Impact of the Preschool Education Component in Integrated Child Development Services Programme on the Cognitive Development of Children

HEMA PANDEY

A Dissertation Submitted to the Bharathiar University
in Partial Fulfilment of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

May, 1988

Acknowledgement

ACKNOWLEDGEMENT

My heart felt gratitude is due to **Dr. (Mrs) Rajammal P. Devadas, M.A., M.Sc., Ph.D. (Ohio, USA), D.Sc., (Madras)**, Dean of Post-Graduate Studies, Director, Sri Avinashilingam Home Science College for Women, Coimbatore, and my Guide for her continuous encouragement, valuable guidance and constant inspiration. Her unique personal and professional response and loving ways of helping throughout the study are acknowledged with great reverence.

Sincere thanks are due to **Dr (Mrs) Lakshmi Santa Rajagopal, M.S. (Tennessee, USA), Ph.D. (Madras)**, Principal, Sri Avinashilingam Home Science College for Women, Coimbatore for her administrative support, encouragement and timely help. The author records her thanks to **Dr (Mrs) N. Jaya, M.Sc., Ph.D. (Madras)**, Professor and Head, Department of Child Development and Family Relationships, Sri Avinashilingam Home Science College for Women, Coimbatore for her guidance and help rendered whenever needed.

Great appreciation and thanks are also due to **Mrs. T.I. Jabaneesa, C.D.P.O.,** Anganwadi Workers and children of the ICDS Urban Project No. 4, for their sincere cooperation and help. But for the free and friendly relations and responses of the children under study, this research effort would not have been possible. They deserve my compliments and best wishes.

Special thanks are due to **Shri K. S. Krishnan,** former Senior Scientist, Indian Agricultural Statistics Research Institute, New Delhi for his valuable and unreserved guidance in the statistical analysis and interpretations. The author is thankful also to the interpreters for the help rendered in collection of data for the study.

The author thanks with gratitude **Dr. C. Prasad,** Deputy Director General, Agricultural Extension, Indian Council of Agricultural Research, New Delhi, for his constant encouragement, loving inspiration and motivation.

Contents

LIST OF CONTENTS

LIST OF CONTENTS

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF PICTURES

Introduction

I INTRODUCTION

Child is a beautiful flower of human garden ; its sweet fragrance fills the heart with joy and attainment, and reminds of the Godly virtues, sentiments and emotions. Child makes adults recapitulate the forgotton childhood. This beautiful creation of God needs utmost care and protection from the harsh blows of winds of poverty, starvation, negligence and disregard for his development needs so that it does not wither before getting opportunities for blooming. Society and people frequently tend to give priority to short-term goals and neglect the long-range educational and developmental needs of children. Pandit Jawaharlal Nehru, the first Prime Minister of India, had realized this neglect way back in 1952 when he expressed : "Somehow the fact that ultimately everything depends on the human factors gets rather lost in our thinking of plans and schemes of development in-terms of factories and machinery, and general schemes. It is all very important that we must have them, but ultimately of course, it is the human being that counts, and if the human being counts, well he counts more as a child than as a grown up".

Children represent the nation's hope for the future. India's National Policy for children adopted in 1974 recognises children as the "Nation's supremely important asset" and declares that the nation is responsible for their "nurture and solicitude". National development is synonymous with child development in the sense that the effort expended on the mental and physical development of children is an investment in human capital. Grant (1984) has pointed out the profound connection between the growth of the mind and the body in childhood and compared it to the growth of economics and the progress of nation. Therefore, long-term policy of human resources development must start with today's children.

Children form the most important national resource for human development. Human resource development is both an important national goal and the essential means of achieving rapid socio-economic progress. The Seventh Five Year Plan points out how a narrow view of resource mobilisation limiting to the financial sphere fails to do justice to the complexity of the development process in which the human factor plays the most important role.

Human development is the result of health care, protection, adequate nutrition and environmental stimulation backed by appropriate education and training. The neglect of these basic factors is bound to reflect on the growth of the citizens and thus on the progress and prosperity of the nation. The deteriorating standard of behaviour of Indian people in almost all walks of life and action is indicative of serious lacuna in the nation's human development and management systems. Sound mind in a sound body is an adage which can only be neglected at our peril. In spite of rapid economic development in the country during the last three decades, the private consumption pattern in the society has not changed substantially and still there are 37 per cent of people below the poverty line. Adequate provision of balanced food, good health services and quality education has been a far cry. In the sphere of development, growth of children requires maximum attention. Proper foundation in childhood is essential for their rapid and sustained growth and development.

The Problem

Of the total population of 685 million (1981 census), the child population (0-14 years), was about 272 million, that is 40 per cent. Of these about one third are economically and socially vulnerable. Today it is widely recognised that children specially require utmost care during their early years because what happens to a person in early childhood between birth and the age of

six, is crucial not only for his physical survival and well-being, but also for realizing his potential in future. Preschool years are the most crucial for intellectual and physical development. They pave the way for the well-being of the entire life span from childhood to old age (Indian Council for Child Welfare, 1976 ; Devadas, 1977). The experiences of the early years of human life span constitutes crucial antecedents for all subsquent behaviours.

Realization that preschool years are crucial for the optimum development of child is increasing all over the world with each passing day. Montessori (1964) stated that there are "sensitive periods for learning", extended from 0-6 years, at which there exist possibilities of making mental acquisition that are no longer possible at other stages. According to Fowler (1962) early years, as compared to the later in the development cycle, are more favourable for the establishment of conceptual learning ; early learning is assumed to facilitate positively that which occurs later.

Bloom (1964) states that the rate of development, particularly intellectual development is most rapid in the early years of life and that during this period of the most active growth of an organism, the environmental enrichment or deprivation makes its maximum impact. This is supported by Bruner (1971) who found that a child's intellectual powers are at a very high level during the first six years of life.

The study group on the development of preschool child, set up jointly in 1970 by the Ministry of Education and the Department of Social Welfare, Government of India, aimed at preparing a programme of action for the development of the preschool child through the mobilization of local resources, especially in the rural areas. The group stated, "The first five years are critical for all forms of development ; effects of a deprived or abundant

environment are most telling at this stage and investment in human resource development at a later stage may prove a waste if the foundation has been neglected".

The impressionable years of childhood call for stimulating and enriched environment as envisaged by Hunt (1964) ; Rosenzweig (1966) ; and Bruner (1971). Early intense stimulation through an "enriched" environment positively results in accelerated rate of intellectual development. Research has also shown that children who lack stimuli or who grow in confined environment suffer impaired growth and development.

On the basis of both animal and human studies, Hunt (1964) showed that development of intelligence was based on interaction between genetic potential and the quality of environment. The findings of Ribble (1943)and Goldfarb (1945) ; have emphasized the need of children for a stimulating environment. Lack of appropriate social and effective stimulation in infancy leads to devastating consequences in personality and intellectual spheres. No matter how healthy the genetic endowment may be, a nurturing environment is essential for the normal development and functioning of the nervous system.

Several researchers agree that as years advance, it would be increasingly difficult to make any real changes in a child's mental ability. The sensitive impressionability of the early years should be taken advantage of for developing values. From this understanding of the early formative years of life as "critical" emerged the preschool education movement. Research studies in India and abroad during the past three decades have amply acknowledged the value of preschool programme for maximizing the potentialities of children not only from the privileged homes, but also from the disadvantaged families.

Deprivation, conceptualized in diverse ways, results in deficient learning, conceptualization, perceptual discrimination, and cummulative deficit in cognitive competence in children. This was found in India (Nand Das and Mishra, 1965 ; Jachnuck and Mohanty, 1974 ; Singh, 1976) ; in the United States of America (Deutsch, 1965 ; Hess and Shipman, 1965 ; Keller, 1963) ; in Isreal (Smilansky, 1968); in England (Bernstien, 1960); in Latin American countries (Lewis, 1965); and in Czechoslovakia (Matezeck and Langmeier, 1965).

The Intelligence Quotient (IQ) of the average slum child is likely to be atleast 10 to 15 points lower than similarly aged but non-disadvantaged children. Further more this IQ deficit occurs early in the preschool years (Zigler and Butterfield, 1968).

Due to socio-economic problems, cultural and psychological fixations, families from disadvantaged strata of societies from developing as well as developed countries are unable to meet fully the physical and psychological needs of children. This lacuna on the part of parents to provide a stimulating environment to children advocates strongly the need for preschools to break the "vicious cycle of deprivation". In such conditions, intervention from the government becomes imperative. Efforts in this direction were made in the United States of America (USA) when the "Project Head Start" was started in 1965. Reports from the longitudinal studies and follow-up research of the Perry Preschool Project (Breedlove, Weikart & Schweinwart, 1982) demonstrated that preschool not only prevents problems that eventually would cost society must more than the preschool programme itself, but also increases the effectiveness and efficiency of the social investment already made in schooling. The other encouraging findings were : (a) children made immediate gains in basic cognitive competence ; (b) out performed other low income children into elementary school ; (c) improved language development ;

(d) sometimes maintained superiority on achievement test scores upto later school years ; and (e) are less likely to become criminals and more likely to have higher earnings.

Turning the focus to the Indian scenario, it is evident that realizing the importance of the preschool years and with an earnest desire to fulfil the existing gaps in the lives of children, government efforts since independence (1947) have been to provide appropriate services for the care and welfare of all children. Governmental concern for promotion of services for the growth and development of preschool children is evident also from the constitution of a National Childrens' Board as also from the resolution of National Policy for Children, 1974. A number of expert bodies have been set-up from time to time : the Bhore Committee (1943) ; the Sarget Committee (1944) ; the Child Care Committee (1960) ; the Committee on Programmes for Child Welfare (1968) ; and the Study Group on the Preschool Child (1972). These Committees collected data related to the needs and problems of children, examined the effectiveness of existing programmes and services, and suggested long-term measures to improve and strengthen them qualitatively and quantitatively.

A majority of India's children live in impoverished, economic, social and environmental conditions which impede their physical and mental development. Developmental programmes aimed at reducing poverty do not necessarily reach children or improve the environment in which they live and grow.

High infant mortality rate, high levels of morbidity, high incidence of mal-nutrition and nutrition related diseases, temprorary or irreversible disabilities, low literacy rates and high ratio or school drop-outs are some of the prospects staring at the 110 million children under six years of age in

India (Ministry of Human Resource Development, ICDS, 1986). Against such a grim background, the Government of India formulated a comprehensive child survival and development scheme, drawing upon experiences culled from 20 years of planned social development and resources of the Centre, States, Voluntary Organizations and the communities themselves. For a decade the Government has been actively implementing, improving and expanding the most ambitious and comprephensive plan to increase the survival rate and enhance the health, nutrition, and learning opportunities of preschool children and their mothers. This plan - THE INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS) is not only India's gift to her own children and to her own future, but a model for many developing nations.

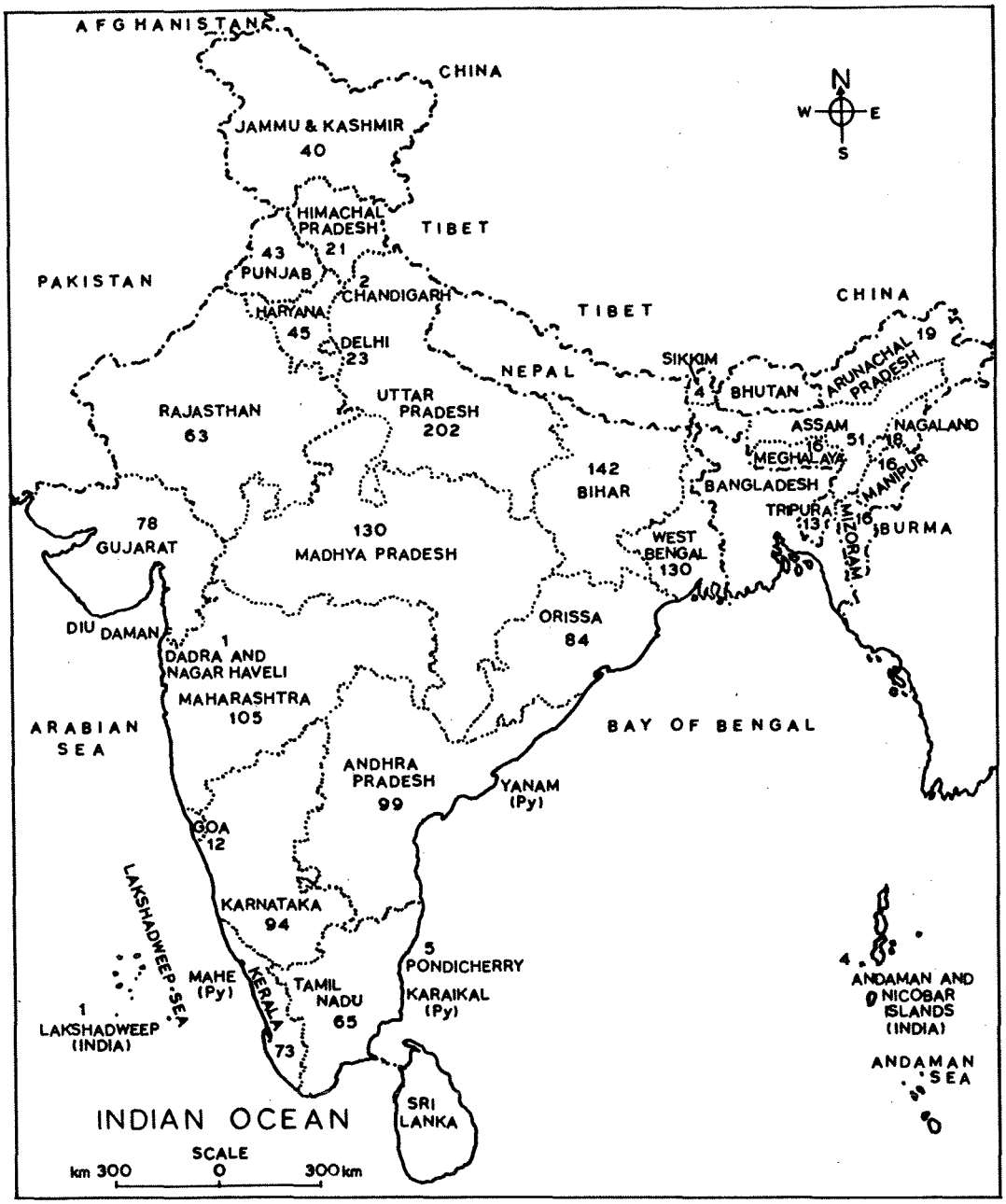
ICDS

In pursuance of the National Policy for Children, which laid emphasis on the integrated delivery of early childhood services, and services for expectant and nursing women, an inter-ministrial study team was set up by the Planning Commission. On the recommendation of this study team, the ICDS was evolved and fully launched on October 2, 1975 in 33 experimental projects. Encouraged by the reports of the various Evaluation Committees on the ICDS performance and impact, the Government of India expanded the number of ICDS projects. Today there are 1615 ICDS projects all over the country including rural, tribal and urban projects. Figure-1 shows the number of ICDS Projects in India.

The ICDS aims at :

1. improving the nutritional and health status of children in the age group of 0 - 6 years ;
2. laying the foundation for proper psychological, physical and social development of the child ;
3. reducing the incidence of mortality, morbidity, mal-nutrition and

Fig. 1. NUMBER OF ICDS PROJECTS IN INDIA (1986-87)



Source: Ministry of Human Resource Development Annual Report 1986-87, Part IV Department of Women and Child Development, Government of India. 1987. P.32.

4. achieving effective coordination of policy and implementation amongst the various departments to promote child development ; and
5. enhancing the capability of the mother, through proper nutrition and health education for looking after the normal health and nutritional needs of the child.

The ICDS is a well thought out national scheme intended to influence children and the expectant and nursing mothers at large. The scheme provides the following package of services with a view to achieve its objectives :

Beneficiaries		Services
1. Expectant and nursing mothers	-	Health check up, Immunization, Supplementary nutrition, Nutrition and Health education .
2. Other women 15 to 45 years	-	Nutrition and health education .
3. Children below one year	-	Supplementary nutrition, Immunization - treatment of minor illness, Health Check-up - supportive services like water supply, Referral services, sanitation etc.
4. Children 1 - 2 years	-	Supplementary nutrition, Immunization, Health Check-up, Referral services, Treatment of minor illness, Convergence of other supportive services like water supply, sanitation etc.
5. Children between 3 - 5 years	-	Supplementary nutrition, Immunization, Referral services, Health Check-up, Non-formal preschool education, Treatment of minor illnnesses, Convergence of other supportive services like water supply, sanitation etc.

The ICDS functions through a net work of Anganwadis (AWs). The Anganwadi Workers (AWWs) are the front liners. They are local women who are appointed on an honorary basis to provide the integrated package of services to children below 6 years, pregnant women and nursing mothers. The AWWs receive

three months basic training initially. They receive continuing education every month at the village level from the medical team and through refresher courses. Mukhiya Sevikas and Child Development Project Officers (CDPO) support and supervise the AWWs.

The medical officers, the lady health visitors and the female health workers of the primary health centre form a team with the social welfare functionaries to implement ICDS.

Integrated approach of ICDS, including the package of mutually supportive services, is more cost effective than individual services delivered separately. The integrated service scheme is shown in Figure 2.

The Anganwadi : Preschool Education

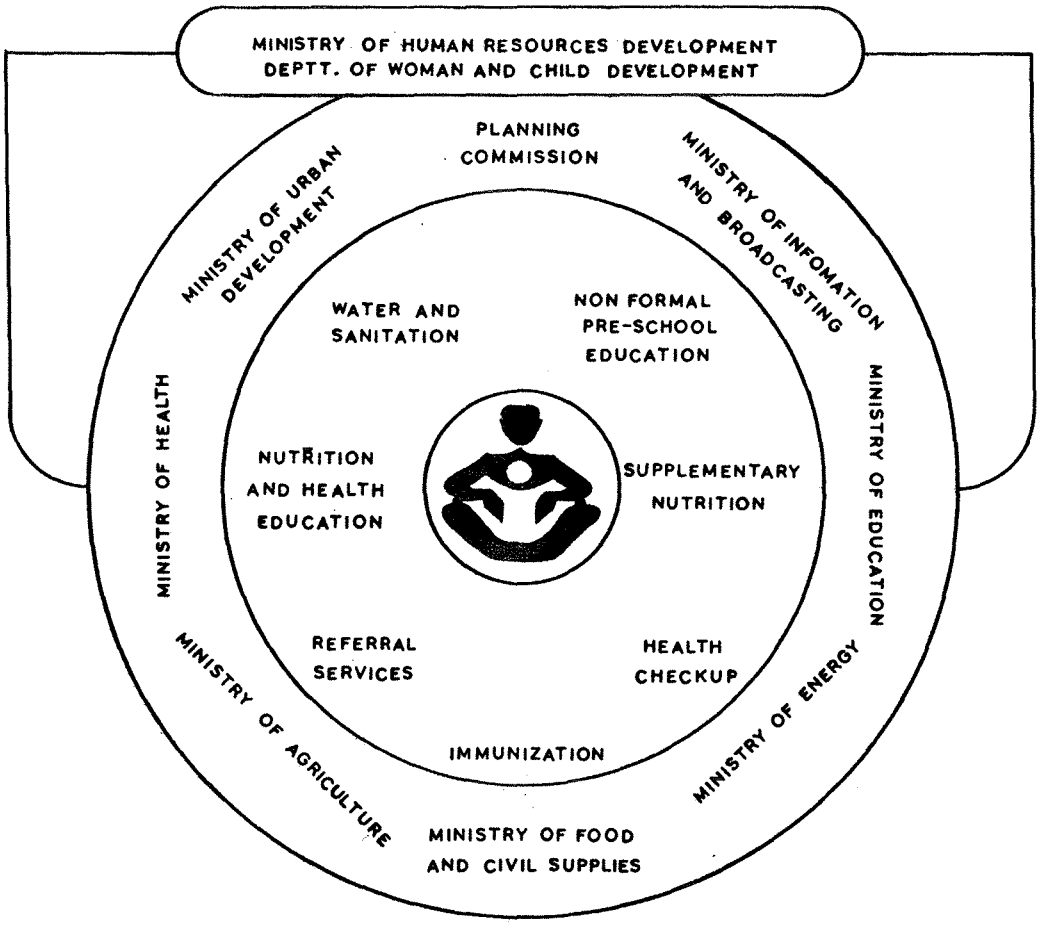
The heart of the ICDS is the AW-'literally the courtyard', located within the village itself. Each AW is run by an Anganwadi Worker and her helper, and usually covers a population of 1000 in rural and urban areas and 700 in tribal areas.

AWW is expected to monitor the growth of children, teach mothers how to prevent and cope up with common illness, educate parents to promote their children's normal growth, organize immunization and Vitamin 'A' distribution, treat minor injuries, organize supplementary feeding where necessary, and act as a referral point for getting more qualified help to children with more serious health problems. All Anganwadi Centres (AWC) also provide preschool education - early stimulation activities for children. Non-formal preschool education is a very crucial component of the package of services envisaged under ICDS scheme. Children between the ages of three and five attend the AWs.

The main objective of the non-formal preschool education programme

Fig. 2 . INTEGRATED SERVICES

APPROACH



Source: A Decade of ICDS Integrated Child Development Services, Ministry of Human Resource Development, (Department of Women's Welfare) Government of India 1986, P.22.

is the all round development of the child. The specific objectives are to

1. develop adequate muscular coordination and basic motor skills the children ;
2. develop creativity and aesthetic appreciation and elementary hygien sense ;
3. provide opportunity for interacting with other children of the sam age group ;
4. develop in the child the ability to express his thoughts and feelin in fluent, correct and clear speech ; and
5. develop the habit of attending AWC regularly.

