving primary education in developing countries: A review of policy options, Washington.

55. Mehta Arun C, 1995, Education for All in India, Myth and Reality, Kanishka Publishers, Delhi, 1995.

56. Mehta A.C. (1992) "Diagnostic and planning model for integrated planning of literacy and UPE", paper presented in Regional Workshop on planning & management of literacy and continuing education, Aug 3-14 NIEPA, New Delhi.

57. Mehta Arun C (1991), "Introduction to Lotus 1-2-3". Educational Technology, November, New Delhi.

58. Mehta, Arun C. (1991) "Districtwise Population projections for Rajasthan and 1991 census count : A Note", Rajasthan Economic Journal, Volume XV, Number I, January, Jaipur.

59. Mehta, Arun C. (1989). "Relationship Between education and Development Indicators; A case study of Asia and the pacific countries", Journal of Educational planning and administration, Silver Jubilee special issue on planning, January, New Delhi.

60. Mehta, Arun C (1981), "An analysis of Density of population and its correlates in Rajasthan". Rajasthan Economic Journal, Volume II, Jaipur.

61. Mohanty Jagannath 1992, Education Technology, Deep & Deep Publications, New Delhi.

62. Mohanty, Jagannath; "Educational Technology : A plea for little media", Educational technology, Yearbook, IAET, New Delhi, 1988.

63. Mohanty, Jagannath " "The open university : An achievement in educational technology", Education quarterly, January, 1980.

64. Mary Jo Pickett Clatt and Jean M. Shaw, "Open questions, open Answers", Science and Children, 23 No. 3 (November, December 1985) : 14-16.

65. Marylou Dantonio, 1987, "Develop Concepts, Question by Question, "The Science Teacher, 54, No. 5 : 46-49.

66. Mehta, Arun C. (1992), "Diagnostic and Planning Model for Integrated Planning of Literacy and UPE", paper presented in regional workshop on planning and management of literacy and continuing education, August 3-14, NIEPA, New Delhi.

67. Mehta, Arun C. (1992), "STudent Flow Analysis as a base to enrolment projections", paper presented in International Programme in Education planning for officers of republic of China, NIEPA, December, New

Delhi.

68. Mehta, Arun C. (1993). "Education for all : Myth and Reality", Journal of Education and Social change, Volume VI. Number 3, Pune.

69. Mehta, Arun C. (1994). "Enrolment Projections and Goal of Education for All", Journal of Educational planning and Administration, Volume VIII, Number 1, January, New Delhi, NIEPA.

70. "Minimum Levels of Learning at primary stage, "Report of the Committee set up by the MHRD, Department of Education, NCERT, New Delhi, 1991, February.

71. Ministry of Education (1966). Report of the Education Commission : 1964-66, New Delhi; Government of India.

72. Ministry of Human Resource Development (n.d.). The District Primary Education Programme, Department of Education, New Delhi, Government of India.

73. Ministry of Human Resource Development (1984). Report of the working group on Elementary Education : Seventh Five Year Plan, 1985-90, New Delhi, Government of India.

74. Ministry of Human Resource Development (1987). The scheme of "Operation Black board", New Delhi, Government of India.

75. Ministry of Human Resource Development (1989). Report of the working group on early childhood education and elementary education, New Delhi, Government of India.

76. Ministry of Human Resource Development (1991). Elementary Education in India : Enrolment trends during 1978-79 to 1988-89.

77. Ministry of Human Resource Development (1992). National Policy on Education : Programme of Action (Revised), New Delhi, Government of India.

78. Ministry of Human Resource Development (1993). Education for All : The Indian Science (A synopsis), December, New Delhi, Government of India.

79. Ministry of Human Resource Development (1994). Annual Report, 1993-94, Department of Education, New Delhi, Government of India.

80. Mohanty, Jagannath (1987). Education in India - Impact of Democracy, New Delhi : Deep and Deep Publications.

81. Murlidharan R., (Ed.). The system of Pre-school Education in India. Maxwell Press, Delhi, 1988.

82. Naik, J.P., "Elementary Education in India", Allied Publishers, 1975, p. 7-11.

83. Naik, J.P. (1966). Elementary Education in India : The Unfinished Business, Bombay : Asia Publishing House.

84. Naik J.P. (1975). Elementary Education in India : A promise to keep, New Delhi : Allied Publishers.

85. Nair, P.R. Gopinathan (1981), Primary Education, Population Growth and Socio-economic change, New Delhi, Allied Publishers.

86. Newman R.S. (1989). Grassroots Education in India - A challenge for policy-makers, New Delhi : Sterling Publishers Pvt. Ltd.

87. NIEPA (1983). Report of the Technical Workshop on Monitoring and Evaluation of Educational Programmes with particular reference to Universalisation of Elementary Education, July 18-22, New Delhi.

88. NIEPA (1990). Education for All by 2000 : Indian Perspective, New Delhi.

89. NIEPA, (1992), Basic Education Data - A compilation (mineograph) version 4.02, New Delhi.

90. NIEPA and Department of Education (1992), Development of Education in India : 1990-91, Ministry of Human Resource Development, Government of India, New Delhi.

91. N.C.E.R.T., "Looking Ahead in Science Teaching Around the World", The Science Teacher Vol. 34, Jan. 1967, P. 33.

92. National Policy on Education, 1986, New Delhi. Ministry of Human Resource Development, Government of India.

93. Nicholas Hans.; 1994, Comparative Education Universal Book stall, New Delhi.

94. Prakash, Brahm, M.A. Ansari and L.S. Ganesh (1986) Primary Education in India : A Trend Analysis (Mimeograph), Report of Project on Education in Year 2000, Document No. 7, NEIPA, New Delhi.