Scope and Need for the Study

ICDS is the Government of India's largest scheme of child protecti and child development. This programme has a holistic approach to the chi and attempts to improve both pre-natal and post-natal environment. Tl ICDS covers 1428 Community Development (CD) Blocks out of 5092 Bloc in the country and 177 urban slums through 1615 projects. In Tamil Nadu (Tl there are in all 65 projects which include rural, urban and tribal, (Annu Report, Ministry of Human Resource Development, 1987). The Sixth Plan outl for ICDS was only Rs. 45 crores, whereas, for the Seventh Five Year Pl (1985 - 90) the budget outlay has been raised to 500 crores. Presently abo one-fourth of the country's children are being served by ICDS. The ICI report (1986) shows that 1,30,294 AWWs are in position with 1,12,870 traine About 1,21,162 Anganwadis were providing supplementary nutrition to 93. lakh children and pregnant and nursing mothers and 1,25,381 AWs were providi non-formal preschool education to 43.27 lakhs children. It is projected th by 1990 the scheme will double its size reaching about 40 per cent of t

deprived children (Grant, 1987). By the turn of the century, it is schedule to reach every child under the age of six in every village in India (Sadka, 1984)

A national programme of this magnitude requires regular and systemati monitoring and evaluation to assess the effectiveness of the implementatio of the programme on one hand, and the quality of services and their utilit to the beneficiaries on the other. There is need to investigate the variou components and dimensions of the ICDS with the ultimate aim of understandin the functional dynamics of the project and its outcomes so that the scop and implementation strategy can be improved.

The impact of the health and nutrition component of the ICDS is mor visible in terms of growth of children and has been studied extensively, whereа information regarding the social components of the ICDS, specially its preschoc education component is inadequate since it does not lend itself easily to measur ment (NIPCCD, 1987).

The National Conference on Research on ICDS held in 1986 pin-pointe the paucity of research studies in the area ofnon-formal preschool educatior Muralidharan (1986) has called attention to the fact that not much work hа been done in the area of preschool education in ICDS. She has stressed thа status studies such as (a) technique of preschool education used in AWs (b) facilities available in AWs - material, space etc ; (c) enrollment and atter dance in the AWs ; (d) day-to-day observational study of the daily activitie of Aw ; and (e) preschool education in the AWs and cognitive developmer of children, should be undertaken.

Although there are clear indications in several states that a high pei centage of children who attend the AW enter the primary school system, s far no authentic formal study has been conducted to determine the impac

of ICDS on cognitive development of young children (Sadka, 1984). Hen the present study "Impact of the Preschool Education Component in ICD on the Cognitive Development of Children" was undertaken.

Further an objective and comprehensive test for assessment of cogniti development of children is not available. The available tests are found have the following limitations :

a) constructed for and standardized on Western sample, hence the application on Indian children is severally limited, Wershow (197 also noted that cognitive tests are valid only for the populati which they have been standardized ;

b) did not measure the conceptual skills of children which are the bas blocks of cognition (Cohen, 1983) ; and

c) sometimes the items are not suitable.

Therefore to be relevant to both culture and time period the investigat decided to construct and standardize a suitable Cognitive Development Te (CDT) for preschool children as a part of this study and administer it on t selected sample of children from the AWs to measure their cognitive developm

Objectives of the Study

The study thus broadly attempted to assess and understand the worki of the preschool component of the ICDS programme, with specific referen to the cognitive development of children. The specific objectives of this stu were to :

A. Construct and standardize a Cognitive Development Test (CDT) for pr school children ;

B. Study the infrastructure, working environment and functioning of selecti Anganwadis in ICDS, and the extent of children's participation and involv ment in their preschool activities ;

C. 1. Study the differences in cognitive development between preschoole participating in the ICDS Anganwadi programmes, and their nor participating counterparts ;

2. Study the level of cognitive development among Anganwadi partic pating and non-participating preschool children according to the sex and age difference at 3, 4 and 5 years ;

3. Study whether or not cognitive scores of the child and age and educ tion of parents, and size, income and type of the family were i dependent ;

4. Study the correlation between cognitive scores of children and (a) bir order of the child, (b) socio-economic status of the family, (c) stimul tion provided at home, (d) child's health status, (e) child's nutrition status, (f) time given to various preschool education activities l the Anganwadi workers, (g) performance and participation of childr in Anganwadi activities, (h) Anganwadi worker's competence ; a (i) Anganwadi attendance of the child ;

5. Study the differences between (1) stimulation provided at hom (2) health status, (3) immunization status, (4) nutritional status, a (5) personal hygiene and illness status of Anganwadi participati and non-participating children at 3, 4 and 5 years of age ;

6. Study the differences between Anganwadi participating and no participating boys and girls at 3, 4 and 5 years of age, in their pe formance on sub-tests of the Cognitive Development Test - concept skills, information, comprehension, visual perception, memory a object vocabulary ; and

D. Make recommendations based on the findings of this study, to augme the preschool education component of the ICDS for optimum cogniti development of children.

It is hoped that the findings of this investigation and the test and tool developed will help the ICDS programme throughout the country for maximi zing the inputs and gains.

Limitation of the Study

Since the investigator hails from North India, this study conducted i South (Tamil Nadu) posed a serious language problem. Although services c local guides and interpreters were used in data collection, after giving necessar orientation in testing children, still it could have been more satisfying to th investigator if the language barrier was not present.

Operational Definition of the Terms

1. **Development** - The term development means a progressive series c changes that occur as a result of maturation and experience (Hurlock, 198 "Development implies qualitative and quantitative changes". This mear that it does not consist merely of improving one's ability. Instead, is a complex process of integrating many structures and functions (Va den Daele, 1976).
2. **Sex** - Sex is a factor affecting the pattern of growth. Sex difference have been observed at birth in physical development, the male beir taller and heavier than female (Ghosh, 1977).
3. **Cognitive Development** - refers to the age related series of change that occur in mental activity - thoughts, memory, perception, attentic and language (Santrock, 1984).
4. **Non-Formal Preschool Education** - relates to activities conducted a the AWs for all round development of 3 - 6 year olds. The attendanc pattern of the children, the time spent on preschool activities, the abili of the AWW to conduct the preschool programme and availability c

material and aids form important components of non-formal preschool educatior

Organization of the Thesis

The thesis has five chapters. The first chapter deals with a brief introdu ction, the problem, the scope and importance, a brief about the ICDS, th preschool education in AWs, the need for the study, the objectives, the limita tions, and the operational definitions used in the study. The second chapte is devoted to a brief critical review of literature.

The third chapter includes the methodology : Location of the study sampling techniques, criteria of sample selection, sample size and distributior data collection techniques, selection/development of tools, procedure of dat collection, administering the cognitive development test, the statistical techni ques used, measurement of variables and the statistical procedures used fc analysis of results.

The results along with discussions are presented in the fourth chapte of the thesis. The fifth chapter highlights the salient results and present a summary of the conclusions, recommendations and the scope for future re search in this area.

Review of Literature

II REVIEW OF LITERATURE

The literature relevant to this study is reviewed in the following parts :

Part I : Cognitive Development Test Construction and Standardization

A. Concept and Definition of Cognition

B. Major Historical Antecedents to Modern Cognitive Testing

C. Classification of Tests

D. Test Development and Standardization

Part II : Need for Early Stimulation through Preschool Education

Part III : The Integrated Child Development Services - India's largest Intervention and Stimulation Programme

A. Impact of ICDS on Nutritional Status of Children

B. Impact of ICDS on Health and Immunization Status of Children

C. Impact of Preschool Education on Cognitive Development of Children

1) Impact Studies

2) Intervention Studies

3) Studies on Training of Anganwadi Workers

Part IV : Factors Effecting Cognitive Development of Children

A. Birth Order of the Child

B. Sex of the Child

C. Socio-economic Status of the Family

D. Home Environment

E. Cultural Factors

F. Physical set up and Environment of the Preschool

G. Importance, Responsibility and Training of Teachers of Young Children

Part I : Cognitive Development Test Construction and Standardization

A. Concept and Definition of Cognition

In psychometrician's vocabulary, the terms, "Cognition", "Intelligence", "General Ability", "Mental Ability", "Mental Maturity", and "Learning Potential", are virtually synonymous and interchangeable (Anstasi, 1976). A number of definitions of intelligence have been given by psychologists as they are not agreed on a single definition for intelligence, mainly because of the differing emphasis which they place on the attributes which can justifiably be regarded as intelligent behaviour.

Vernon (1969) classifies the definitions of cognition into (1) biological (2) psychological and (3) operational. Briefly, the biological definitions stress adaptation to the environment and actions which are of survival value. Psychological definitions generally deal with reasoning, rational thinking and capacity for abstract thinking. Operational definitions make no assumptions about the internal mental processes but only observe the outward manifestations of what is defined as intelligent behaviour.

Intelligence has been viewed by educators as the ability to learn ; by biologists as the ability to adapt to the environment ; by psychologists as the ability to deduce relationships; and by computer scientists as the ability to process information (Wechsler, 1975). Binet and Simon (1916) regarded intelligence as a collection of faculties, judgement, practical sense, initiative and the ability to adapt oneself to circumstances.

Stoddard (1943) stated that intelligence was the ability to undertake activities that are characterized by (1), difficulty, (2) complexity, (3) abstractness, (4) economy, (5) adaptiveness to a goal, (6) social value and (7) the emergence of originals, and to maintain such activities under conditions

that demand a concentration of energy and a resistance to emotional forces.

Thurstone (1946) viewed intelligence as a number of primary mental abilities and independent factors which different people possess in different degrees. The primary mental abilities are : verbal perception, numerical, word fluency, memory, spatial relations and reasoning. These activities are nearly or completely separate and distinct functions of the mind.

According to Burt (1955) intelligence is "innate, general cognitive ability". Wechsler (1958) put forth that intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment. Dworetzky (1984) is the view that intelligence is a general term for a person's abilities in a wide range of tasks including vocabulary, numbers, problem-solving, and concepts. It may also include the ability to profit from experience, to learn new information and to adjust to new situations.

Santrock (1984) explains that cognitive development refers to the age related series of changes that occur in mental activity - thoughts, memory, perception, attention and language. Good (1959) cognition is the faculty of knowing. From a development point of view, cognition describes the growth of concept in the child and the process by which the concepts are acquired and put to use (Reese and Lipsitt, 1973).

Cognition includes the individual's thoughts, interpretations understandings and ideas about himself and his environment (Maiseh, 1972 ; Eson, 1972 ; Hilgard, 1975; Meconnell, 1977).

The Concise Oxford Dictionary (1985) states that the word cognition means faculty of knowing, perceiving and conceiving. Craig (1979) viewed cognition as the process by which one comes to perceive, know or understand

something. Viewed thus, learning of a new word, solving an equation, an memorizing the conjugation of a verb are all cognitive activities. He furthe added that cognition is composed of many different kinds of processes-percep ion, memory, problem-solving, and the relationship of one piece of infor mation to another.

Schiamberg and Smith (1981) opine that the quantitative and qualitativ changes throughout the life span in thinking, organising perceptions and probler solving can be defined as cognitive development.

B. Major Historical Antecedents to Modern Cognitive Testing

Cognitive testing has emerged as the fulfilment of a need in the society Intelligence testing has its roots in the field of general psychology and measure ment. It was by administering intelligence tests that large number of aspirin psychologists were first able to make a living. Intelligence testing has some times been called "the bread and butter of psychology" (Aiken, 1982).

No one knows when man became interested in human intelligence an its measurement, but Itard's study of the "Wild boy of Aveyron" in 179 may have been the first scientific investigation in this area. At any rat Itard's intriguing experiment stimulated psychologists to explore the problem of mental measurement. Thus it has became a starting point in the histor of intelligence testing (Robb et al., 1972).

Before the invention of precise, automatic equipment for measurin and recording, the accuracy of measurement depended to a large exten on the perceptual abilities of human observers. These observers though highl trained and careful, were still liable to make conflicting judgements on th same occasion due to human factors. Therefore psychologists directed the attention to the construction of instruments that would be more consister and precise than unaided human observations (Aiken, 1982).

The psycho-physical methods developed by Webner (1795 - 1878) and Fechner (1801 - 1887), the study of differences by Muller (1850 - 1934) and the statistical studies of higher mental processes initiated by Galton (1822 - 1911) formed the background for much of the work that took place in the 20th century. Galton became interested in the hereditary basis of intelligence and in techniques for measuring mental abilities. His particular concern was the inheritance of genius.

During the latter half of the 19th century Fechner, Wundt and other experimental pyschologists demonstrated that psychological phenomena could be expressed in quantitative, rational terms. What was occurring in France, Germany and the United States in the field at the time was also important to psychological testing.

In America, the mental testing movement grew out of individual differences. Cattell (1860 - 1944) used the term "mental test" for the first time in 1890, in the psychological literature, in one of his articles. Cattell contributed to the development of statistical prcedures that were necessary for the evaluation and application of tests (Anastasi, 1970 and Robb et al., 1972).

In Germany, Kraepelin (1889) introduced more complex tests such as, tests of perception, memory, motor functions and attention, for measuring mental functions.

The work of Haus (1987) which dealt with tests of memory, computation and sentence completion was also related to the early development of mental tests. The opening of world's first psychological laboratory by Wundt in Leipzig, Germany in 1879, made the growth of experimental psychology very rapid. Experimental psychology gave birth to clinical psychology and impetus to its growth in Germany.

In France Binet (1857 - 1911). Henry (1872 - 1940), and Simon (1873 - 1961) were developing methods for the study of a variety of mental functions. Their work culminated in the 1905 Binet-Simon Scale, which might be consi dered the first modern Intelligence test. It served the purpose of objectivel diagnosing degrees of mental retardation and became the prototype of subse quent scales for assessment of mental ability. With the introduction of th Binet-Simon Scales, the testing movement began to flourish in the Unite States.

Terman standardized the Binet-Simon Scale in 1916. Subsequently Merri revised them in 1937 and 1960. (Terman and Merrill, 1960) Yerkes (1976 1956) and his colleagues published a point scale in 1915, because they foun fault with the age scale format of the Binet-Simon scales. In 1939, Wechsle introduced the Wechsler-Bellevue Intelligence Scale, Form I (the fore-runne to Form II of the Wechsler - Bellevue Intelligence Scale and the WISC-F WPPSI, and WAIS-R). Wechsler studied the standardized tests that were avai able during the later part of 1930s and selected 11 different sub-tests to for the scale. Many other specialized tests were also developed to evaluate specifi facts of cognitive ability. Testing in schools, clinics, industry and the militar became a common practice and influenced public affairs, business and scient fic psychology.

The selected events in the history of psychological and educationa measurements as identified by Aiken (1982) are given below :

2200 B. C. Mandarians set up civil service testing programme in China.

1219 A. D. First formal oral examinations in law were held in the Universit of Bologna.

1575 Haurte published the book, "Examen de Ingenios" concerned wit individual differences in mental abilities.

1636 Oral examination for degree certification was used at Oxfor University.

1869 Scientific study of individual differences began with publicatio of Galton's "Classification of Men According to their Natural Gifts"

1879 Founding of first psychological laboratory in the world by Wund at Leipzig, Germany.

1884 Galton opened Anthropometry Laboratory in London for Internationa Health Exhibition.

1887 Fechner formulated the first psychological law.

1888 Catell opened testing laboratory at the University of Pennsylvania U. S. A.

1897 Rice published research findings on spelling abilities of U. S. schoo children.

1904 Spearman described his two factor theory of mental abilities.

1905 The first Binet-Simon Intelligence Scale was published.

1808 Revised edition of Binet-Simon Intelligence Scale was publishe

1908-14 Thorndike developed standardized tests of language, spelling, arithmeti

1916 Stanford-Binet Intelligence Scale was published by Terman.

1917 Army Alpha and Army Beta, first group intelligence tests were cons tructed and administered to U. S. Army recruits.

1919 Thurstone's Psychological Examination for College Freshmen wa published.

1921 'Psychological Corporation', the first major test publishing compar was founded by Cattell, Thorndike and Woodworth.

1923 First achievement test battery, 'Stanford Achievement Tests wa published.

1937 Revised edition of Stanford-Binet Intelligence Scale was publishe

1939 Wechsler-Bellevue Intelligence Scale was published.

1949 Wechsler Intelligence Scale for Children was published.

1960 Form L-M of Stanford Intelligence Scale was published.

1974 Wechsler Intelligence Scale for Children was revised.

1980 Wechsler Adult Intelligence Scale was revised and published.

Historical Perspective of Intelligence Testing in India.

Much is not known about the earlier work done in India in the fie of intelligence testing because of inadequate records. Attempts have, howeve

been made to review the work done in India.

Barnettee (1955) reviewed the work done in India upto 1953. After thi Harper (1960) and Mitra (1961) attempted the systematic documentation o the psychometric work done in India. Manzel (1956) was the first to writ a book on tests and measurements in India. Later Long and Mehta (1966 published the first mental measurement hand book for India. The menta tests available upto that period and a few more recent ones have been liste below though their accurate year of publication is not available.

Intelligence Tests Developed in India - A Historical Perspective

Author	Test	Type of test/ age group
Shah, B. L.	A Survey of Intelligence of the Children of University Experimental High School, Baroda	Verbal, Individual 5 to 17 years
Sethna, Jerbanu.	Standardization of a Test for Preschool Children	Verbal, Individual 3 to 5 years
Shukla, N. N.	Intelligence Test for Gujarati Children	Verbal, Individual 3 to 16 years
Rice, H. C.	Hindustani Binet-Performance Point Scale	Performance 5 to 16 years
Kamat, V. V.	Hindi Hudugara Buddhimapanavu (Both in Kannada and Marathi Version)	Verbal, Individual 3 years to adults
Central Institute of Education.	C. I. E. Verbal Group Test of Intelligence T2	Verbal, Group 11 plus to 12 plus
Desai, K. G.	Desai Group Test of Intelligence	Verbal, Group 11 to 15 years
Khuddus, A.	Verbal Group Test of Intelligence	Verbal, Group 11 to 15 years
Manovigyan Shala, U.P. Allahabad.	Verbal Group Test of General knowledge and General Intelligence (1958, 1959 and 1960)	Verbal, Group Adults
Manovigyan Shala, U.P. Allahabad.	Verbal Group Test of Intelligence for 10+, 12+, 13+, 15+ and 16+ years	Verbal, Group

Author	Test	Type of test/ age group
Psychological Research Wing, Ministry of Defence, New Delhi ,	P. R. W. Test 2, 4, 1, 8, 20, 27.	Group, Adults
Das, R. C. & Das, G. N.	Orissa Group Test of Intelligence	Group, 12 years to Adul
Dave, N. P.	Vocabulary Test	Verbal, Group 8 to 15 years
Leelamma.	Verbal Group Test of Intelligence	Verbal, Group 15 years
Patel, B. C.	Adaptation of Goddard's Form Board Test for Measuring Intelligence of Gujarati Children	Performance, Individual 6 to 10 years
Bhatia, C. M.	Battery of Performance Test of Intelligence	Performance, Individual 11 to 16 years
Patel, P. D.	Adaptation of Good enough's Man - Drawing Test	Non-Verbal, Group 4 to 11 years
Phatak, P.	Draw-a-Man Scale for Indian Children	Non-verbal, Gro and Individual 6 to 10 years
Shrimali, P.L.	Good enough "Draw-a-Man Test	Performance, Group 6 to 15 years
Manovigyan Shala, (U.P)	Hindi Adaptation of Stanford-Binet Test of Intelligence , Scale 'L'	Verbal, Non-verl and Individual 2 years to super Adults
Singh, R. N.	Battery of Tests to Measure Verbal Abstract and Numerical Reasoning Abilities	Verbal, Individua Abstract 13 to 20 years
Mehrotra, P. N.	Group Test of Intelligence for Children	Verbal, Group, Non-verbal 11 to 17 years
Kulshreshtha, S. K.	Stanford-Binet Intelligence Scale Form L-M 1960. Hindi Adaptation	Verbal, Individua Performance 2 years to Adulthood

Cognitive Tests for Infants and Preschool Children - A Historical Perspective

Author	Name of the Test	Year	Age suitable	Type of work
1.	2.	3.	4.	5.
Binet, A. and Simon, T.	Binet-Simon Scale	1905	2 years to Adulthood	Verbal, Individual and Non-verbal
Pinter, R. and Peterson, D.	Pinter Peterson Performance Scale	1917	4 - 16 years	Performance, Individual
Porteus, S. D.	Proteus-Maze Test	1919	3 years to Adult	Performance, Individual
Goodenough, F. L.	Measurement of Intelligence by drawing	1926	3 1/2 years to 13 1/2 years	Group, Performance
Koh	Koh's Block Design Test	1927	3 to 6 years	Performance, Individual
Stutsman, R.	Merrill Palmer Scale of Mental Tests	1931	1 to 6 years 5-11 years	Verbal, Individual, Non-verbal
Macfarlane	California Preschool Scale	1938	15-84 months	Verbal, Individual, Non-verbal
Baley,, N.	Infant Intelligence Scale	-	0-2 1/2 years	Verbal, Individual, Performance
Gesell, A.	Developmental Schedule	1940	15-17 months	Verbal, Individual, Non-verbal
Leiter, R. G.	Leiter International Performance Scale	1948	2-18 years	Performance, Individual
Griffith, R.	Griffith's Mental Development Scale	1954	2 weeks to 2 years	Performance, Individual
Science Research Association (SRA)	SRA tests of General Ability	1959	Kindergarten to 12th grade	Verbal, Group, Performance

1.	2.	3.	4.	5.
Central Institute of Education.	CIE Individual Scale of Intelligence (Hindi)	1960	3 to 11 years	Individual
Kamat, V. V.	Hindi Mutanchen Buddhimapan	1960	3 to Adulthood	Individual
Ramaseshan	Preschool Test for Children	1960	2 1/2 to 6 years	Individual
Terman, L. M. and Merrill, M. A.	Stanford-Binet Intelligence Scale	1960	2 years to Adulthood	Verbal, Performance
Harris, D. B.	Good enough - Harris Drawing Test (Draw - A-Man	1963	3 to 15 years	Performance
	California Test on Mental Maturity (CTMM)	1963 revision	Kindergarten to 16 grade	-
	Cognitive Abilities Test (CAT)	-	Kindergarten to 12th grade	-
Wechsler, D.	Wechsler Preschool and Primary Scale of Intelligence (WPPSI)	1967	4 to 6 years	Verbal, Performance Scale
Boehm	Boehm Test of Basic concepts	1971	Kindergarten to 2nd grade	Non-verbal
Burgemeister Blum and Lorage	Columbia Mental Maturity Scale	1972	3-6 and 9-11 years	Non-verbal
Henmon, V. A. C. Nelson, M. J.	Henmon Nelson Tests of Mental Ability	1973	Kindergarten to 12th grade	-

C. Classification of Tests Cognitive Test Formats

Aiken (1982); Brown (1970) ; Robb et al.,(1972)have classified cognitive tests as follows :

1) Individual versus Group Test
2) Objective versus Non-objective Test
3) Verbal versus Performance Test
4) Speed versus Power Test
5) Age versus Point Scale
6) Language versus Non-language
7) Structured versus Projective

1) Individual versus Group Tests :

Individual test is administered to one examinee at a time, whereas a group test is administered to many examinees simultaneously (Aiken, 1982).

The first intelligence test,the Binet Simon Scale (1905) was administered individually. This was necessary because the subjects were young children. Individual intelligence tests are preferred by psychologists in clinics, hospitals and other settings where clinical diagnoses are made, and where they serve not only as measures of general mental ability but also as a means of gaining insight into personality functioning.

An advantage is that the examiner can pay more attention to the examinee, and consequently, encourage and observe him or her more closely during the test. The child who appears dull in the class room may be only hard of hearing or has poor eye sight. These factors would probably, not be found in group testing situation, but an experienced clinician can often use the individual testing situation to diagnose why an individual is performing poorly (Nunnally, 1959).

Individual tests provide margin for a short break if subject seems fatigued or bored (Robb et al., 1972).

Two disadvantages of individual tests are that they are time consumin and require a highly trained examiner.

Group tests differ from individual tests in the directions given, iten selection, the test format, and scoring procedure. These are uniform for objec tivity of test. Group tests are time bound i.e. all the subjects must start a one time and finish at the same time. One's intelligence is measured in term of amount of work successfully completed within the given time (Boaz, 1971)

Group intelligence tests are composed of several types of items : vocabu lary, general information, arithmatic and reasoning. Group administration permit more efficient testing of large number of persons and, because of the les complex procedure, a group test generally does not require a highly traine professional administrator. Group test format usually requires that the tes be administered with a time limit but direct observation of test taking behaviou is not feasible, and certain persons, for example young children and illiterate cannot be tested. Group tests are usually paper and pencil tests with item cast in the multiple choice format (Brown, 1970). Group tests characteristicall group items of similar contents into separately timed sub-tests. Within eac sub-test, items are usually arranged in increasing order of difficulty. Thi arrangement ensures that each subject, has an opportunity to try each typ of item (such as vocabulary, arithmetic, spatial etc.) and to complete th easier items of each type before trying the more difficult ones on which h might otherwise waste a good deal of time (Anastasi, 1976). Group intelligenc tests are used for initial screening in schools, industry and business, to b followed by individual testing in cases where the examinee scores low and/c more information on the person's particular strength and weakness is needec

The youngest age at which it has been proved feasible to employ grou test is the kindergarten and first grade level. At the preschool age individu

testing is required in order to establish and maintain rapport, as well as to administer the oral and performance type of items suitable for children of that age . By the age of 5 or 6 years however, it is possible to administer printed tests to small groups of no more than 10-15 children and the examiner must give considerable individual attention to the children to ensure that directions are followed, and pages are turned properly in the test booklets. All instructions are given orally and are usually accompanied by demonstrations. Most of the tests require only marking the correct picture or drawing lines than join two dots. Tests for this age level require no reading or writing (Anastasi, 1976).

A distinct advantage of group testing over individual testing is that in the group situation many persons can be tested in a relatively short period of time (Robb et al., 1972) yet its limitations cannot be overlooked. In group testing, the examiner has less opportunity to establish rapport, obtain cooperation and consider the physical and emotional condition of the subject. This may lead to poor performance. For all these reasons, when important decisions about individuals are to be made, it is desirable to supplement group tests either with the individual examination of doubtful cases, or with additional information from other sources.

2) Objective versus Non-objective Test :

An objective test has fixed objective scoring standards and a clerk can score it. On the other hand, the scoring of a non objective test like an essay test is often quite subjective and two scorers may obtain different results (Aiken, 1982).

3) Verbal versus Performance Tests :

Test may also be classified according to content or the task that they

pose for an examinee. Tests are referred to as "Verbal" tests if they emphasize verbal comprehensive and symbolic responses. For example vocabulary and sentences.

Non-verbal test includes non-verbal material. For example diagram and puzzles. A test may also require that the examinee manipulates objects for example putting pegs into holes. This kind of test is called performance test (Aiken, 1982).

A Performance Scale is one in which language is used only in the instructions, or not at all when directions are given in pantomine. The task to be performed requires an overt motor response other than verbal. The principle characteristics of the performance test is that a response to, or a solution of, the task does not require the use of language or numeral. For this reason, the term, "Performance Scale" is synonymous with "Non-verbal test" (Freeman, 1976).

Performance Tests are especially helpful in studying persons whose behaviour or emotional responses are unstable, the mentally retarded, adults with limited education, children suspected of inefficiency in learning, persons with poor hearing and those whose command of the tester's language is limited. Such tasks make minimal demands on verbal facility. They permit significant observation of the process of performance and they appeal to examinees who resist school like tasks (Cronbach, 1984). Used in conjunction with the verbal type, performance tests are helpful in identifying, with increasing certainity, the mentally deficient and the mentally retarded (Freeman, 1976).

4) Speed versus Power Test :

Speed versus power pertains to the time limits of a test. A pure speed test consists of many easy items, but the time limits are very stringent and almost no one finishes within time alloted. In contrast, time limits on

a power test are generous, but the test contains many difficult items (Aiken, 1982; Anastasi, 1976; Brown, 1970).

5) Age versus Point Scale :

Binet when developing the first individual intelligence test conceive the idea of measuring mental growth by comparing a child's performance with that of the average child of various age levels (Brown, 1970).

The fundamental assumption of age scale is that the ability, skill or characteristic being tested increases systematically with age, and the two essential elements are : (a) a series of tasks or items that discriminate between persons of different ages and (b) a norm group composed of a representative sample of persons of different ages which provide the basis for assigning an item to a particular age.

For skills that vary systematically with age, the age scores are straigh forward and easy to interpret ; if the characteristic does not vary systema tically, age scales are inappropriate (Brown, 1970).

In contrast to the age scale approach of Binet, the Wechsler's Scale are point scales, where in points are assigned on the basis of correctness

According to Boaz (1971), in the point scale method, the entire tes is given to each subject to be examined irrespective of his age. Each subjec has to work upto his maximum grade. Within the test there are various group of items and the items within each group are themselves graded.

6) Language versus Non-language :

Non-language tests make no use of language or involve only minima use in the directions. Non-language tests are used with persons with languag deficits, such as young children, the mentally retarded, and persons whos native language is not that of the tester (Brown, 1970).

7) Structured versus Projective :

In a structured test the stimuli and subject's tasks are clearly specified ; in a projective test, the stimuli and task are somewhat ambiguous (Brown, 1970).

D. Test Development and Standardization

Brown (1970) defined a test as a systematic procedure for measuring a sample of an individual's behaviour. A test is a systematic procedure for observing behaviour and describing it with the aid of numerical scales or fixed categories (Cronbach, 1984).

The phrase 'systematic procedure' indicates that a test has been constructed and administered and scored according to certain prescribed rules. A test is systematic in three areas : its contents, procedure for administration, and scoring. Not only is the item content systematically chosen from the domain to be measured, but also the same items or tasks are administered to all persons taking the test. The administration procedure is standardized in that specific instruction are developed with respect to what directions will be given to the persons taking the test, how answers are to be recorded, time limits and other relevant procedural matters. Scoring is objective in that there are predetermined rules for recording and evaluating the responses. The minimum essential for objective scoring is agreement between competent scorers in order to minimise the influence of irrelevant personal and environmental variables on test scores (Brown, 1970 ; Freeman, 1976 and Anastasi, 1976).

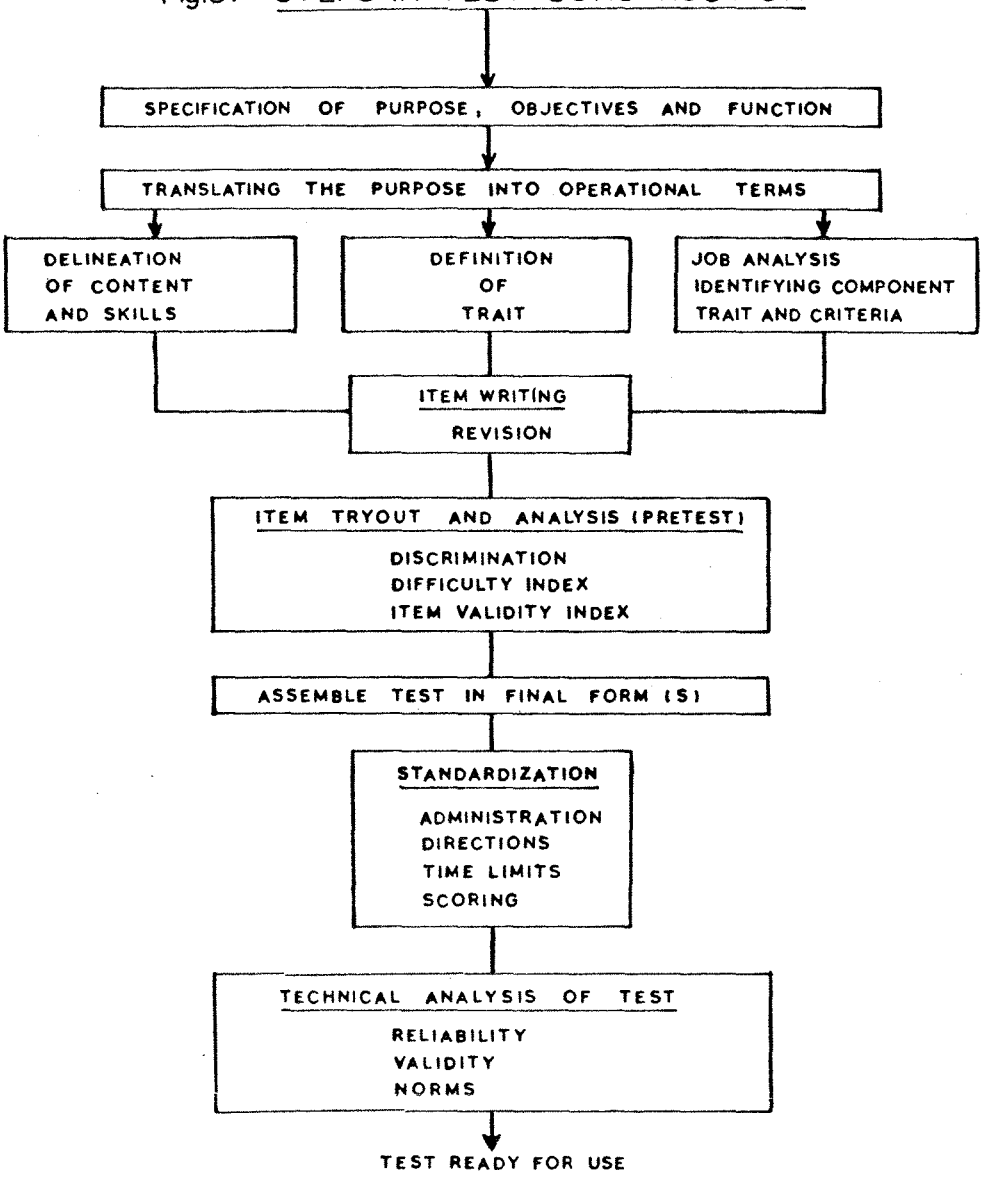
Steps in Test Construction

Although the test construction procedure varies depending upon the type and purpose of the test. The general steps identified by Brown (1970); Borg and Gall (1983) are given in Fig. No. 3.

The Test Purpose

As a first step the test constructor must decide what are the purposes

Fig.3. STEPS IN TEST CONSTRUCTION



and intended uses of the test ? What are the composition and characteristics of the group to which the test will be applied ? The test constructor must take into account at the outset such variables as the subject's age, intellectual level, education, socio-economic and cultural background, rural or urban sample and reading level. These will set constraints on the test construction process and give indications of how to proceed (Brown, 1970; Freeman, 1976; Anastasi, 1976 and Borg and Gall, 1983).

Translating the purpose into Operational Terms

In order to proceed with the building of the test, the test constructor must translate the purpose into operational terms. This process covers two major areas (a) content and (b) format. As with other aspects of test construction, this step will vary depending on the type of the test. This includes decision regarding the number and kind of sub-tests and the nature of the individual items of the test and the format of the test. In order to construct an effective test, a multiple format should be used (Brown, 1970).

With regards to content, Freeman (1976) states that any given test measures a limited aspect of the person being measured. It is essential, therefore, that the test builder defines the aspects he proposes to measure. This test plan, is to prepare an outline that will serve as a guide for constructing items to measure or predict certain objectives (Aiken, 1982; Freeman, 1976).

Two kinds of sampling are actually involved in constructing a psychological test. First, the most relevant constituents of the gross variable (the broad, comprehensive trait or function) must be selected, where for example, the gross variable is cognition, the constituent parts in the test might be vocabulary, verbal comprehension, reasoning, memory, perceptual organisation, and so forth. Second, the operational levels (that is, the actual items) must be selected : which perceptual organization and at what levels, what kinds

and which levels of words, what types and ranges of situations ? (Freeman, 1976; Borg and Gall, 1983).

Item Writing

After the outline the next step is to construct the test items themselves. It is recommended that about 20 per cent more items than needed be written so that an adequate number of good items will be available for the final version of the test (Aiken, 1982). Hence the test is usually somewhat longer than the final product since many items are discarded after try out (Borg and Gall, 1983).

It is advised to get the test items reviewed by three or more experts in test construction (Borg and Gall, 1983). The process of obtaining the final form of an item is one of writing, try out, (relatively small groups) revision, try out, revision-alternating until a satisfactory product is developed. These exploratory stages of test construction will show that some items are of little or no value for the purpose of the test, while others will be eliminated from the final verison because they are superfluous, even though in themselves they might be relevant to the purpose. This editing also eliminates duplicate and unusable items. (Brown, 1970; Freeman, 1976).

Item Tryout and Item Analysis

Item Try Out :

The items that survive the initial screening are then combined into one or more forms of pretest. The pretests are then administered to samples of subjects who are similar to the total population for which the final test is intended. The goal of pretesting is to obtain information on the subjects reaction to the items. This evidence will be both qualitative - comments on techniques used in solving the items, ambiguities present in the items etc., and quantitative - evidence of the difficulty and discrimination power

of the items (Brown, 1970). Pretesting helps also to clearify instructions, to judge the clarity of item-phrasing, to learn whether or not each item evokes the kind of response expected and to decide on time limit (Freeman, 1976).

It is desirable to have a sample of 100 or more subjects in order to obtain adequate and representative data for item analysis. However, wher small or difficult to reach population are involved, the researcher will have to settle for smaller sample (Borg and Gall, 1983).

Item Analysis

Psychological tests are made up of a number of items. The score or each item is added to the scores of the other items to obtain a subtest score or a total score, either or both of which are used in calculating reliability and validity. The quality and merits of a test depend upon the individual items of which it is composed (Freeman, 1976). According to Garrett (1983), the adequacy of a test depends upon the care with which the items have been chosen. It is therefore necessary to analyse each item in the standardizing process, in order to retain only those which suit the purpose and rational of the device being constructed. Item analysis thus forms an integral part of both reliability and validity of the test (Freeman, 1976).

Item analysis can be treated under the following heads (Brown, 1970 Anastasi, 1976; Freeman, 1976; Garrett, 1983; Aiken, 1982.; Borg and Gall 1983).

1. Item Selection,
2. Item Difficulty (Item easiness) and Discrimination Indexes, and
3. Item Validity Index.

1. Item Selection

The choice of the items depends, in the first instance, upon the judgemen of competent persons as to its suitability for the purpose of the test. Th

validation of the content through competent judgement is most satisfactory when the sampling of items is wide and judicious and when adequate standardization groups are utilized (Garrett, 1983).

2. Item Difficulty (Item easiness) and Discrimination Indexes

The difficulty of an item may be determined in several ways : (a) by the judgement of competent people who rank the items in order of difficult (b) by how quickly the items can be solved, and (c) by the number of examinees in the group who get the item right. The proportion of the group which can solve an item correctly is the "standard" method for determining difficulty in objective examination (Garrett, 1983).

Aiken (1982) states: a short cut procedure is to divide the examinees into three groups according to their score on the test as a whole - an upper group consisting of the 27 per cent who make the highest score and a lower group of the 27 per cent who make the lowest score and a middle group of the remaining 46 per cent. Using the scores of the upper and lower groups, the following statistical indices are computed :

Item Easiness Index

$$P = \frac{U_P + L_P}{U + L}$$

where P = Item Easiness Index

U_P and L_P are the numbers of examinees in the upper and lower groups respectively, who pass the item, whereas 'U' and 'L' are the total numbers ir the upper and lower groups. The valve of 'P' is referred to as Item Easiness Index (or Item Difficulty Index).

Item Discrimination Index

$$D = \frac{U_P - L_P}{U}$$

Where D = Item Discrimination Index

For example, If 50 examinees attempt the test, 14 will be in top group, 14 in the lower group. If 12 examinees in the 'U' group and 7 in the 'L' group pass the item A, of the test then $P = \frac{(12 + 7)}{28} = .68$ and $D = \frac{(12 - 7)}{14} = .36$

The item easiness index has a range of .00 to 1.00. An item whose P is .00 is one, that no examinee answers correctly, and an item with P = 1.00 is one, that all examinees answer correctly. If 90% of standard group pass an item it is easy, if only 10 per cent pass, the item is difficult. Other things being equal, items of moderate difficulty (40 - 50 - 60 per cent) passing are to be preferred to those which are much easier or much harder. That is, an intermediate mean value of P is viewed as optimum. (Garrett, 1983; Aiken, 1982).

The Item Discrimination Index

The Item Discrimination Index (D) is a measure of the effectiveness of the item in discriminating between the high and low scorers on the test as a whole. The higher the value of 'D', the more effective is the item. An item is usually considered acceptable if the 'D' index is .30 or higher. Selecting items with high 'D' values for the final test produce an internally consistent test in which the correlation among items are highly positive (Aiken, 1982).

Item Inter-correlation and Range of Difficulty

There is a general agreement among the test makers, that : (a) for the sharpest discrimination among examinees, items should be around 50% in difficulty; that (b) when a certain proportion of the group (the upper 25 per cent is to be separated from the remainder (the lower 75 per cent), but comparison within each group are of no special interest, the difficulty indices should be close to 25 per cent, that is, the cut off point. Finally, (c) when item correlations are high and the talent range wide (over several grades), difficulty indices may range from high to low. The normal curve can be taken as a

guide in the selection of difficulty indices. Thus 50 per cent of the items might have difficulty indices between .25 and .75 ; 25 per cent indices larger than .75, and 25 per cent smaller than .25. An item passed by 0 per cent or 100 per cent has no differentiating value, but such items may be included in a test solely for the psychological effect (Garrett, 1983).

Item Validity

According to Brown (1970) the most crucial index is the validity of the item - the extent to which the test item measures what it is designed to measure. If an external criterion is available such as grades on a final course examination, then against that the item response could be compared. That is, it could be determined empirically whether the people who correctly answered the items were the same ones who obtained high scores on the criterion measure. If they were, the item would be considered valid. If not, the item would not be measuring what is desired and would need revision.

According to Garrett (1983) item validity can be found by the Validity Index and cross validation.

a) The Validity Index of an item is determined by the extent to which the given item discriminates among examinees who differ sharply in the function measured by the test as a whole. Biserial Correlation is regarded as the standard procedure in item analysis. Biserial 'r' gives the correlation of an item with total score on the test, or with scores in some independent criterion.

One method of determining validity indices, much favoured by test makers, sets up extreme groups in computing the validity of an item. First, the number who answer the item correctly is selected and upper and lower sub-groups are formed. Next, the discriminative power of the item - its consistency with total score on the test - is gauged by the correlation (r_{bis}) of the item and the whole test.

b) Cross Validation of a complete test should always be computed on a new sample, that is, one different from that used in the item analysis. This process is called "Cross Validation" Garrett, 1983).

Assembling the Test

Using the results of the pre-test analysis, those test items which provide the best coverage of contents and skills, which provide the best discrimination and appropriate difficulty, and do not have any practical limitation, such as requiring inordinate amount of time for completion are selected for the final test form.

Arrangement of Items

The examinees' task would be facilitated if all items of the same type and items dealing with the same topic were grouped together (Aiken, 1982) Furthermore, it is reasonable to suppose that test scores would be higher if sub-tests of the items were arranged in order, from the easiest to the most difficult. Being successful on easier items, which come first, would presumably encourage the examinees to try harder on the subsequent more difficult items. However, Gerow (1980) views that although arranging items in group according to type may make the test preparation, administration, and scoring easier, there is no evidence that it improves the test scores. Likewise, grouping items according to topics or arranging them in order of difficulty does not usually have a significant effect on test scores. Consequently, test designers would do well to be less concerned about the arrangement of items and more concerned that items are written well and measure what they are supposed to measure.