95. "Primary Drop-out Rate 53 percent", (based on UNICEF Report), Times of India, November 18, 1993.

96. Paul chance and Joshua Fishman, 1987 "The Magic of Childhood", Psychology today, 21, No. 5 : 58.

97. Peter C. Gega - 1977, Science in Elementary Education Third Edition John Wiley & Sons. Inc.

98. Paul Torrance, Guiding, 1962 Creative Talent, Englewood Cliffs, New Jersey, Prentice Hall Inc. p.16.

99. Robert M. Gagne, The conditions of Learning (New York : Holt, Rinchart and Winston, 1980.

100. R.M. Kalra, 1994. Technology of Teaching Elementary school science in the 21st Century. Sterling Publishers Pvt. Ltd.

101. Rajasthan Skiksha Karmi board (1993) Moving Towards Universalisation of Primary Education : Learning from the Skiksha Karmi Model, Jaipur.

102. Rajput, J.S. (1994). Experience and Expectations in Elementary Education, New Delhi : Anamika Prakashan.

103. Rammurti, Acharya (Chairman) Towards an Enlightened and Humane Society. A Perspective Paper on Education (1990).

104. Raza, Moonis, Aijazuddin Ahmad and S.C. Nuna (1990) School Education in India - The Regional Dimension, NEIPA, New Delhi.

105. Sharma, A.K. Director, NCERT, New Delhi.

106. Sampath, k, et al., Introduction to Educational Technology, Sterling Publication Pvt. Ltd., New Delhi - 1981.

107. Schramm. W., Big Media, Little Media, Agency for International Development, New York, 1974.

108. Swaminathan, I., Playing and Learning, A manual an cognitively oriented programme for pre school children, Agha Khan Foundation, 1989.

109. Sharma, R.S. (n.d), "Universalisation of Elementary Education and the Disabled" (mimeograph), NEIPA, New Delhi.

110. Thier, H.D., "Content and Approaches of Integrated Science Programs at the primary and secondary school levels", New Trends in Integrated Science Teaching P.E. Richmond, ed. Paris. The Unisco Press, Vol. II, 1973.

111. UNESCO (1993). FEA in Nine High population countries (India) : Analysis and synthesis, Education for All Summit of nine High population countries December, New Delhi.

112. UNESCO (1993). Education for All (Status and Trends) December; Paris.

113. UNICEF (1985). Education for All : Make it Happen, New York.

114. Upadhay, G.C. Easy to make toys and Games, A handbook for teachers, NCERT, 1993.

115. Zaidi S.M.I.A. (1991). "Problem of Wastage in School Education Drop-outs at Elementary Level", Journal of Educational Planning and Administration, Volume V, Number 2, April, New Delhi.

ANNEXURE

Yearwise Progress in Class IA

S.No.	Name of the child	Dae of Birth	Date of Admi-ssion	Caste	Address	I	II	III	IV	V
						90-91	91-92	92-93	93-94	94-95
1.	Raghubir Singh	8.6.84	2.7.90	Kumhar	Pilani					
2.	Arjunsingh	16.1.84	2.7.90	Rajput	Pilani					
3.	Mukesh Sani	20.6.85	2.7.90	Mali	Pilani					
4.	Deepak Saini	22.6.84	2.7.90	Mali	Pilani					
5.	Ajay Saini	18.10.84	2.7.90	Mali	Pilani					
6.	Rakesh I	4.4.83	2.7.90	SC	Pilani					
7.	Joginder Singh	9.7.84	2.7.90	SC	Patharia					
8.	Naresh	30.3.85	2.7.90	SC	Pilani					
9.	Rakesh - II	5.1.84	2.7.90	Chamar	Pilani					
10.	Sajan Kuamr	2.2.85	2.7.90	SC	Pilani					
11.	Om Prakash I	8.8.84	2.7.90	Mali	Pilani					
12.	Anand Singh	20.10.85	2.7.90	Rajput	Patharia					
13.	Ajay Alaria	2.5.85	2.7.90	SC	Pilani					
14.	Rakesh - III	5.5.85	2.7.90	Chamar	Pilani					
15.	Pawan Kumar Singh	10.2.85	2.7.90	Rajput	Dhani Shyoran					
16.	Vijay Kumar Singh	2.6.85	2.7.90	RAjput	"					
17.	Ravinder Kumar Naik	20.12.84	2.7.90	Naik	Bishanpura					
18.	Prakash Saini	5.7.84	2.7.90	SC	Pilani					
19.	Satya Pal Singh	14.6.85	2.7.90	Jat	Rayla					
20.	Pradeep Kuamr	10.6.85	2.7.90	Jat	Rayla					
21.	Rajender Kumar	30.6.83	2.7.90	SC	Pilani					

S.No.	Name of the child	Dae of Birth	Date of Admi-ssion	Caste	Address	I	II	III	IV	V
						90-91	91-92	92-93	93-94	94-95
22.	Rajender Kumar II	1.12.82	2.7.90	SC	Pilani					
23.	Ashok Kumar	7.9.85	2.7.90	SC	Pilani					
24.	Guljhari Lal	8.11.84	2.7.90	Kumhar	Pilani					
25.	Ram Das	1.12.84	2.7.90	Maki	Pilani					
26.	Mukesh Rathore	16.1.84	2.7.90	Rajput	Pilani					
27.	Virender Shekhawat	28.6.85	2.7.90	Rajput	Dhani Shyoran					
28.	Muhamad Aslam	16.5.85	2.7.90	Muslem	Pilani					
29.	Shrikant Goyal	1.2.854	2.7.90	Baniya	Pilani					
30.	Sunil Verma	8.12.84	18.7.90	Kumhar	Pilani					
31.	Joginder Singh	9.7.84	2.7.90	SC	Patharia					