After this exercise the tentative final form of the test is assembled and the items are once more reviewed. Changes at this point are likely to be minor but do occur. When all changes have been made, the test is printed

in booklet form, and for the first time in the construction process the test exists as a separate, distinct entity. Furthermore, whether the test will be excellent or mediocre will depend on the quality of its standardization and the provision of technical information regarding the meaning of the test scores (Brown, 1970).

Standardization

Accurate estimation in psychological testing, as in other scientific procedures, depends on the control of errors. This control is established by developing procedures designed to make the test taking situation the same, or as similar as possible, for all individuals. Thus, according to Anastasi (1976); Brown (1970); Aiken (1982) and Cronbach (1984) standardization means - standard content, standard procedure for administration, and scoring, so that precisely the same test can be given at different times and places, to similar groups.

The purpose of standardizing a test is to give it objectivity, to devise an instrument that will be free from subjective judgements regarding the ability, skills, and knowledge to be measured and evaluated (Freeman, 1976).

Content : The first essential element is the provision of a common set of items (stimuli) to which all test takers will respond. Unless all persons are exposed to the same items, their performance cannot be compared (Brown, 1970)

Administration : In order to secure uniformity in testing conditions, the test constructor provides detailed direction for administering each newly developed test (Anastasi, 1976 ; Brown, 1970) :

a) Directions : Two sets of directions are usually necessary - one for the test taker and one for the administrator. The purpose of the direction to the administrator is to explain the process of presenting the test material

to the subject, the ways of handling the querries from the subjects ; the ra of speaking, tone of voice, pause and facial expressions. These directio will also include details such as the arrangement of the testing room, seatir timing, method of recording answers and the way the test is to be scor (Aiken, 1982). These directions should also include detailed instruction how to handle emergencies, and questions arising during the testing sessi (Brown, 1970). Direction to the test takers should cover the purpose of t test, how to make the responses, time limit if any, and other special procedure

b) Time Limit : One salient aspect of the directions is time limit. T determination of time limit should be based on the purpose and content the test. Most measures of typical performance (Brown, 1970) are administer without a time limit, thus allowing the test taker to proceed at his own pac Power tests, where the individual is given unlimited time to respond to series of items which have no time limits (Anastasi, 1976; Brown, 1970 Freeman, 1976).

c) Scoring : The third element in standardization is the provision of directio and procedures for objective scoring. Objectivity in scoring means agreeme between two or more competent scorers. The first essential is immedia and unambiguous recording of responses. The second requirement is a l of standard or correct responses - called the scoring key. In a multiple choice examination, this key would be the number or letter of the corre response to each item. In a short - answer (Completion) item it would a list of the correct responses and acceptable variations. In an essay exa it would be an outline of the points to be covered (Brown, 1970).

d) Answer Sheets : Separate answer sheets which are easier to score c be used if the investigator is scoring herself for the preschool children. T test designer gives directions to check,blacken or circle the correct item sc These are counted later for getting the raw score (Aiken, 1982).

Technical Analysis of Test

The three essential characteristics of a sound test are reliability, validity and norms.

1. Reliability

Reliability refers to the consistency of scores obtained by the same persons when re-examined with the same test on different occasions, or with different sets of equivalent items, or under other variable examining conditions (Anastasi, 1976).

According to Garrett (1983) "A test score is called reliable when there are reasons for believing the score to be stable and trust worthy". Stability and trust worthiness depend upon the degree to which the score is an index of "true ability" and is free of chance error.

Reliability may be defined as the level of internal consistency or stability of the measuring device over time. The method of estimating reliability call for computing a Correlation Coefficient between two sets of similar measurements (Borg and Gall, 1983). Reliability is often reported only for the total score.

By a "perfectly reliable" measurement is meant one that is completely accurate or free from error. The same "Yard stick" applied to the same individual or object in the same way should yield the same value from moment to moment, provided that the thing measured itself has not changed in the mean time (Guilford, 1973).

Freeman (1976) maintains, "The reliability of a test is its ability to yield consistent results from one set of measure to another, it is the extent to which the obtained test scores are free from such internal defects as will produce errors of measurements inherent in the items and their standardization. These errors are not due to instability of the performances of the testees themselves or to chance factors. However, since individuals do not perform

with complete consistency upon all occasions, and since chance error cannot be entirely eliminated, the actual indices of reliability obtained for psychological tests are the product of the interaction among true individual differences, defects of the instruments and chance determinants". In other words, Guilford (1973) states in "Psychological Measurements", reliability depends upon the population measured as well as upon the measuring instrument. Hence one should speak of the reliability of a certain instrument applied to a certain population under certain conditions". However, reliability is not an all-or-none principle; but a matter of degree. No test presently available is in itself perfectly reliable, scores for the same individuals, obtained on repeated testings, are not completely stable. Not only are there likely to be some different chance determinants in operation at different times, but it is quite normal for human to vary in performance, generally within fairly narrow limits, from one occasion to another. Such variation is expected quite aside from changes that occur as part of the process of growth and development (Freeman, 1976). The reliability of a standardized test is usually expressed as a coefficient. Reliability Coefficient varies between values of .00 to 1.00. The Reliability Coefficient reflects the extent to which a test is free of error variance. As per Garrett (1983) the four procedures in common use for computing Reliability Coefficient are :

a) Test - retest (repetition)

b) Alternate or parallel forms

c) Split - half technique and

d) Rational equivalence.

All these methods furnish estimates of the reproducibility of the test scores. Sometime one method and sometimes another will provide the better measure (Garrett, 1983).

a) Test - Retest Method

Repetition of a test is the simplest method of determining agreement between two sets of scores (Garrett, 1983). The test is given and repeated on the same group, and the correlation is computed between the first and second set of scores. Administering the identical test form twice has the obvious advantage of providing completely equivalent test content on both occasions, which is an essential consideration. Furthermore, it is less difficult to develop one form of a test rather than two (Freeman, 1976).

If the test is repeated immediately, many subjects will recall their first answers and spend their time on new material, thus tending to increase their scores-sometimes by a good deal. On the other hand, if the interval between test is rather long (for example six months or more) and the subjects are young children, growth changes will affect the retest scores. Given sufficient time interval between the first and second administration of a test to offset-in part at least - memory, practice and other carry over affects, the retest coefficient becomes a close estimate of the stability of the test scores

b) Alternate or Parallel Form Method

When parallel forms of a test can be constructed, the correlation between Form A, for example and Form B may be taken as a measure of the self-correlation of the test, under these conditions the reliability coefficient becomes an index of the equivalence of the two forms of the test (Garrett, 1983)

But this method presents an additional problem in the construction and standardization of the second form, that is, the problems of making both forms truly equivalent.

c) The Split-Half Method

In the 'Split-half Method', the test is first divided into two equivalent "halves" and the correlation found for these half-tests. From the reliability

of the half-test, the self-correlation of the whole test is then estimate by the Spearman-Brown prophecy formula. The procedure is to make up tw sets of scores by combining alternate items in the tests-the odd - even spli is most commonly used (Garrett 1983). A marked disadvantage of the spli half technique lies in the fact that chance errors may affect scores on th two halves of the test in the same way, thus tending to make the reliabilit coefficient high (Garrett, 1983).

d) The Method of "Rational Equivalence"

Two forms of a test are defined as "Equivalent" when correspondin items, a, A, b, B etc., are interchangeable; and when the inter-item correlatio are the same for both forms (Garrett, 1983). The method of rational equivalenc stresses the intercorrelations of the items in the test and the correlatio of the items with the test as a whole. Statistical formulas are used for deter mining the reliability of the tests.

2. Validity

The single most paramount characteristic of a psychological test is it validity ; validity is defined either by a) the extent to which it measure whatever it is designed to measure or b) the relationship between test score and some extra-test criterion measure (Brown, 1970; Freeman, 1976). A index of validity shows the degree to which a test measures what it purport to measure when compared with accepted criteria (Garrett, 1983).

According to the standards for Educational and Psychological Test American Psychological Association (APA), 1974 validity procedures are classi fied under three major classes; a) content validity, b) construct validity an c) criterion-related validity (Anastasi, 1976).

a) Content Validity

As the name indicates, this type of validity is estimated by evaluatin

be a sampling of the knowledge of performance which the test purports tc measure. Taken collectively the items should constitute a representative sample of the variable to the tested. At the same time, it is essential that the conten is not compounded by introducing irrelevant items. For example, a test o spelling ability should not place any weight on the rate of writing (Freeman 1976).

The validation of content through competent judgement is most satisfactor when the sampling of items is wide and judicious, and when adequate standardi zation.groups are utilised (Garrett, 1983).

After deciding the items to be included in the test andits careful analysi by several specialists, statistical analysis of the items should follow, for th purpose of : i) determining which item discriminates best between individual atthe upper and the lower levels of performance, ii) detremining the per cen that answers each item correctly (Freeman, 1976). Thus, content validatio rests firstly upon an expert analysis of the materials to be sampled (the vari ables) and secondly upon the use of available statistical procedures to refin the original selection of items (Kelly, 1964).

b) Construct Validity

The construct validity of a test is the extend to which the test may b said to measure a theoretical construct or trait (Anastasi, 1976). Construc validity of a given test might be demonstrated by finding substantial correlatio with other tests that have been shown to measure satisfactorily the menta processes or traits in question. Construct validity depends upon the degre to which the test items, individually or collectively sample the range or clas of activities or traits, as defined by the mental processes being tested.

c) Criterion - Related Validity

According to Anastasi (1976) "Criterion related validity indicates the effect

tiveness of a test in predicting an individual's behaviour in specified situation. For this purpose, performance on the test is checked against a criterion, that is a direct and independent measure of that which the test is designed to predict. The best criterion measure is the one which has most practical advantages, the one that is simplest to use, readily available, less expensive, is valid, reliable and free from bias (Brown, 1970).

The validity of the test is determined experimentally by finding correlation between the test and some independent criterion. A high correlation between a test and a criterion is evidence of validity, provided the criterion was set up independently and both the test and the criterion are reliable.

3. Norms

A norm provides an indication of average or typical performance of the specified group. Norms are needed because the raw scores in themselves are not very meaningful. Norms facilitate the comparison of the child's score with those of a representative population. The comparison is carried out by converting the child's raw scores into some relative measure, termed derived scores, which indicate the child's standing relative to the norm group.

Derived scores also allow us comparison of the child's performance on one test with his or her performance on other tests.

Norm data are presented in the form of a table that shows the proportion of the norm group scoring within various ranges (Brown, 1970). The process of collecting normative data on a test is an important part of the process of standardization. Therefore, the norm group should be chosen carefully to represent the group for whom the test is designed. It should include the proportionate number of urban and rural subjects of both sxes, subjects from various socio-economic levels. Failure to provide a representative sample, will, bias the norm data and make interpretation of scores difficult. A minimum sized

group is necessary for stability but a smaller, better selected group is always more desirable than larger, vaguely defined norm group (Brown, 1970).

Types of Scores

The scores obtained directly from the test are called raw scores. The raw scores need to be converted on another scale for comparing and interpreting the individual's score relative to the group performance (Borg and Gall, 1983; Brown, 1970).

According to Brown (1970) there are five classes of scores as specified below :

a) Content scale,
b) Percentile scale,
c) Standard scores,
d) Developmental scales, and
e) Ratio and quotients.

All these scales vary in the assumption made about the nature and the underlying measurement scale. Selection of the scale depends upon the purpose of the test designed and the kinds of norms required. For several reasons but particularly when further statistical analysis are to be made of test scores, it would be valuable to have scores expressed on an interval scale that is, to have a scoring scale whose units were all of equal size. Standard score possesses this property. Any standard score is basically the deviation of a raw score from the mean, expressed in standard deviation units.

Age-Equivalent Norms

Age equivalent norms are obtained by detremining the average scores obtained by children of various ages. This is obtained by computing the mean raw scores of a measure for a group of children with a specific age.

Other terms for age - equivalent scores are 'mental age (MA) and test age. For 1972 norms on the Stanford - Binet', mental ages do not mean scores (or performances) that are associated with children of a certain age. MAs

Part II. Need for Early Stimulation Through Preschool Education

According to the 1981 census there are about 121 million children in the age group of 0-6 years, constituting about one-sixth of the total population of India. Such a large segment of the society cannot possibly be neglected specially when research undertaken in recent years in the field of general development of the child has shown the importance of the first six years of life and the capital and predominant role they play in the child's future development.

Sharma (1974) putforth that preschool age marks an important period in mental development, because 50 per cent of mental growth is completed by the time the child is four years old. In other words, the child's brain reaches 75 per cent of its adult weight by the end of the second year; by the age of six, increase to 90 per cent of its adult weight.

The reason for the need for preschool education as pointed out by Eyken (1977) are : to alleviate the physically harmful and potentially dangerous situation in which thousands of children find themselves for the first five years of their life with incalculable damage to their physical, emotional, psychological and cognitive development. Preschooling, if properly carried out, can stimulate and enhance such development. It can give children a 'Head start' on the road to life.

Preschooling is desirable for all children but it is very essential for the disadvantaged, because as pointed out by Ratnaike (1981) disadvantaged, children do not experience as many objects and situations as elite children do. As such the 'preschool' should compensate for the deficits by focusing upon appropriate toys, puzzles, games, field trips, and emphasizing cognitive development.

McDonald (1969) termed early childhood education as a form of deliberate

social intervention. The society prepares children to fit into the existing order. School experiences can either help children conform to existing social order or help to prepare for a new social orgnization. During the last two decades or so evidence has accumulated suggesting that there may be a basic need for stimulation, a need that is involved with the maintenance of biological processes and is thus essential for normal development. The importance of stimulation is further shown by the fact that when it drops below a certain level, the human organism is likely to become disturbed (Lindgren, 1980).

A number of programmes have been devised in an attempt to intervene and stimulate the development of lower-social class children by exposing them to an enriched environment at least for part of the day, in order to speed up their cognitive development. Evaluation reports of a few programmes has also been indicating the beneficial effects of the early stimulation on development of children.

Muralidharan and Banerjee (1974) stipulated that children who have had preschool experience are at an advantage in both language and intellectual areas. Greenfield et al., (1966) highlighted that schooled children exhibit a considerable degree of cognitive flexibility in solving problems, even when the problems are drawn from the natural, non-school environment, whereas unschooled children use a rigid, pedestrian approach based on first impression.

In a study carried out by National Council of Edcuational Research and Training (NCERT) (1977), 252 five year old children, all belonging to lower middle class families and drawn from 27 schools of the Municipal Corporation of Delhi, were tested soon after admission to Class I. One hundred and forty three of these children had attended Corporation Nursery School and the rest had not attended any kind of preschool. They were given reading readiness

tests, and it was found that the group with preschool education did much bette than those without it.

Research results reported from the Department of Child Developmen M.S. University of Baroda, (1978) highlight the beneficial effects of six week preschool programme on children from low income group families. Gray an Klaus (1970) brought to light that black, disadvantaged children who participate in the Early Training Project (ETP) gained about 11 IQ points, on the averag over non participants.

Another team of investigators developed an enrichment programme tha provided intensive daily care and cognitive training over a six-year perio for children of black women who lived in the Milwaukee ghetto and who ha IQs of 75 or under-far below average. The children were taken into the pro gramme when they were three months old and were tested at regular interva on a number of cognitive measures. This experimental group's cognitive develop ment was compared to that of children whose mothers lived in the same are and who also had IQs of 75 or under. Developmental measures included IQ the use of language, and the ability to solve problems. They showed that th experimental children scored consistently higher than the control childre When the children were 6 1/2, the mean IQ of the experimental group wa about 125, whereas that of a comparison group was below 80. The expeiment group's mean IQ had remained above 120 during most of the experiment period, but that of the comparison group had declined steadily (Garber ar Heber, 1975). McKay et al., (1978) concluded that an enriched programme o activities can prevent losses of cognition abilities, and further more the earli the programme is begun, the more effective it can be.

Animal Studies

Research shows that stimulation also makes an important contributi

to the development of animals. Young animals that are handled or otherwise stimulated by experimenters at frequent intervals during the weeks after birth develop more rapidly, are more curious, and are better at solving problems than are 'control' animals, that is their littermates that were not so handled (Meler, 1961 ; Wilson, Warren and Abbott, 1966).

Furthermore, rats and mice that spent weeks prior to maturity in an environment that has a variety of stimulating objects and events, that is stimulus - enriched - are not only better at solving maze problems, but actually developed a thicker cerebral cortax in contrast to control animals (Bennett et al., 1964 ; Wallace, 1974).

Part III. Integrated Child Development Services - India's largest Intervention and stimulation programme

The strategy adopted in ICDS for delivery of package of services mentioned earlier is one of simultaneous delivery of early childhood services in an integrated manner so that the overall impact is much greater as the impact of a particular service will depend upon the support received by it from related services (ICDS Manual, 1984).

Supplementary Nutrition

Three hundred days in a year, food is prepared and distributed to children at the ICDS AWs. By providing 300 calories a day to children under 6 years the ICDS attempts to bridge the calorie gap between the national average intake of 810 calories and the required 1200 calories per day. Additionally specific micro-nutrients are supplied to off-set regional or individual deficiencies.

Immunization

All children in the ICDS project areas are supposed to be immunized as per the specified immunization schedule against dephtheria, whooping cough

tetanus, poliomyelitis, tuberculosis and measles.

Health Check-up and Referral Services

Health check-up and referral services in the ICDS for preschoolers includes :

A. serial recording of the height and weight of children with a view to keeping close watch over their nutrition status ;

B. watch over the mile-stones in the growth and development of the child;

C. provide all the immunizations according to the policy enunciated ;

D. provide general check-up every three/six months in order to detect diseases and other evidences of mal-nutrition or infection ;

E. provide treatment for the widely prevalent diseases like diarrhoea, upper respiratory tract infections, skin diseases, eye diseases etc. ;

F. deworming against the prevalent parasitic infections etc. ;

G. prophylactic measures against diseases of nutritional origin ; and

H. refer serious cases to the appropriate hospital for specialised treatment

The review on studies on ICDS comprise : Impact of ICDS on (1) Nutritional status of children, (2) Health and immunization status of children, and (3) Pre-school education.

A. Impact of ICDS on Nutritional Status of Children

Several studies have been carried out to measure the impact of ICDS on nutritional status of children. A majority of the studies are cross-sectional carried out as before-and-after, some have control population (non-ICDS areas) and in a few data has been collected in a longitudinal manner.

Reduction in the prevalence of mal-nutrition has been observed in base line and repeat surveys conducted over a period, as reported by Bhandari et al (1981). Tandon et al.,(1981), Lal et al., (1977), Gupta et al., (1979), and Jayan et al.,(1985).

In their longitudinal study carried out over 20-21 months in rural, triba and urban areas Tandon et al., (1981) showed that after the utilizatio of ICDS services the prevalence of severe mal-nutrition in the same grou of children declined to 11.9 per cent in the rural, 5.5. per cent in the triba and 7.9 per cent in the urban projects against a prevalent rate of 23.2, 29. and 22.7 per cent in rural, tribal and urban projects observed respectivel in the baseline survey.

Jayam et al. (1985) studied children below 3 years and showed that th percentage of severely malnourished children was 2, 10 and 8 at 6 months 1 year and 3 years of age respectively, indicating a higher prevalence of sever malnutrition at 1 year.

Santhanakrishnan et al. (1985) reported the percentage of malnourishe children below 3 years in a project operating for 8 years was lower (31 pe cent) compared to the one operational for 2 years (38 per cent). Knowledge attitudes and practices of mother's was better in a project established 8 year back, indicating that with longer exposure of ICDS services the impact ha increased.

Cross sectional surveys carried out in ICDS and Non-ICDS projec areas generally indicate a lower prevalence of malnutrition in children receivin the ICDS services when compared to the control group. These results hav been shown by Gupta (1982); Chakrabarty (1985); Saxena et al., (1985); Masoo et al., (1985); Patel (1985) and Subramaniam (1985).

Two studies by Rouf (1985) and Agarwal (1985), however, show a highe prevalence of severe malnutrition in the ICDS blocks when compared to th non-ICDS blocks. Rouf (1985) has explained this as being due to poor access bility of a scattered population to the ICDS services in the block covere The extent of severe malnutrition as reported by the Annual Survey Report

(1985) of the Central Technical Committee (AIIMS) was found to be as high as 10 per cent even in the projects which have been operational for 8 - 10 years. The prevalence of malnutrition decreased from 11.4 to 7.8 per cent in 1983, according to survey reports of the Central Technical Cell (1983).

Mathew et al.,(1983) conducted a study to assess health status of children in Anganwadi of coastal and interior areas of Kerala. They revealed that there was significant improvement in weights and heights of children in Anganwadi over a period of four months. Improvement was also observed in the nutritional status of children at the end of the study.

B. Impact of ICDS on Health and Immunization Status of Children

Health is an important component of the ICDS package of services. In each ICDS project certain additional inputs in the form of a medical officer, LHV and ANM and financial support for medicines, petrol and oil etc. are given to facilitate the health functions of the primary health centre and sub-centres of the ICDS block. Results of the ICDS evaluation have been summarizec by Tandon (1984) which are given below :

1. Progressive improvement in the delivery and utilization of the nutritior and health services was observed.
2. Immunization coverage with BCG and DPT (3 doses) increased to 45.6% and 43.4% from 21.0% and 4.9% respectively in 1976. Poliomyelitis (3 doses) coverage in ICDS projects was noted to be 42.7% compared tc baseline figure of 16.4% during 1982 - 83.
3. Prevalence of severely malnourished children declined from 19.1% to 6.6%.
4. Services to pregnant and lactating women had improved significantly through the integrated approach, 46.7%, 35.0%, 49.7% and 32.1% of pregnant women received Iron and Folic acid, supplementary nutrition, antenatal care and tentanus toxiod (2 doses) respectively in ICDS projects.

The corresponding baseline figures for 1976 were 20.4%, 21.6%, 21.6% and 6.0% only.

5. Improvement in the family welfare programmes was observed. Birtl rate in ICDS projects was estimated to be 24.2 per thousand populatio compared to the 33.3 per thousand as national estimates provided b SRS for the year 1982.

6. Several research studies have been conducted by the consultants of ICD and their teams of research students which show the following impac of ICDS approach :

a) increase in birth weight ;

b) decrease in nutritional anemia ;

c) improvement in nutritional status of mothers ;

d) decrease in Vitamin 'A' deficiency ;

e) decrease in mobidity rate ; and

f) increased community participation, restricted school drop-out psycho-social development of children, increased community awarenes etc.

Gupta and Srivastava (1982) did a study from October 1980 - June 198 with the objective of acertaining the health status of children below 6 yea in the ICDS and non-ICDS blocks, to study the impact of ICDS scheme an suggest measures for effective implementation of the programme. Result of the study revealed that height, weight and chest circumference of childre was found to be lower in non-ICDS group than in children of the ICDS bloc

The overall prevalence of Protein Energy Malnutrition was significantl higher in non-ICDS (77.1 per 100) as compared to ICDS (44 per 100). It wa observed that there was higher incidence of diarrhoea and dysentry, eye an skin infection in the non-ICDS group. Infant mortality rate in ICDS bloc

was found to be 74.1 compared with 111 in the non-ICDS area. This study concludes that health status of children in the ICDS block was better than those in the non-ICDS block.

Vasudeva et al., (1983) studied 171 children drom ICDS block Beri and 164 non-ICDS block Beri. Their immunization status was determined from the records available at the Anganwadi and sub-centres. This study indicates that immunization coverage of children in ICDS block is better than the non ICDS blocks.

Similarly the impact of ICDS has been analysed periodically by Devi and Yaimbe (1983) in Imphal, Mathur et al., (1983) in Gorakhpur and Bai (1983) in Tirupathi unanimously voiced that there is a considerable improvement in the health status of the beneficiaries of ICDS scheme.

C. Impact of Preschool Education on Cognitive Development of Children

Preschool edcuation component of the ICDS covers non-formal education through environmental stimulation to children between 3-6 years with the objective of developing desirable behaviour patterns. Against this background the research studies conducted so far on preschool education in ICDS have been reviewed. The studies are divided for the sake of convenience and read ability into (1) Impact studies, (2) Intervention studies and (3) Studies on training of AW workers.

1) Impact studies

A study conducted by NIPCCD on a matched sample of 60 beneficiary and non-beneficiary children selected randomly from five anganwadis of Delhi to evaluate the impact of preschool education on language and cognitive develope revealed :

1. Children attending AWs scored higher in all tests consistently than the non-attenders though significant differences was recorded only in listening comprehension, sequential thinking and time perception.

2. Male beneficiaries were found to score higher in cognitive tests while females performed better in language tasks (Khosla, 1986). She also reported that preschool activities were mostly geared to rote learning of alphabets and numbers, through the use of printed charts, not necessarily related to the immediate environment. Songs and stories were repetitive and rendered in a monotone, only in 25 per cent of the AW children enjoyed the preschool programme.

Goswami (1986) also indicated that the AWWs and helpers often came late and sent the children back immediately after the distribution of food. A dismal picture of AW programme was presented by her, it was reported that the AWW did not conduct any preschool activities and centres were mainly functioning for food distribution. Adish et al., (1985) found that intellectual development of children in the ICDS villages was definitely better than that of the children in the non-ICDS villages. How much of this improved intelligence is due to the preschool education and how much to the improved nutritional status is difficult to say on the basis of this study. Perhaps both of them had a synergistic role in improving the intellectual status of the child.

2) Intervention studies

Invention studies are conducted on the assumption that AWWs lack training in organizing preschool education programmes.

Muralidharan et al., (1984) conducted a tribal study on 144 children following experimental - control, pre-test, post-test design. The AWWs of the experimental group and control groups were given pre-tests in language and cognitive tasks. The AWWs of the experimental group were given a ten days orientation in techniques of story telling, conversation, picture reading, songs and games, art activities etc. The workers were then supplied with picture books, picture cards, songs and games for use with children. The AWWs were

asked to use the materials constantly and after about eight weeks, a post-testing was done. The results showed that in most of the tests, the experimental group showed a higher gain than the control group. It thus emerged that no matter how disadvantaged the children are, well planned early childhood education strategies do make an impact and foster the development of children.

Similar results were reported by Gupta and Rahgir (1984). Their findings indicated that experimental group of children who attended modified preschool programme for one month showed significant progress and improvement ; they also surpassed their control counterparts in learning the preschool activities.

Significant differences between pre and post intervention in the knowledge and skills of AWWs and also in the cognitive abilities of children before and after intervention were observed by Sahni (1984).

3) Training of AWW

A study on 128 children (3 - 5 years) who had been exposed to teachers trained for two years, one year, six months and four months (AW training) showed that in most tests of language and cognitive development, the children whose teachers had two years training performed the best, followed by anganwadi children whose teachers had one year training (Muralidharan, 1986).

In a case study of Chavara ICDS, the educational level of the AWW and her continuous training, re-orientation and field visits were reported to result in motivation for superior delivery of services and eliciting community participation (Lalitha, 1983).

Part IV. Factors Effecting Cognitive Development of Children

A child lives in a complex and multifaceted environments and his adjustments depend largely upon his competence in meeting his biological and psychosocial needs within the framework of environmental facilities and constraints.

His competence is an outcome of organism-environment interaction. Since a large part of sensory input comes from environment it can easily be assumed that development and growth of various psychological functions should be shaped by the characteristics of environment to which a developing organism is exposed.

In the present section an attempt has been made to review the avilable studies on the socio-cultural, familial and school variables influencing cognitive development in children. These studies have been discussed under following heads :

A. Birth Order of the Child

B. Sex of the Child

C. Socio-economic Status of the Family

D. Home Environment

E. Culture

F. Physical set up and Environment of the Preschool

G. Importance Responsibilities and Training of Teachers of Young Children

A. Birth Order of the Child

High achievement is more often associated with the first born child in a family. First borns constitute a greater percentage of the intellectually superior portion of the population. First borns are more articulate - they talk earlier and more clearly, perform better academically, tend to score higher on intelligence tests and are better in problem solving and perceptual tasks than later borns (Kagan, 1966 ; Altus, 1967).

A large scale study carried out by Belmont and Marolla (1973) ; Zajonic and Markus (1975); Kelly, (1981) showed that the average IQ declines as the number of children in the family goes up. Consequently, first borns tend to have higher IQ scores than second children, second children also tend to have higher scores than the third, and so on.

The explanation seems to be that the older children in a large family enjoy more contact with, and stimulation from the parents, while the younger ones spend more time in the company of other children. Both parents tend to be more attentive and stimulating to first born babies, spend more time with them and encourage and help them more in tasks at the appropriate age. These differences in parental treatments result in first born being more studious serious, responsible and competitive, while later borns are more outgoing relaxed imaginative and athletic (Kilbride, Johnson and Streissguth, 1977)

Some studies on the other hand, find no birth order effect (Galbraith 1982; McCall and Johnson, 1972). Nonetheless, studies that include large samples of subjects generally support the theory that birth order is related to achievement motivation and IQ test scores (Belmont and Marolla, 1973; Berbaum Markus and Zajonc, 1982).

Uchat (1982) brought to light that mental ability level of preschool children decreases with increase in the number of siblings. Significant relationship between the size of the family and mental ability was shown by Borbora (1987). She found that the children coming from small families had better mental ability than those from large families.

B. Sex Related Differences in Cognitive Functioning

There are several biological criteria that generally differentiate male from females : sex chromosomes, sex hormones, and reproductive organs.

The effects of sex difference on cognitive abilities have also been studied Minton and Schneider (1980); Bee (1981); Lalitha (1986) reported that female tend to be superior to males in verbal fluency, males tend to surpass female in visual-spatial ability, speed and coordination of large bodily movements

Ratnakumari, (1976) found no sex difference in the mental abilities o preschool children.

C. Socio-Economic Status of the Family

One of the most common findings in the psychological literature is th of a direct relation between socio-economic status and intelligence test pe formance. Socio-economic status has been defined in terms of parental occup tion, income, education, characteristics of the home and neighbourhood, a various combinations of these. A relationship between low SES and low intel gence has been reported which ever definition is used. One of the most co prehensive and widely quoted studies of significant differences in mean among the various social classes was published by Burt in 1961. The most straig forward interpretation of his data is that intelligence is itself a major dete minant of occupational class. In a large study on Indian children conduct by Abhichandani (1970) it was pointed that the total mean scores of the bab from the socio-economically better placed families were slightly higher all ages as compared to the inferior group.

Socio-economic status of the family have also been correlated w the mental development. In a study by Migliorino (1974) a positive correlati was found between socio-economic level and the mental development of t subjects; in general, the higher the socio-economic level, the greater t mental development.

Survey conducted to find out the impact of father's occupation a education, the number of siblings, and the early intelligence level of the r pondent on educational attainment, intelligence at maturity, occupatio achievement and monetary earning. Results indicated that all the above fact did make a substantial difference in educational outcome (Duncan, 1982)

Jenson (1974) found that economic status was related positively to inte gence. Ramoji Rao (1974) found that subjects belonging to low SES had signi cantly low intelligence.

Simon and Simon (1975) obtained significant relationship between SE and academic achievement and SES and IQ. Morris and Clarizio (1977) four improvement in IQs of high risk, disadvantged preschool children enrolled a developmental programme.

McCandless (1973) highlighted that highly educated fathers read mo books to their children and provide more intellectually challenging atmosphe to them, which help in their cognitive development.

Abraham and Prasanna (1982) found that maternal education was high related to child's mental ability.

Kaul (1986) also stressed that educated mothers are capable of shapi the mental development of children.

Hothersall (1985) stated that mental abilities were constantly fou to be higher as the parents move up the occupational ladder.

D. Environment and Cognition - Home Environment

Inhelder (1969) indicated that "the age at which the cognitive structur appear is relative to the environment, which can either provoke or impe their appearance".

It is generally maintained that a favourable home environment can ha a measurable effect on mental ability (Hunt, 1961; Skodak and Skeel, 194 Gray and Klaus (1965) reported the results of a study where forty four pr school black children whose family incomes were less than 3,000 dollars year were exposed to teaching methods designed to create positive attituc towards achievement, as well as persistence and the ability to delay grati cation. Visits to each mother were also made to help her in supporting t child's efforts to learn. The result of this kind of treatment was a mean crease of 5-9 points in the IQs of these children compared with a drop 4-6 points in a control group of children.

A longitudinal study by Hanson (1975) across three time periods in childhood (0-3 years ; 4-6 years, and 7-10 years) with a sample of 110 children revealed that a number of home environmental variables were significantly related to Stanford-Binet IQs, highly consistent within a given period, and extremely stable across the childhood years. Variables such as freedom to engage in verbal expression, language teaching, parental involvement, and provision of language development models were found to be related significantly to intelligence in each age period.

Studies provide evidence that cognitive scores depend on motivation and adjustment as well as on cognitive skills. It seems that children are more likely to gain in IQ, over the years if the parents provide a stable emotional climate, serve as models of intellectual achievement, and emphasize and reward intellectual accomplishment and independence.

Baldwin (1961) Homes which are stimulating and accelerating are the homes which send children to nursery school. This is one symptom of a stimulating home.

Children who score well in school and who seem to do academic work more easily tend to come from homes where the parents are involved in a variety of activities which may indirectly stimulate their children intellectually Books, magazines, and other printed materials are available to explore. Activities are planned to arouse curiosity, the child is taken on trips often for the express purpose of finding out something about the world (Hess and Croft, 1972).

Most psychologists assume that parental behaviours serve a large variety of stimulus function, controlling both the respondent and operant behaviour of their children. Parental behaviour and attitude that constitute his psychological environment are among the most important elements which affec

the cognitive development of the individual. The relationship between parer child reciprocity and the child's mental development (Becker, 1974) and parenta influence on children's cognitive style (Oliver, 1974) have been studied. Parenta behaviours are probably much more important determinates of rates of develop ment than are such indices of intellectual environment as level of parenta education, socio-economic level, number of books in the house etc. (Hunt, 1967

In an adoption research, Scarr and Weignberg (1976) studied black ar mixed race children adopted by 101 working class to upper-middle class familie The eligible families for adoption were required to be better off than averag groups in terms of parental IQ, income, education, occuptional standing ar desire to rear children. It was found that the adopted children averaged 11 on IQ tests, well above the average of 90 generally scored by black childre in the North Central United States. This indicates the importance of hom environment for development of better cognitive skills. As it was conclude that the adoptive family environment have increased the scores of genotyp cally average groups by 5 to 15 points.

The difference in average IQ, between children born into lower-cla homes and those born into middle-class and upper-class homes has been four to increase through early childhood (Baley, 1970). On the other hand, childre of lower-class parents, if adopted into families that are above average education and income, wind up with higher IQs than might have been expecte A study made in France managed to compare a group of such adopted childre with their blood brothers and sisters, who remained in their original hom with their parents. The adopted children had an average IQ of 111. Their brothe and sisters averaged only 95 (Schiff et al., 1978). The earlier the adoptic takes place the better, indicating that the environment is important eve during the earlier months of life.

Muralidharan (1970) found significant differences in the developmenta levels of children coming from high stimulating and low stimulating homes

A considerable number of studies has shown that the early environmer of children is more important than the SES of parents. A longitudinal stuc of children born in Kauai, one of the Hawaiian Islands, showed that the leve of intellectual stimulation in the home was a more powerful predictor of children's later success in school than was the SES of the parents. Intellectua stimulation was assessed by factors like attempts made by parents to enlarg the children's vocabulary ; the intellectual interests and activities of the famil values placed by parents on education facilities and help provided by parents work habits emphasized in the home; the availability of learning supplie books, periodicals, and the opportunity to explore rewarding aspects of th environments outside the home, recreational activities etc. Estimates of SE were made on the basis of the father's occupation, steadiness of employmen income and condition of housing. Data regarding the mother's and the father educations were also collection (Werner, Bierman, and French, 1971). Wha these studies show is that SES significantly influences children's school perfo mance and cognitive ability, but that the effect of family environment is eve more significant.

Whiting (1970) observed that the parents of under achieving boys we likely to be either highly permissive or authoritarian and restrictive.

E. Culture and Cognition

Investigators have also shown that more complex cognitive process are influenced by cultural factors. According to Witty (1979) cultural and soci factors enhance or inhibit the manifestation of genetic potentialities. Hawa and Roland (1954, 1955) have shown that abstraction capacity is influenc by culture. Dennis (1975) also found cultural differences on good enough's drav a-man test performance.

Perceptual processes have also been investigated with reference to culture. Ray (1953) examined human colour perception and behaviroural responses in various cultural groups. He concluded that the colour systems of human beings are not based on physiological, psychological or anatomical factors. Each culture has divided the spectral continuum upon bases which are quite arbitrary except for pragmatic considerations. Bagby (1957) found predominant effect of culture on prceptual selection. On the basis of cross-cultural data Cole and Bruner (1971) have strongly argued that culture plays crucial role in cognitive functions. Hudson (1960) reported evidence of cultural factors in space perception. Jadoha, Deregowski and Sinha (1974) have reported a cross-cultural study of topological and Euclidean spatial features noted by children. Broota and Ganguli (1975) found evidence of cultural differences in perceptual selectivity. They compared perceptual organization of Hindu, Muslim and American children and noted significant cultural differences in the three groups. Differences along urban-rural dimension have also been reported in intelligence (Tripathi, 1970), perceptual discrimination (Nand, Das and Mishra, 1965).

F. Physical set up and Environment of the Preschool

Jenkins et al.,(1963) remarked that the physical facilities and equipment provided in a preschool should be functional for the development of children and should be selected to allow for a wide range of abilities and growth patterns. He further stated that "children cannot be made to grow, but their growth can be influenced and encouraged by an environment which provides good physical and emotional care".

Lorten and Walley (1979) opined that the physical environment of the class room is not the determining factor in children's learning, but it can enhance or limit learning. The very nature of young children requires that they have space in which to move and that they have material and equipment with which to interact.

Physical set up efficiently organized in terms of space, orderliness comfort and convenience gives the children better opportunity for workin effectively and creatively (Hochman, 1958).

Devadas and Jaya (1984) stated that the surroundings of a preschoc building greatly influence a child's health, attitudes and development of per sonality. Therefore, if the aim of the preschool is to bring about mental, mora and physical development of children, the school building must be locate amidst desirable surroundings.

Gardener (1964) holds that the well equipped nursery school can provid an almost unlimited range and variety of stimulating experiences because o the nature of equipment itself.

Halmes, Turner (1976) mentioned that, the provision of proper indoo and outdoor equipment as well as the space in which to run and play, enable youngsters to develop healthy minds as well as bodies. When selecting toys teachers should try to choose those that exercise small as well as large muscl activity.

Singh (1981) emphasized that Balwadi equipment on the whole shoul range of simple activities. Massive use of waste material - news papers, car board cartons and adequate arrangements for their use would help to ensur a rich environment for the children which would stimulate intellectual as we as social and emotional growth.

G. Importance, Responsibility and Training of Teachers of Young Childre

The future of education depends upon dedicated teachers. Just any on cannot teach and care for the young child ; good teachers alone can understan and teach young children (Devadas and Jaya, 1984).

Brar (1985) rightly pointed out that teachers have a key role to play i helping the children to develop ability. Wadehra (1985) comments that durin the early years, the teacher exercises the most significant psychological influenc on the child. The physical plant of the school, the teaching materials, the cla: room schedule and routine all wane in comparison with the potential impac of the teacher on the child, on his adjustment to school, on his personality deve lopment and on his academic achievement.

Mishra (1985) opines that the teachers are said to be the builders of natio It is with this view that the Secondary Education Commission, considered teach as the most important factor in the contemplated national reconstruction. Becau: a teacher shares the responsibility of shaping the destiny of a country.

Responsibility of (AWWs) Teachers for Young Children

According to the UNICEF report on ICDS (1984) the role of AWW (teache is many fold :

- She is multi-purpose agent of change ;
- Selected from the community ;
- Provides direct link to children and mothers ;
- Assists CDPO in survey of community and beneficiaries ;
- Organizes non-formal education sessions ;
- Provides health and nutrition education to mothers ;
- Assists PHC staff in providing health services ;
- Maintains records of immunization, feeding and preschool attendanc
- Liaises with block administration, local school, health staff and community ; ar
- Other community-based activities for example family planning.

Sehgal (1972) states that an Anganwadi teacher is the pivot of all the activi ties. She plays the most important role to enrich the environment in which th child is placed. The success of any programme depends on the competence c teacher (Chowdhary, 1980).

Bosque (1973) feels that teachers must realize their role to help the childre develop their natural abilities by practical exercises that will increase and satisf

task of nation building with all the fervour and gusto of an architect (Swaminathan, 1972).

Devadas and Jaya (1984) put-forth that the teacher needs to fulfil the following responsibilities to the children in her group. She should : a) meet the needs ; b) enjoy working and being with them ; c) respect them as individua d) build desirable. relationship with them ; and e) help them build a good sel image.

Training of Teachers of Young Children

Guruge and Berstecher (1984) agree with the concept of training and poi out that training and the orientation of the personnel of an organization vital to the maintenance and the improvement of the organization's functior effectiveness.

The important purposes of the training programme discussed by Basu (19E are to : 1. build up the motivation of the teachers ; 2. involve them in gro activities ; 3. strengthen their knowledge base ; 4. improve their microski of teaching through practice ; and 5. provide immediate feedback on their pe formance.

Dove (1985) remarked that there are four interrelated features of conter porary teacher-education programmes if good teachers are to be attracted and retained in schools. These are field-based preparation, team work in trainir community support of training and the recruitment and preparation of loc teachers. Annapoorni and Chandramani (1972) remarked that additional traini is required for the teachers of existing preschools in order to sustain thei interests.

Indira (1971) brought to light the positive relationship between childrer adaptive behaviour, sociability and teachers' trianing. Refresher training is al advocated by Ministry of Social and Women's Welfare (1985) in order to enat the teachers of young children to organize and conduct play and other activiti

Methodology

III METHODOLOGY

The plans, designs and method used in this study are described in this chapter. The study design used was experimental versus control. This approach was selected to help in assessing effectively the impact of independent variables on the dependent variable. This design has been recommended by the National Conference on Research on ICDS (NIPCCD, 1986). The descriptive analysis has been followed to elicit the background information and other supportive dimensions of this study.

Location of Study

The study was conducted in Coimbatore City of Tamil Nadu State. Out of the four urban ICDS projects operating in Coimbatore, Project Number Four at Singanallur was selected purposively. Since Sri Avinashilingam Home Science College had already established rapport with this project, maximum cooperation was expected to facilitate collection of the appropriate and relevant data. Approachability and accessibility to the Anganwadis was another consideration for the selection of this Project.

The investigator obtained the necessary permission to evaluate the functioning of the AWs of the ICDS in Tamil Nadu from the Ministry of Human Resource Development, Department of Women and Child Development, Government of India and from the Director of Social Welfare, Government of Tamil Nadu.

Sampling Techniques

Purposive sampling technique was adopted for selecting the samples The samples were identified for both the experimental and control groups of children. The sample selected for the final data collection was entirely

new ; it was not included in any other stage of the study that is, during pre testing of the schedules and standardization of the Cognitive Developmen Test.

An eligible child for the Experimental group was defined, "any child age three to five years, who had been attending an ICDS-AWC regularly at leas for a period of six months". An eligible child for the control group was define as, "a child aged three to five years, who did not attend ICDS-AWC or an other child welfare programme". These two groups of children were matche in respect of age, sex and socio-economic status for making the groups comparat

a) Age : Children between the ages of 3+, 4+ and 5+ were selected. T avoid the problem of children crossing the prescribed age limits for the researcl in the very first instance, a sex-wise list of all available eligible children wa drawn with the help of the AWWs. While making the list, a margin of two montl for each age level was kept as shown below :

- under 3+ age group, children from 2 years 10 months to 3 years 9 months
- under 4+ age group, children from 3 years 10 months to 4 years 9 months and
- under 5+ years of age, children from 4 years 10 months to 5 years.

Care was taken to test the children as and when they attained the ag level. An equal distribution of boys and girls at each age level was include in the experimental as well as the control group samples.

b) Sex : An equal distribution of boys and girls was included in the sample

c) Socio-Economic Status (SES) : Subjects belonging to lower SES were selecte In this study, families belonging to the lower SES have been operationally defin as those earning Rs. 750/- or less per month (as per the definition of the Plannin Commission, 1985) with the father employed as unskilled or semi-skilled worke An examination of the differences in the family background and socio-economi

status between children belonging to the Experimental and the Control group did not reveal any significance by the conventional statistical tests.

Sample Size

The ICDS Project Number Four has 90 AWCs. The target population o children proposed to be covered under this Project was 4856; however, th number of children actually enrolled was 3820 and the actual attendance o children in the AWs was 3170 ; only 650 were defaulters. Out of 90 AWs, 2 were selected for collecting data on the required number of experimental grou children. The following procedure was used for selecting AWs for collectin children for the experimental group.

An Anganwadi Observation Schedule (AOS) was used for selecting th AWs. The AOS included the following aspects : (1) infrastructural and othe facilities; (2) play equipment available ; (3) childrens' participation and atter dence; and (4) qualification and competence of the AWWs. The total score allotted to this proforma was 232. Cumulative scores were provided to eac AW. The Anganwadis were further ranked into 1st Class, 2nd Class and 3r Class on the basis of the scores obtained. The AWs which scored upto 33.3 per cent were ranked third, the AWs which scored between 33.33 - 66.66 pe cent were ranked second,and the AWs which scored above 66.66 per cent wer ranked first. Thus out of the 25 selected AWs, eight which fell in the firs class, eight in second class, and the remaining nine in the third class wer included for obtaining the experimental sample. Thus, these 25 AWs selecte represented a good cross-section of excellent, good and fair anganwadis. Th precaution was necessary to take care of the representativeness of the selecte sample.

The experimental group comprised 6.6 per cent of the total populatic of the children enrolled and participating in the ICDS AWCs of Project Numbe

Four (that is, 210 out of 3170 children). These children attended the ICDS AW from 10.30 A.M. to 4.30 P.M. For the control group, children were selecte from those who were registered under ICDS AWs, but were not attending at all. This decision was taken because it was not possible to get children fc the control group elsewhere as in Tamil Nadu State, the Honourable Chie Minister's Nutritious Meal Programme and the ICDS are committed to cove all the preschoolers under their wings. This sample consisted of 13.13 per cer of the population that is, 90 out of 650 subjects who constitute the gap betwee the registration in the AWs and the actual attendance.

Children in both experimental and control groups were equally distribute sex-wise over the 3+, 4+ and 5+ age groups.

The age and sex-wise distribution of sample children is given in Table

Table 1. Distribution of the children in the Study Sample

Age of Children	Experimental group		Control group		Total
	Male	Female	Male	Female	
3+	35	35	15	15	100
4+	35	35	15	15	100
5+	35	35	15	15	100
Total	105	105	45	45	300

Thus 300 children were selected. Seventy children (35 male and 35 femal were selected for each age class in the experimental group making the tot of the experimental sample 210. Regarding control group, 30 children (15 ma and 15 female) were included under each age class. Thus the number of childr studied under the control group was 90.

Out of the total number of children surveyed, that is 210 + 90 childr

the experimental group accounted for 70 per cent and the control group cons tituted 30 per cent. Ideally, for comparison involving statistical tests equa number in the two groups (experimental and control) is preferable. However since data relating to experimental group has varied uses (inter programme and inter-state comparisons) a large sample for the experimental group wa considered appropriate. Furthermore, in the areas covered, the proportion o children participating in the programme was much higher than those not parti cipating. This was another reason for inclusion of a lesser number of childre under the control group.

Data Collection : Techniques and Tools

Techniques : The interview method using a schedule was considered most appro priate. It allows an indepth face to face probing of the subject's conceptior and is the most suitable technique for eliciting information from illiterate and young children (Gupta, 1985).

The interview schedules were structured in nature for maintaining uni formity and ease of analysis. The schedules were formulated both in Englis and in Tamil Language ; however, the interview was conducted in Tamil. Th following schedules were used :

a) Personal Data Sheet : Personal data sheet was prepared for collectin the information regarding the identification of the group, and AWC, backgroun information of the child and his family (Appendix I).

b) Socio-Economic Scale (SES) : Socio-economic scale by Vendal (198 was used, as it was comprehensive, relevant and recent (Appendix II).

c) Home Stimulation Inventory : A Home Stimulation Inventory was prepare to get the information on the home environment of children. The main factor included were on adults responsible for rearing children, availability of pla

material, play opportunities, entertainment facilities, printed literature, parenta stimulation, and time spent by parents in playing/narrating stories to youn children (Appendix III).

d) Anganwadi Observation Schedule : Anganwadi Observation Schedule wa prepared for studying the infrastructure, activities and functioning of the ICD Anganwadis (Appendix IV).

e) Health Status Inventory : To collect information on the health statu of children inventory comprising of four major components, namely : (1) Immuni zation, (2) Physical appearance, (3) Nutritional status, and (4) Episodes of illnes was constructed (Appendix V).

These interview schedules were field tested to find out their effectiveness language and avoidance of ambuguities and repetitions. For this purpose, pilot study was conducted on 25 children, their parents and on 15 AWCs. Afte 20 days of rigorous field work, the filled in schedules were checked and analysed Some necessary changes were incorporated and the schedules were prepare in the final form.

f) Developing and Standardizing and Administering Cognitive Developmer Test (CDT) : A new cognitive development test for measuring the cognitiv development of preschool children was constructed, standardized and administere to the sample children. Standardized tests which attempt to assess cognitive de velopment of children between 3-5 years of age are derived from two traditions the Psychometric approach from the intelligence testing movement, and Piagetia methods of studying the cognitive development of children. Psychometric instru ments are usually interval scales with normative data which allow compariso of a child with other children of the same age. Piagetian-oriented instrument in contrast, are usually ordinal instruments which assess a child's current statu place individual abilities within a hierarchy of skills and emphasize measuremer of mental growth over time.

Elkind (1976) in his analysis of similarities and differences between thes two approaches, notes that both Piaget and Psychometricians, assume tha mental ability is atleast partially determined by genetics, both rely on nor experimental methods of investigation, and both regard reasoning ability a the central function in intelligence. Each approach to assessment presen a unique set of advantages as well as disadvantages. Thus neither Piaget n Psychometric approach singly has yielded assessment procedures which a completely appropriate for preschooler. Therefore, in the process of constr ction of CDT for this study, an attempt has been made to blend the two appr aches of assessment - the Psychometric and Piagetian.

The construction and standardization of the test was carried out in th following steps :

1. defining cognitive development and deciding the sub-tests to be include
2. developing an item pool ;
3. pre-testing, modifying items and materials ;
4. item try out and item analysis ;
   a. Item try out
      i) Item selection ; and
      ii) Sample selection.
   b. Item Analysis
      i) item easiness index ;
      ii) Item discrimination index (D) ;
      iii) Item validity index ; and
      iv) Assembling the test.
5. Standardization of the test ;
   a. Content ;
   b. Administration ;

i) Test direction ;

ii) Time limit ;

iii) Scoring ; and

iv) Answer sheets.

6. Technical Analysis of the Test ;

a. Reliability ;

b. Validity ; and

c. Norms.

1. Cognitive Development and Sub-tests

Robb et al., (1972) remarked that a great deal of ambiguity involved in intelligence testing might be removed if the author of such a test would define clearly the concept of intelligence incorporated in his/her test and provide some evidence that this test does provide the information attributed to it. On this basis the investigator decided to construct an operational definition of intelligence and the areas which the test would measure.

Operational Definition : 'Cognitive Development' refers to higher mental processes which comprise concept formation (conceptual skills), information, comprehension, perception, memory and object vocabulary (Language) development. Before developing the tool for the assessment of cognitive development of preschool children, the following preparatory steps were undertaken. Study of literature on cognitive development, cognitive abilities and their assessment especially with reference to the preschool age. Children attending preschools that is, Anganwadis, Balwadis, and Nursery schools, were observed, in order to acquire an insight into the capabilities of the preschoolers, their attention span and other factors that would serve as guidelines for the development of the test.

The available standardized tests on intelligence, for example, Stanford

Binet Intelligence Scale, Raven's Progressive Matrices, Wechsler's Preschool and Primary Scale of Intelligence and Wechsler's Intelligence Scale for children and Measures of Cognitive Development (Not standardized) developed by NCERT were scrutinized, and each item was carefully studied with reference to the cognitive ability that it was expected to assess in order to adapt items which were suitable. The proven validity of these items was also found helpful.

Taking advantage of this ground work and in line with the operational definition given in the present study the following six sub-tests were included :

i) Conceptual Skills : Concepts are building blocks of the knowledge system. This sub-test was oriented to measure the development of various concepts by children, namely, concept of shape, colour, time, classification, number, seriation, weight, size, texture and coins. The sub-test calls into operation remote memory, ability to discriminate, think and utilize past experiences. Concept of counting and numerical operation also measure cognitive development. Since concentration and attention are non-cognitive functions in essence and manipulation of number, seriation, classification operations are cognitive, this test is of value in that it furnishes a demonstration of how the child relates cognitive and non-cognitive factors in terms of thinking and performance (Glasser and Zimmerman, 1967).

ii) Information : This sub-test measures how much general information the subject has abstracted from his surrounding environment. The test requires ability to comprehend and capacity for associative thinking. Items included in the test are expected to assess the subject's awareness of, and alertness to, the environment.

iii) Comprehension : This test measures the subject's ability to think, recall, associate and comprehend oral directions and actions of people in the environment and reasoning with abstraction.

iv) Visual Perception : Visual perception is basically included to determine the qualitative aspects of relationships which the subject has abstracted from his environment. The subject should be able to see the basic, essential relationship between the objects in the environment. This requires ability to comprehend, capacity for associative thinking, discrimination, reasoning, attention, analysis and concentration.

v) Memory : This sub-test attempts to determine the level of child's ability to pay attention in a simple situation. It measures immediate auditory recall or immediate auditory (attention) span and level of mental alertness and rote memory.

vi) Object Vocabulary : This sub-test measures child's richness of ideas, kind and quality of language and degree of abstract thinking. Vocabulary reflects also a child's level of education and environment.

2. **Developing an Item Pool**

After deciding the sub-tests, 150 test items considered relevant were selected to be included in the CDT battery. In this connection Aiken (1982) has stated that about 20 per cent more items than needed to be written so that an adequate number of good items are available for the final version of the test.

These test items were selected with great care, considering the age range and comprehension level of children. The test included both 'verbal' and 'non-verbal' items since the tendency in the cognitive testing according to Boaz (1971), is to have a composite battery of tests containing verbal and non-verbal tests.

The initially pooled items were then presented to 10 experts/judges in the areas of Psychology, Education and Child Development. Their suggestions and comments were helpful in establishing content validity and comprehensiveness.

The items were arranged under the relevant sub-tests, irrespective of the age level and difficulty level as the point-scale method was followed. The subject had to perform upto the maximum level possible on the test. Gerow (1980) views that there is no evidence that grouping items in order of difficulty has a significant effect on test scores. Consequently test designers would do well to be less concerned about the arrangement of the items and more concerned that items are well written and measure what they are supposed to measure. The testing kit was locally developed as per the test items, taking care to include models, wherever possible. The picture cards were drawn by an artist, the wooden material was made by a carpenter and other things were purchased locally. Elements which would distract the attention of the child were avoided to the extent possible.

In the first instance the test was written in English subsequently was translated into Tamil, the only language with which the subjects were familiar. When the material, the text of the test and the scoring cards were ready, testing work was undertaken. Due to language barrier, the testing was done by a well trained whole-time tester and interpreter who was a Home Science Graduate with specialization in Child Development. Before going to the field for testing she was given a week's intensive training in the administration of the test battery.

3. Pretesting - Modifying Items and Materials

The first pilot study was carried out with 54 children, 3+, 4+, 5+ year old of both sexes from the lower, middle and higher socio-economic group (3 children in each category). The test was administered to each of the individuals orally. This initial try out in the exploratory stage of test construction revealed that some items were of little or no value for the purpose of the test. Problems were also identified with some of the testing procedure, presentation of the

test material, and the selection and utility of the test material as such. Attempts were therefore, made to correct these ambiguities. Fifty irrelevant/inappropriate items were deleted/modified from the test ; and a few items like memory relating to story was added. Items on verbal perception were increased and items from object vocabulary were decreased in order to balance the sub-test.

Four subsequent pretestings followed with another set of representative samples, to formulate and clarify instructions, to judge the clarity of item phrasing, to find out whether each item and materials evoked the kind of responses expected. The instructions, items, procedure of presentation and materials were modified on the basis of these pilot studies. The scoring procedure adopted during pretesting was, giving one point for each correct answer. The six sub-tests of the CDT have differential weightages. Such differentials are consequential to the number of items included under the various sub-tests.

4. Item Try Out and Item Analysis

a. Item Try Out

i) Item Selection : Taking into account the findings of the exploratory studies a preliminary test form containing 100 items which survived the initial screening was prepared. A separate score card was also prepared.

ii) Sample Selection : This preliminary test form of Cognitive Development Test was then administered individually - orally to 15 boys and 15 girls each in the age group of 3+, 4+, 5+, equally distributed from higher, middle and lower socio-economic groups. Thus the total number of children was 270 as shown in Table 2.

Table 2. Sample distribution/Selection for gathering data for item analysis

Socio economic level (SES)	Age group						Total
	3+		4+		5+		
	Male	Female	Male	Female	Male	Female	
Low SES	15	15	15	15	15	15	90
Middle SES	15	15	15	15	15	15	90
Higher SES	15	15	15	15	15	15	90
Total	45	45	45	45	45	45	270

Borg and Gall (1983) state that it is desirable to have a representative sample of 100 or more subjects in order to obtain adequate data for item analysis However, when small or difficult to reach population are involved, the researchers must settle for smaller sample. Since the test was devised for urban preschool children, rural subjects were not included. The sample was selected from urban ICDS projects, anganwadis, municipal schools, experimental nursery schools, nursery schools run by public and private agencies. The total scores were obtained.

b. Item Analysis

Freeman (1976) holds that the quality and merits of a test depend upon the individual items of which it is composed. It is, therefore, necessary to analyse each item in the standardization process, in order to retain only those that suit the purpose and rationals of the device being constructed. High reliability and validity can be built into a test in advance through item analysis Item analysis thus formed an integral part of the test construction. The following were calculated for Item Analysis :

i) Item Easiness Index : The method given by Aiken (1982) was adopted. The steps in this method are :

a. all the 270 score cards are arranged in the order of ascending scores

b. 27 per cent (i.e. 73) score cards from the upper score group and 27 pe cent (i.e. 73) score cards from the lower score group are counted off

c. the middle (124 score cards) 46 per cent is kept aside ; and

d. using the scores of upper and lower group with the help of the statis tical formula given below item easiness index was calculated for eac item :

$$P = \frac{U_p + L_p}{U + L}$$

Where P = Item easiness index

U_p and L_p = designate the number of examinees in the upper and lowe groups respectively, who pass the items.

Garrett (1983); Aiken (1982) maintain that other things being equal; item of moderate difficulty (40 - 50 - 60 per cent) passing are to be preferred t those which are much easier, or much harder. In addition to this criterion th normal curve was taken as a guide in the selection of difficulty indices a the talent range to be measured was wide as per Garrett (1983). Therefore items having difficulty level from 0.25 to 0.85 were selected. Since the tes was meant for three age groups, items of varied difficulty as per normal curv were also added.

ii) Item Discrimination Index (D) : The item discrimination index (D) is a measur of the effectiveness of the item in discriminating between the high and lo scorers on the test as a whole. Item discrimination index was calculated b using the following formula :

$$D = \frac{U_p - L_p}{U}$$

Where D = Item discrimination index

U = Number of examinees in the upper group who pass the iten

Items having D index 0.20 or higher were selected for the final form. A

Aiken (1982) holds that selecting items with high 'D' value produces an internally consistent test in which the correlation among items are highly positive. Hence the test constructed is internally consistent, that is, it is valid.

iii) Item Validity Index : Item validity index using biserial correlation was also computed following Garrett (1983), as it is usually regarded as the standard procedure in item analysis. The procedure followed was as given below :

a) the answer sheets were arranged according to the test scores with the highest score on top;

b) the top 27 per cent and the bottom 27 per cent were counted off that is, the first pile contained 73 and the second pile contained 73 score cards respectively ;

c) the number of subjects who had passed each item in the top group and the bottom group were noted and this was converted into percentage and

d) by referring to Table-51 in Garrett's "Statistics in Psychology and Education" (1979), with the percentage of successes in the two groups biserial correlation (r_{bis}) was read.

Items with Validity indices of over 0.30 were selected. According to Garrett (1983) as a general rule, items with validity indices of 0.20 or more are regarded as satisfactory. The selected test items for the final form or CDT on the basis of the results of the analysis are shown in Table 3.

FINAL FORM OF CDT

Table 3. Item Difficulty, Proportion of Pass (P), Item Discrimination (D), Validity Index - Biserial Correlation (r_{bis}) : Test - Items

Sl.No. (1)	Test Items (2)	(P) (3)	(D) (4)	(r_{bis} (5)
I	Conceptual skills			
	1) Concept of shape			
	o Round	.40	.76	.76
	o Square	.30	.76	.76
	o Triangle	.30	.76	.76
	2) Concept of color			
	a) Matching colors			
	o Red	.82	.30	.53
	o Green	.77	.40	.62
	o Blue	.75	.40	.62
	o White	.75	.52	.69
	o Black	.73	.52	.70
	o Yellow	.67	.60	.72
	b) Identification of colors			
	o Red	.56	.60	.63
	o Green	.52	.64	.65
	o Blue	.50	.72	.70
	o White	.45	.76	.76
	o Black	.31	.82	.83
	o Yellow	.32	.82	.82
	3) Concept of time			
	o Night	.50	.56	.59
	o Day	.42	.58	.60
	4) Classification			
	o Separating two pulses	.40	.74	.74
	o Separating three pulses	.20	.44	.66
	5) Concept of number			
	o Two buttons	.68	.60	.72
	o Four buttons	.50	.86	.85
	o Six buttons	.35	.82	.82

(1)	(2)	(3)	(4)	(5)
	6) Concept of serialisation			
	o Seriation	.50	.44	.45
	7) Concept of weight			
	o Heaviness	.85	.42	.33
	8) Concept of size			
	o Thick and thin	.70	.28	.55
	o Big and small	.79	.36	.61
	9) Concept of texture			
	o Soft	.67	.52	.70
	o Rough	.50	.60	.60
	10) Recognizing coins			
	o 5 np	.65	.52	.59
	o 25 np	.46	.62	.62
	o 50 np	.30	.54	.62
	o Which coin is most valuable	.30	.40	.45
II	11) Information			
	o What is this ? (showing your thumb)	.57	.48	.50
	o What are eyes for ?	.41	.56	.58
	o What do you get from a coconut tree ?	.41	.64	.63
	o What is the color of the grass ?	.40	.60	.66
	o How many ears do you have ?	.45	.54	.54
	o What is dosai made of ?	.40	.60	.60
	o How many legs does a dog have ?	.42	.52	.61
	o Why should you not play with a match box ?	.42	.54	.54
III	Comprehension			
	12) Verbal perception			
	o Point out your right ear ?	.62	.30	.43
	o What should you buy to go by bus ?	.44	.48	.49
	o What does the postman bring ?	.50	.50	.51
	o Why do you come to school ?	.36	.44	.47
	o Where does the fish live ?	.68	.40	.51
	13) Listening comprehension			
	o Three directions	.50	.62	.63
	o Four directions	.40	.50	.60

(1)	(2)	(3)	(40	(5)
IV	Visual perception			
	14) Dissimilarities			
	o Big and small	.65	.42	.65
	o Fruits and vegetables	.40	.50	.53
	o Animals and birds	.39	.36	.32
	15) Button pattern			
	o Two buttons	.69	.48	.68
	o Three buttons	.50	.76	.79
	o Four buttons	.45	.76	.76
	o Five buttons	.27	.56	.72
V	Memory			
	16) Memory for digits			
	o Four digits	.50	.80	.80
	o Five digits	.46	.86	.83
	17) Memory for words			
	o Ramu climbed the coconut tree and plucked coconuts	.50	.64	.63
	18) Memory for objects removed			
	o Four objects	.32	.28	.44
	o Five objects	.12	.38	.30
	19) Memory for story			
	o How many goats were there ?	.79	.10	.28
	o With what did they make their house ?	.67	.22	.28
	o Who blew at their houses ?	.62	.48	.59
	o Which house did not break ?	.45	.52	.52
	o Why ?	.41	.58	.64
VI	Object vocabulary			
	o Pencil	.83	.12	.36
	o Knife	.80	.38	.55
	o Key	.80	.30	.55
	o Watch	.79	.40	.62
	o Umbrella	.76	.38	.68
	o Spectacles	.72	.50	.65

Out of the 100 items selected on the basis of the pilot study only 63 items having high discrimination power, high validity index and a difficulty index ranging from 0.25 to 0.85 were retained for the final test form; for one item that is, the concept of size, the test material was modified. Aiken (1982) stated "new items are difficult and time consuming to construct so whenever possible a defective but relevant item should be revised rather than discarded".

In addition to the 63 items chosen on the basis of item analysis, one very easy item that was passed by majority of the subjects and one very difficult item that was passed by negligible proportion was selected, making the total number of items 65. An item passed by all subjects was selected in order to avoid zero score.

Regarding the length of the test Anastasi (1976) stated that when a test is shortened by eliminating the least satisfactory items, however short the test may be, it is more valid and reliable than the original longer instrument.

iv) Assembling the Test : After item analysis the selected items were assembled and once again reviewed.

5. **Standardization of the Test**

The assembled test items were then standardized. The purpose of standardization was to construct an objective test which would be free from subjective judgement regarding the ability, skills and knowledge to be measured and evaluated.

a. Content

The test constructed had a common set of stimuli (items) to be presented to each subject in a specific order and their responses were to be recorded in the same order of presentation. Brown (1970) also stated that unless all persons are exposed to the same items, their performance cannot be directly compared.

Ambiguity in the wording of an item or in specifying the procedure fc recording may produce unstable responses (Brown, 1970). Therefore, care wa taken to minimize the errors within the test by wording the test procedu in such a manner that the same responses would forthcome on each testin

b. Administration

i) Test Directions : The test administering procedure was clearly state Preschool testing is a more highly inter-personal process - a feature that au ments both the opportunities and the difficulties presented by the test situatio

All tests designed for preschool children require individual administratic (Anastasi, 1976). Therefore, the present test constructed was individual. Detail direction for presenting each sub-test items was also given.

ii) Time Limit : The test constructed was power test and there was no tin limit. Speeded scales should not be used in tests for the lower age levels f two reasons : a) speed of performance has not yet become a motivating fact in very young children ; and (b) the shifting attention of children at these a levels can obscure their true levels of skills and insight (Freeman, 1976). Besid this, the restricted time limits frequently produce unstable performance (Brow 1970).

iii) Scoring : Scoring errors were minimized by providing objective scori procedure. For each correct answer one mark was given. The total score const tuted the 'raw' score obtained by the subject.

iv) Answer Sheets : Separate score cards were designed for recording t answers of the subjects. Immediate recording in the score card was consider the best procedure.

6. **Technical Analysis of the Test**

The next major step in the construction and standardization of the te was to technically analyse the test in order to determine its reliability, ensu

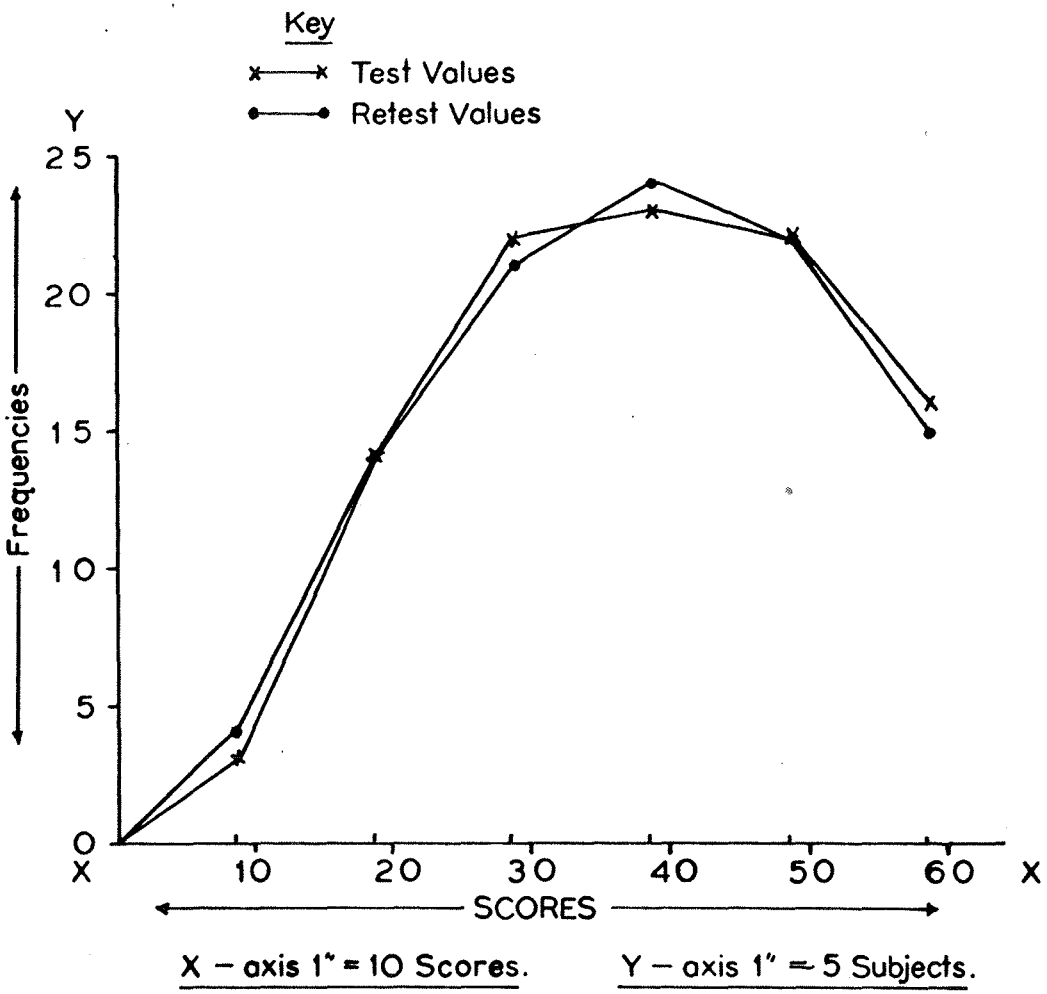
a. Testing Reliability

"Reliability refers to consistency of scores obtained by the same person when re-examined with the same test on different occasions, or with different sets of equivalent items, or under variable examining condition" (Anastasi, 1976 A "perfectly reliable" measurement means one that is completely accurat or free from error. Guilford (1973) stated the same "Yardstick" applied to th same individual or object in the same way should yield the same value fro moment to moment, provided that the thing measured had itself not change in the meanwhile.

Condsidering the disadvantages of the various methods of determinir reliability, Freeman (1976) stated that the desirable procedure for testing reli bility would be to use test - retest reliability procedure, and conducting th retest within a week. The results can be affected by irregularities of grow tempos, when the time interval is significant.

For determining test-retest reliability, the constructed CDT was admin stered to a new sample of 100 children in preschool age. Five days after th initial test, the same group was re-examined with the same test form. Th total scores of the subjects in the two tests were taken and the correlatic coefficient was calculated by the product moment method. The frequency distr bution of scores obtained by children on CDT on testing and retesting are shov graphically in figure 4. The correlation coefficient for the two sets of cogniti scores was 0.95. If the reliability coefficient of a test is 0.95, it means th test measures the true ability to the extent expressed by an 'r' of 0.95. Garre (1983) states if the test is to be used to make individual diagnosis (that to seprate pupil from pupil), its reliability coefficient for a single grade shou be 0.90 or higher.

Fig. 4. FREQUENCY DISTRIBUTION OF SCORES OBTAINED BY CHILDREN ON TEST AND RE-TEST OF CDT.



Sattler (1986) mentioned that for most tests of cognitive and special abilities, a reliability coefficient of 0.80 or higher is acceptable. Therefor the constructed test has outstanding reliability.

b. Evaluating Validity

The validity of a test is determined experimentally by finding the correl tion between the test and an independent criterion. A high correlation betwe a test and a criterion is evidence of validity, provided (1) the criterion w set up independently and (2) both the test and the criterion are reliable (Garret 1983). In line with this description, the criterion validity of the CDT beir constructed was evaluated by comparing results from the instrument und study with results from the standardized test - the abbreviated version of t Stanford-Binet Intelligence Scale - Form L-m 1960 revision, adapted in Hin by Kulshreshtha (1971). The abbreviated version was used for saving tim Kennedy et al., (1963) ; Terman and Merrill (1960) stated in the interest saving time, the Binet scale can be administered in an abbreviated scale consi ting of four or six items at each age level. The correlation between the lo and short forms was found to be about 0.98, which represents, a nearly perfe relationship.

The Binet scale being in Hindi was first translated into English, then in Tamil for administration in Tamil Nadu. Tamil version of the Binet scale a the test constructed was then administered to 25 subjects, randomly select for separate validation sample. The IQ of children on the Binet scale was co puted. The raw scores of the subjects in CDT, the validity of which was be determined, were converted into standard scores referring to the nor derived by the investigator for each age group during the standardization proce The standard scores of the subjects were then correlated with their IQ in Stanfo Binet Intelligence scale by the Product-moment Coefficient of Correlatio

The correlation was found to be 0.80. The test including the items usec oral questions asked, the instructions for testing, test presentation sequence and scoring procedure and the score card thus finalized is given in (Appendix V The testing kit is shown in picture 1, 2, 3 & 4.

c. Norms

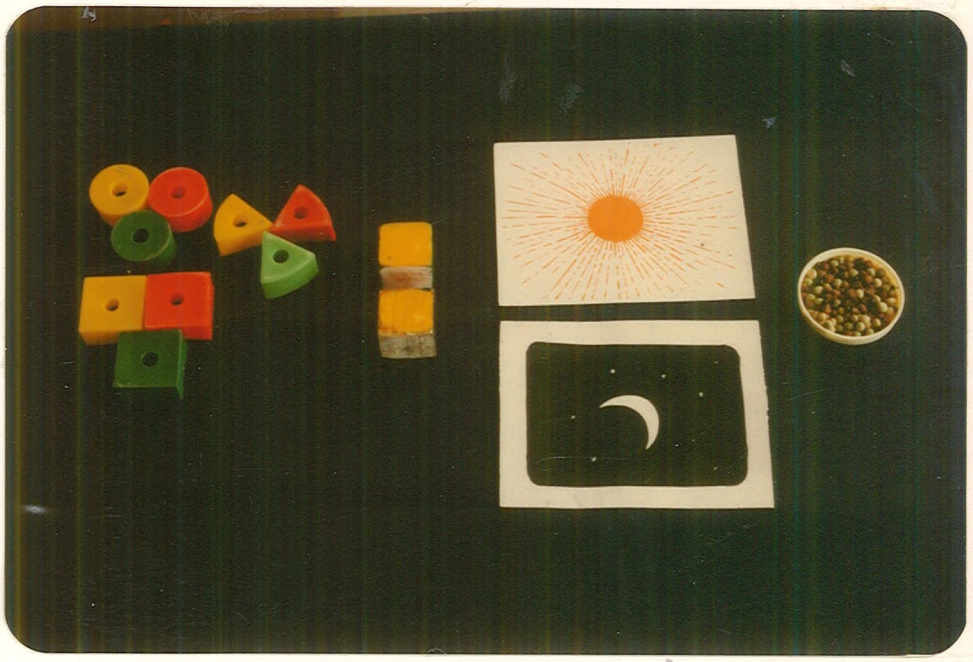
Cognitive measurement norms for 3 years, 4 years and 5 years old childre were computed from the raw scores of the representative standardization sample These norms serve as a basis for interpreting the scores of subsequent examinee (Aiken, 1982).

There are 5 kinds of scales to express the raw scores. But when furthe statistical analysis are to be made of the test scores, it is valuable to hav scores expressed on an interval scale-that is, to have a scoring scale whos units are all of equal size. Standard scores possess this property (Brown, 1970 The scaled scores are based, as mentioned earlier on a reference group of 27 children which were included in the standardization sample between the age of 3 and 5 years. For every subject in the standardization sample, raw score on the test were converted to scaled scores (standard scores) based on referenc group. Consequently, the scaled scores permit a direct comparison of the te performance of a subject of a given age with the performance of the referenc group.

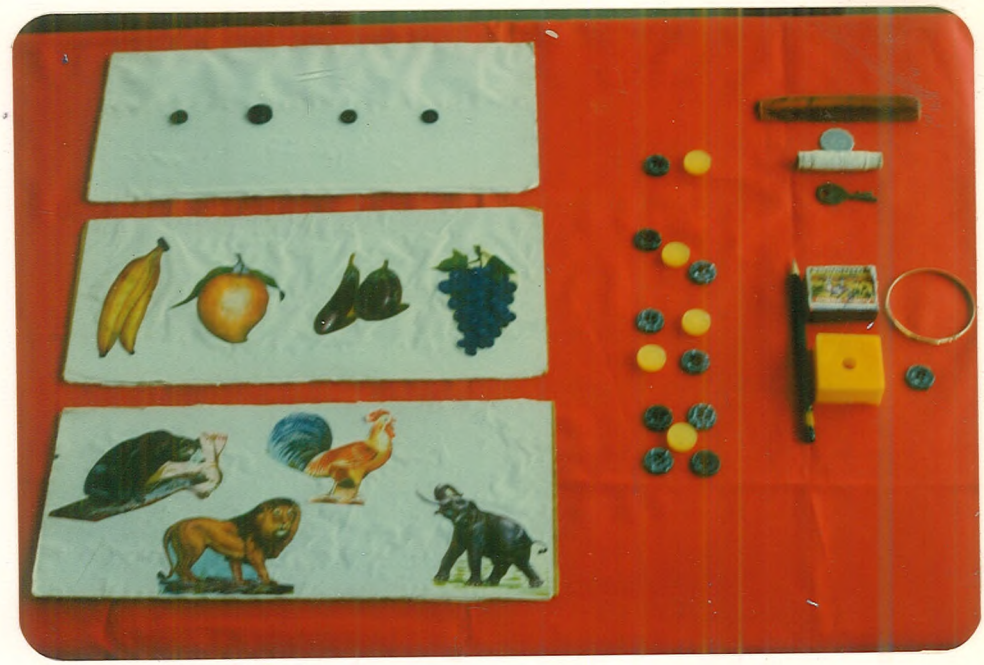
Standard scores are set of transformed scores derived from the mean ar standard deviation of the raw scores. The disadvantage of standard scores tha is decimals and negative numbers are usually overcome by transforming standard scores to another scale with an arbitary $\overline{X}$ and σ (Brown, 1970). The followir formula for conversion of raw score to standard score was used (Garrett, 1983

$$X' = \frac{\sigma'}{\sigma} (X - M) + M'$$

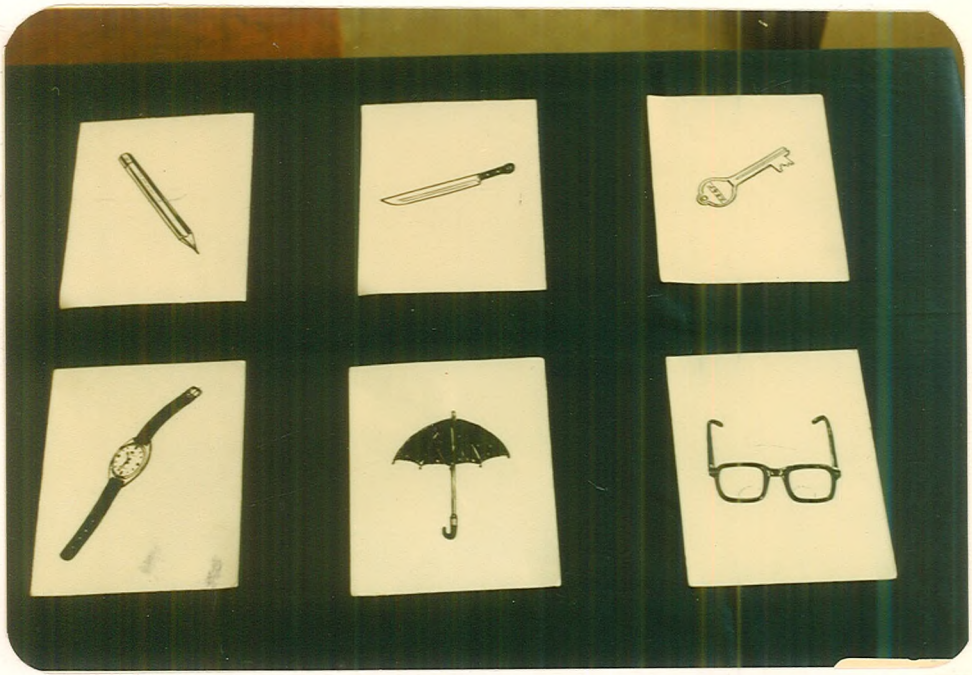
Where X = a raw score



Picture 1 Showing the Testing Kit



Picture 3 Showing the Testing Kit



Picture 4 Showing the Testing Kit

X' = Standard score

M = Mean of raw scores

M' = Arbitary mean (100)

σ = SD of raw scores

σ' = Arbitary SD (20)

The norms thus calculated for 3, 4 and 5 years old children were put into a form of norm table (conversion table) given in Table 4, 5 & 6.

Table 4. Cognitive Development Norms for three year old children

C. A-3 years

M = 27.5
M' = 100
σ = 7.54
σ' = 20

Raw scores	Standard scores	Raw scores	Standard scores
1	30	34	117
2	33	35	120
3	35	36	123
4	38	37	125
5	40	38	128
6	43	39	130
7	45	40	133
8	48	41	136
9	51	42	138
10	53	43	141
11	56	44	144
12	59	45	146
13	61	46	149
14	64	47	152
15	67	48	153
16	69	49	157
17	72	50	160
18	75	51	162
19	77	52	165
20	80	53	168
21	83	54	170
22	85	55	173
23	88	56	176
24	91	57	178
25	93	58	181
26	96	59	184
27	99	60	186
28	101	61	189
29	104	62	192
30	107	63	194
31	109	64	197
32	112	65	200
33	115		

Table 5. Cognitive Development Norms for four year old children

C. A - 4 years

$M = 38.66$
$M' = 100$
$\sigma = 12.9$
$\sigma' = 20$

Raw Scores	Standard scores	Raw scores	Standard scores
1	42	34	93
2	43	35	94
3	45	36	96
4	46	37	97
5	48	38	99
6	49	39	100
7	51	40	102
8	52	41	103
9	54	42	105
10	55	43	107
11	57	44	108
12	59	45	110
13	60	46	111
14	62	47	113
15	63	48	114
16	65	49	116
17	66	50	117
18	68	51	119
19	69	52	121
20	71	53	122
21	73	54	124
22	74	55	125
23	76	56	127
24	77	57	128
25	79	58	130
26	80	59	131
27	82	60	133
28	83	61	135
29	85	62	136
30	86	63	138
31	88	64	139
32	90	65	141
33	91		

Table 6. Cognitive Development Norms for five year old children

C.A-5 years

M = 46.66
M' = 100
σ = 11.4
σ' = 20

Raw scores	Standard scores	Raw scores	Standard scores
1	20	34	78
2	22	35	79
3	23	36	81
4	25	37	83
5	27	38	85
6	29	39	86
7	30	40	88
8	32	41	90
9	34	42	92
10	36	43	93
11	37	44	95
12	39	45	97
13	41	46	99
14	43	47	100
15	44	48	102
16	46	49	104
17	48	50	106
18	50	51	107
19	51	52	109
20	53	53	111
21	55	54	113
22	57	55	114
23	58	56	116
24	60	57	118
25	62	58	120
26	64	59	121
27	65	60	123
28	67	61	125
29	69	62	127
30	71	63	128
31	72	64	130
32	74	65	132
33	76		

These conversion (norm) tables would enable the test users to convert raw score to a standard score or to find the raw score equivalent to a giv derived score, for comparison of the subject's performance with his peers. stated earlier the interview and testing of all the subjects was conducted indi dually in Tamil. The selected children in each age group were given Cognit Development Test, and their parents were interviewed for obtaining informat on family background, socio-economic status and stimulation provided to child at home. Care was taken to interview the parents at their convenien In addition to above, in the case of control group, the parents were reques to indicate the reasons for not sending their children to AWs.

The filling in of all the schedules and testing of each subject was conduc in more than one session. This was done to sustain the attention of child through out.

The guidelines given below were followed while testing the preschoole

- the testing was done in the forenoon because in the afternoon child were found to be less alert and sleepy ;
- all the children were tested individually, orally, in an exclusively priv room where testing could be done undisturbed (Picture - 5). The st room of AWs was selected for this purpose in case of the experimer group. In case of the control group, the child was tested in an exclus area of the house ;
- rapport was established with children by visiting the AWs for times prior to testing ;
- all the material was arranged systematically out of the child's si in order to avoid distraction ;
- before starting the testing, the child was made physically comfortat and
- adequate praise and encouragement was given in order to make child confident.

The data on health status of children was collected partly by mak observations of the physical appearance of the child and partly from the recor registers and weight for age charts maintained in the AWCs to identify n

Picture 5 A Typical Testing Situation

nourished cases in case of the experimental group. For the control group, thei mothers were requested to furnish the immunization and illness details and thei weight was personally checked by investigator for finding out their nutritiona status.

The Anganwadi observation schedule was filled by observing the functionin of the selected AWs and the competence of the AWWs. The AWWs were als interviewed for collecting information regarding their qualifications and trainin

Variables

The independent variables chosen for examining their influence on th dependent variable namely cognitive development of the child were :

i) parental age and education ;

ii) family size, income and type of the family ;

iii) ordinal position, age and sex of child ;

iv) stimulation provided at home ;

v) health and nutritional status of child ;

vi) Anganwadi attendance of the child ;

vii) AWW's competence ;

viii) time given to various preschool education activities by the AWWs ; ar

ix) performance and participation of children in AW activities.

Statistical Methodology Applied

Prior to the summarization of the data, every schedule and score car was checked thoroughly to ensure that no incomplete or inappropriate informatic was recorded ; the gaps, if any were filled in. The data thus obtained were sun marized manually in the form of four-way master tables, namely, Age, Se: Experimental versus Control and different items on which information was obtaine through the different schedules and CDT.

Initially, the data collected were in the form of ticks and crosses ar

hence qualitative. They were transferred to the respective quantitative scale b assigning scores. For the purpose of statistical analysis, possible alternative for each question were given scores in suitable scales and the scores for group of items were added. The score totals thus obtained were treated as quantitativ variables.

A tabulation plan was prepared for the utilization of the master table to prepare suitable three-way and two-way tables. Utilizing the 12 combinations of sex, age and experimental vs control, Analyses of Variance (ANOVA) on completely Randomized Design (CRD) model was carried out. Percentages wer worked out and compared for different cells involving Experimental Vs Contro age-wise, sex-wise and overall. The variation between the means in respec of the 12 combinations of sex, age, Experimental Vs Control was tested agains the residual within cell variation through the 'F' test. The differences betwee the mean cognitive scores between different sexes, between different age group and between Experimental Vs Control were tested using the normal and the ' tests.

Relationship between the cognitive scores (dependent variable) on or hand and different independent (variables) factors on the other were investigate using simple correlation, simple regression, multiple correlation, and partial re gression equations. The Chi square (χ^2) test of independence was extensive used to identify the background socio-economic and other factors influencing significantly the cognitive scores. For calculating the ANOVA, multiple correlatic and multiple regression equations, electronic computer was used. The multip regression equations were used to obtain predicted values of the cognitive scor corresponding to selected combinations of the score values of significant facto treated as independent variables.

Findings and Discussions

FINDINGS AND DISCUSSIONS

This research study aimed at investigating the impact of the preschool education component in the ICDS on the cognitive development of children. This involved studying also the other related aspects of the ICDS programme which influence childrens' personality and growth. This chapter presents the critical analysis of the data and interpretations of the findings under the following broad dimensions :

A. **Information on the Family Background of the Selected Children ;**

B. **Mental Stimulation Received at Home by the Children ;**

C. **Physical Environment and Functioning of the Anganwadis ;**

D. **Impact of ICDS on Health and Nutrition Status of Children ;**

E. **Sub-tests of CDT ;**

F. **Difference in Cognitive Development of Children in Experimental Versus Control, Male Versus Female and Between the Different Age Classes (3+, 4+ and 5+ Years) ;**

G. **Influence of Family Background on Cognitive Development ; and**

H. **Other Factors which Influence the Cognitive Development.**

The analysis done in this chapter has been rigorous using relevant statistical tools and techniques. The discussions, interpretations and findings are critical and objective, bringing out both the strengths and weaknesses of the ICDS programme, with special reference to its impact on the cognitive development of children.

A. Information on the Family Background of the Selected Children

Information on the family background of the selected experimental and control children included parents' age, education, occupation, income, family size and type. The data are summarized in two aspects. The first aspect consists of percentage distribution of parents or families of experimental

and control groups of children in respect of each of the variables mentioned above. The second aspect consists of comparing the mean scores of the experimental and the control groups of children on the various items included in the socio-economic status scale in order to statistically examine the validity of the hypothesis that selected children for the experimental as well as control group belonged to similar socio-economic background.

For the first aspect data over the age classes and sexes were pooled in order to ensure an adequate base for comparison of the experimental versus control. For the second aspect, however, relevant data were summarized and presented for each age class separately because these were considered adequate for the statistical tests to be carried out.

I Percentage Distribution

The distribution of percentage of parents of experimental and control groups of children according to their age is given in Table 7.

Table 7. Percentage distribution of parents of experimental and control groups of children according to their age

Age range in years	Parents of children belonging to			
	Experimental group (210)		Control group (90)	
	Mother	Father	Mother	Father
20 - 30	68.0	29.0	90.0	54.0
31 - 40	30.0	53.0	8.8	42.0
41 - 50	2.0	14.0	1.2	4.0
51 - 60	-	4.0	-	

Note : For the experimental and control groups the percentages were calculated over the base numbers of 210 and 90 respectively.

A higher percentage of the parents of the control group was in the younger age group, that is 20 - 30 years. In contrast the percentage of parents in the experimental group was relatively higher in the intermediate age group of

31 - 40 years. Sixty eight per cent of the mothers and 29 per cent of the fathers of the experimental children were in the youngest age group of 20-30 years whereas 90 per cent of the mothers and 54 per cent of the fathers of the control children were in that age group.

Table 8 presents of percentage distribution of parents of experimental and control groups of children according to their literacy status.

Table 8. Percentage distribution of parents of experimental and control groups of children according to their literacy status

Literacy Status	Parents of children belonging to			
	Experimental group		Control group	
	Mother	Father	Mother	Father
Illiterate	40.0	19.0	64.0	39.0
Primary	32.0	28.0	19.0	22.2
Middle	19.0	36.0	12.0	26.6
Secondary	9.0	15.0	4.0	12.2
Graduate/Diploma	-	2.0	1.0	-
Post-graduate	-	-	-	-

Mothers of experimental as well as control groups had less education than the fathers. A majority of the illiterate mothers and fathers belonged to the control group - 64 per cent and 39 per cent respectively. Higher education, middle class onwards, even though very limited, was found among fathers of children in both the experimental and control groups.

Table 9 shows the occupation pattern of parents of selected children.

Table 9. Percentage distribution of occupation of parents of experimental and control groups of children

Occupation	Parents of children belonging to			
	Experimental group		Control group	
	Mother	Father	Mother	Father
Not employed	96.2	6.0	85.5	-
Unskilled workers	3.4	93.0	14.5	98.0
Semi-skilled and skilled	0.4	1.0	-	2.0

A majority of the mothers of both the experimental (96%) and the control (85.5%) groups of children were generally unemployed. Almost all fathers of the experimental and control groups were unskilled workers (93 and 98% respectively). Occupation-wise mostly fathers of both the groups were mill coolies or building construction labourers. The percentage of parents with semi-skilled employment was very small being 0.40 per cent for the experimental mothers and 1 per cent and 2 per cent for the experimental and control fathers respectively. None belonged to clerical, supervisory, middle management, professional or top management level positions.

Table 10 presents the percentage distribution of experimental and control households according to their monthly income.

Table 10. Percentage distribution of experimental and control households according to their monthly income

Income range Rupees	Households of children belonging to	
	Experimental group	Control group
126 - 150	5.7	4.2
151 - 700	82.8	95.8
701 +	11.5	-

Most of the households of children in both the groups had income of Rs. 151 - 700 per month.

Table 11 displays the data on the family size of selected children.

Table 11. Percentage distribution of the family size of the selected experimental and control groups of children

Number of family members	Family size of children belonging to	
	Experimental group	Control group
3 - 4	27.6	32.2
5 - 6	48.5	46.6
7 - 8	18.1	14.5
9+	5.8	6.7

Nearly one third of the households, both in the experimental and control groups, had 3-4 members in the family, whereas nearly half the families in both the groups had 5-6 members. Only 18.1 per cent and 14.5 per cent of the experimental and control families had 7-8 members. Only a small percentage That is, 5.70 and 6.65 per cent of experimental and control families had 9 or more members.

Table 12 presents the family type of selected experimental and control groups of children.

Table 12. Percentage distribution according to the family type of the selected experimental and control groups of children

Family Type	Family type of children belonging to	
	Experimental group	Control group
Joint	25	22.3
Nuclear	75	77.7

Three-fourths of the households, both in experimental and control groups, belonged to nuclear family type.

Table 13 presents the mean differences of families of experimental and

II Mean Differences of Scores

Table 13. Mean differences of scores on different socio-economic characters (experimental versus control)

Character	Age (yr)	Mean scores: Experimental T_1	Control T_2	Difference $T_1 - T_2$	C.D. (at 5% level)	Significance
Mothers' education	3+	1.07	0.933	0.14	0.450	NS
	4+	1.05	0.56	0.49	0.430	*
	5+	0.785	0.266	0.519	0.359	**
Fathers' education	3+	1.54	1.33	0.21	0.449	NS
	4+	1.57	1.16	0.41	0.452	NS
	5+	1.31	0.766	0.53	0.420	*
Fathers' occupation	3+	1.01	1.03	0.02	0.061	NS
	4+	1.07	1.07	0.00	0.128	NS
	5+	1.10	1.00	0.10	0.140	NS
Family income	3+	3.028	3.16	0.135	0.175	NS
	4+	2.98	3.10	0.12	0.212	NS
	5+	3.14	3.06	0.08	0.148	NS
Family size	3+	1.485	1.466	0.02	0.241	NS
	4+	1.40	1.50	0.10	0.242	NS
	5+	1.45	1.48	0.03	0.190	NS
Family type	3+	1.77	1.76	0.01	0.183	NS
	4+	1.71	1.76	0.05	0.193	NS
	5+	1.77	1.80	0.03	0.180	NS

Age-wise (3+, 4+ and 5+ years) analysis of the mean differences of SES scores of the experimental and control groups revealed that only in the case of the 5+ aged children the differences in scores on mothers' as well as fathers' education was significant statistically. The mean scores on mothers' education for the experimental group was somewhat higher at the 4+ and 5+ age classes.

than the mothers of the corresponding age classes of children belonging to the control group. It may, however, be mentioned that even for the experimental group the mean score was low, being only about 1.1 or less in the scale of 0-5.

As far as fathers' education was concerned the difference between mean scores of fathers was not significant for the 3+ and 4+ age classes, but was marginally significant for the age class 5+, the scores for control group being somewhat lower. However, even for the experimental group, the mean score was low being only about 1.6 or less in the scale of 0-5.

No difference was found between the mean scores of families of experimental and control groups, with respect to fathers' occupation, family income, family size, and family type. Thus at all the age levels, in most of the items, the mean scores for the experimental and the control groups were of the same order, the differences in SES of experimental and control group being negligible.

The components of SES were considered together by working out total scores for the SES as a whole. Data were pooled over the age classes. The differences in the overall scores between the experimental and the control groups were examined separately for each sex ; subsequently the mean differences pooled over both the sexes were worked out.

For the male children the mean of the total score in respect of the socio-economic status scale was 8.6 for the experimental group, and 8.1 for the control group, the difference between the two groups being only 0.5. For the female children the mean of the corresponding total score was 8.5 for the experimental group and 7.5 for the control group, the difference being 1.0. When scores of both the sexes of children were pooled, the mean of the total score for SES was 8.5 for the experimental group and 7.8 for the control group, the difference being 0.7. When compared with the overall range of the total score for socio-economic status scale (0-19.5) the above differences are

be considered negligible. In other words, the difference between the two groups of children in respect of their socio-ecnomic status, which largely determines the family background, is statistically insignificant, thereby implying that the difference between the cognitive scores of children of experimental and control groups, if any, may not be ascribable to the difference in their SES.

The appropriateness of the selection of the control was also examined from the angle as to why these children were not attending the ICDS AW despite registration.

Table 14 gives the reasons given by parents of control children for non-participation of their children in the ICDS AWs.

Table 14. Percentage distribution of reasons given by parents of control group for non-participation of their children in the ICDS AWCs.

Reasons for non-participation of children in ICDS AWCs.	Percentage parents
Parents not interested in /not convinced of the benefits of the programme	49.0
Children were looking after younger siblings	32.0
Children were afraid of the teacher	16.0
Children were suffering with infectious disease	1.5
Anganwadi was far away	1.5

As evident, every alternate parent was not interested in or not convinced of the benefits of the ICDS programme. About one third of the number of parents kept their older children at home to look after younger siblings. In the remaining cases, most of the children were afraid of the teacher and hence reluctant to go to the Anganwadis. Reasons such as distance of anganwadi and child suffering from infectious disease were rare.

As indicated above, the reasons for not sending the children to the AWs were principally disinterestedness in the programme and unwillingness on the

part of the parents, particularly mothers, for fear of loosing the assistance from the elder child to look after the younger child. These reasons cannot vitiate their serving as control since they were similar to the experimental group in most respects.

B. Mental Stimulation Received at Home by the Selected Children

Home environment and the stimulation provided at home to a child contribute to cognitive development. Hence it was considered important to study whether there existed any difference in the home environment of the experimental and control groups of children. For this purpose, 15 major components constituting the home stimulation inventory were examined for the experimental and control groups of children. In respect of these factors also, the two aspects: percentage distribution as well as the differences in the mean scores were studied. The method of analysis and the discussions were of similar pattern as that followed for the study of the Socio-Economic Status.

I Percentage Distribution

Table 15 presents the information on the adults responsible for bringing up the children in the experimental and control groups.

Table 15. Percentage distribution of experimental and control groups of children according to adults responsible for bringing them up

Adults responsible	Percentage of children belonging to	
	Experimental group	Control group
Both parents	97.5	96.0
One of the parents	1.5	2.0
Other relations	1.0	2.0

The responsibility of bringing up of children was shared by both parents in almost all of the experimental and control groups of children - 97.5 per

Table 16 gives data on adults in whose company children spent most of their time.

Table 16. Percentage distribution of children according to adults in whose company they spent most of their time

Adults	Percentage of children belonging to	
	Experimental group	Control group
Both parents	0.5	4.5
Only father	-	-
Only mother	95.0	80.0
Close relatives	4.5	15.5
Distant relatives	-	-

Ninety five per cent of the children in the experimental group spent most of their time in the company of their mothers as against 80 per cent in the control group. In the case of the control group, over 15 per cent spent most of their time in the company of close relatives while their mothers worked as labourers on the construction sites.

Table 17 depicts the availability of printed literature in the homes of experimental and control group children.

Table 17. Percentage distribution of experimental and control children in respect of availabile printed literature at home

Printed literature	Percentage of children belonging to	
	Experimental group	Control group
Plenty of books, newspapers and magazines	-	-
A few books, magazines and daily use of newspapers	0.6	1.0
Only newspaper regularly	3.3	3.0
Only newspaper occasionally	1.0	-
None of the above	95.1	96.0

Almost all the families of the experimental and control groups of children (over 95%) had no printed literature. This indicated the limitation of the families in terms of money for buying books, magazines and newspaper. Lack of understanding of the value of literature for children was evident.

Table 18 presents the frequency of play and recreation opportunities given to children at home.

Table 18. Percentage distribution of experimental and control children according to frequency of play and recreation opportunities given to them in the home

Frequency	Percentage of children belonging to	
	Experimental group	Control group
Very frequently	3.0	5.5
Frequently	96.0	84.0
Occasionally	1.0	2.0
Rarely	-	8.5

Among the experimental 96 per cent and 84 per cent children in the control group were allowed to play and recreate frequently by their parents. Over 8 per cent of the control group of children had rarely any opportunity to play and recreate at home. This might be because they had perhaps other pre-occupations at home.

Table 19 shows the frequency of outing opportunities available to children

Table 19. Percentage distribution of experimental and control children according to frequency of taking them for outing

Frequency class	Percentage of children belonging to	
	Experimental group	Control group
Very frequently	-	5.5
Frequently	62.0	59.0
Occasionally	34.0	28.0
Rarely	4.0	7.5

A majority of experimental (62%) and control (59%) groups of children had frequent opportunities to go out with their parents. Thirty four per cent of children of experimental group and 28 per cent children of control group were taken for outing occasionally by their parents.

Table 20 presents the information on the frequency of opportunities available to children to hear stories.

Table 20. Percentage distribution of experimental and control children according to frequency of opportunities given to them to hear stories at home.

Opportunities	Percentage of children belonging to	
	Experimental group	Control group
Very frequently	-	-
Frequently	30.0	35.0
Occasionally	27.5	20.0
Rarely	42.5	45.0

Regarding opportunties given to children to hear stories, 57.5 per cent of the children in the experimental group and 55 per cent of the children in the control group had frequent or occasional opportunities to hear stories. Children who had frequent opportunities were somewhat larger than those who had occasional opportunities in both the groups. However, in the control group of children those having frequent opportunities were somewhat more (35%) compared to those in the experimental group (30%). On the other hand the experimental group accounted for a larger percentage of children with occasional opportunity. It was further noted that 42.5 per cent of the experimental and 45 per cent of the control group of children had rarely heard stories at home.

Table 21 gives distribution of frequency of parental permission granted to children to participate in suitable household activities.

Table 21. Percentage distribution of experimental and control groups of children according to the frequency of parental permission to participate in suitable household activities

Frequency class	Percentage of children belonging to	
	Experimental group	Control group
Very frequently	-	2.0
Frequently	55.5	78.0
Occasionally	18.0	15.0
Rarely	26.5	5.0

The control group children participated more in household activities (78% frequently) than experimental group(55.5%frequently); 45 per cent of the experimental group children had only occasional to rare participation in such activities

Table 22 presents the extent of freedom available to children to expres their desires/wants at home.

Table 22. Percentage distribution of experimental and control children according to the extent of freedom granted to express their desires wants at home

Extent of expression allowed	Percentage of children belonging to	
	Experimental group	Control group
Fully	94.0	81.0
Partially	6.0	10.0
Moderately	-	-
Rarely	-	9.0

It was found that 94 per cent of the experimental as against 81 per cen of the control group of children were allowed to express their desires/want at home fully with their parents, while in the control group 9 per cent ha rarely such opportunties.

Table 23 gives information on the extent to which childrens' curiosity wa satisfied by their parents.

Table 23. Percentage distribution of the experimental and control children according to the extent to which their curiosity was satisfiec by parents

Extent of satisfaction of curiosity	Percentage of children belonging tc	
	Experimental group	Control group
Fully	3.5	1.0
Partially	4.0	1.0
Moderately	15.0	10.0
Slightly	60.0	75.0
Least	17.5	13.0

In case of a very limited percentage (3.5% experimental and 1% control) of children, parents satisfied fully their curiosity.

Parents of a majority of children (60% experimental and 75% control) satis fied curiosity of their children only slightly. Least satisfaction in this respec was derived by 17.5 per cent of the experimental and 13 per cent of the contro groups of children.

Table 24 presents information on the entertainment facilities availabl to the families of children.

Table 24. Percentage distribution of experimental and control childre according to the entertainment facilities available to their familie

Entertainment facilities	Percentage of children belonging tc	
	Experimental group	Control group
Cinema, Radio, Play-house, T. V., Record Player	-	-
Cinema and Radio	90.5	94.0
Only Radio	-	-
Only some local sports/games	-	-
No facility	9.5	6.0

Regarding the availability of entertainment facilities it was observed tha cinema and radio were available to the families of 90.5 per cent experimenta and 94 per cent control group of children. No such facility was available t 9.5 and 6 per cent children of the experimental and control group respectively

Table 25 presents data on the availability of play material at home.

Table 25. Percentage distribution of experimental and control childre according to availability of play material at home

Amount of play material available	Percentage of children belonging to	
	Experimental group	Control group
More than sufficient	-	-
Sufficient	2.0	-
Average	9.5	5.0
Insufficient	81.5	75.0
Extremely insufficient	7.0	20.0

A majority of the experimental and control groups of children had insuffi cient play material at home. None of the control group children and a negligibl percentage of the experimental group children had sufficient play materi at home. One-fifth of control group children had extremely insufficient pla material at home.

Table 26 gives the percentage distribution of time given to children t play at home.

Table 26. Percentage distribution of experimental and control childre according to time given to them to play at home

Time given to play	Percentage of children belonging to	
	Experimental group	Control group
More than sufficient	2.0	10.0
Sufficient	98.0	87.0
Average	-	2.0
Insufficient	-	1.0

Almost all children in the experimental and control groups were allowed sufficient time for playing at home. A substantial percentage (10%) of control group of children were infact given more than sufficient time to play as against a negligible percentage (2%) of the experimental group children. The childrens' play were generally outdoor in nature and consisted of running, jumping, catching each other, playing with pebbles, sticks and so on. The play time devoted with toys and other indoor play material was however, limited due to the absence of play material.

Table 27 gives information on degree of freedom given by parents to their children to handle the limited play material available at home.

Table 27. Percentage distribution of experimental and control children according to the degree of freedom given to them to handle play material at home

Freedom given to child	Percentage of children belonging to	
	Experimental group	Control group
Allowed to handle freely	97.0	100.0
Allowed to handle carefully	1.0	-
Allowed to handle in adult's presence	-	-
Allowed to see without touching	-	-
Not allowed to handle	2.0	-

A disheartening fact was that children had very limited play materia at home. Almost all the children in the experimental as well as control grou who had play material at home were given freedom to handle the availabl play material.

Table 28 presents the data on annual expenditure incurred by parents o toys and childrens' books.

Table 28. Percentage distribution of parents of experimental and control children according to the expenditure they incurred on toys and children's books annually

Amount spent	Percentage parents of children belonging to	
	Experimental group	Control group
Rupees 25	6.0	7.0
Rupees 15	13.0	9.0
Rupees 10	30.3	21.0
Rupees 5	50.0	53.0
Nil	1.0	10.0

Fifty per cent parents of the experimental and 53 per cent parents o the control group children spent only five rupees annually on childrens' toy and books. Only 6-7 percentage of the parents spent rupees 25 per annum o these items. It was also noted that only one per cent of the parents of th experimental group of children did not incurr any expenditure on toys an childrens' books as against 10 per cent of the parents of the contol grou This may perhapes be attributed to the positive though indirect influence exerte by the Anganwadis on the parents to recognise the importance of play materi for children.

Table 29 gives information on times spent by parents with their childr in play activities.

Table 29. Percentage distribution of parents of experimental and contr children according to approximate amount of time spent b them per day with children in their play activities

Time spent by parents	Percentage parents of children belonging to	
	Experimental group	Control group
4 hours	-	1.0
3 hours	-	-
2 hours	3.0	-
1 hour	45.0	48.0
1/2 hour	52.0	51.0

For the experimental and the control groups, about one-half of the parent spent half an hour only per day with their children in their play activities Most of the remaining parents spent one hour per day in such activities.

II Mean Differences of Scores

The mean differences of scores on different components of home stimulatic inventory are presented in Table 30.

Table 30. Mean differences of scores on different components of Hom Stimulation Inventory (experimental versus control)

Components		Age (yr)	Experimental T_1	Control T_2	Difference T_1-T_2	C. D. (at 5% level)	Significance
1.	Responsibility for bringing up children	3+	5.00	5.00	0.0	0.0	NS
		4+	4.92	4.93	0.01	0.141	NS
		5+	5.00	4.80	0.20	0.102	*
2.	Maximum time spent in in whose company	3+	2.97	2.90	0.07	0.178	NS
		4+	2.97	2.87	0.10	0.101	NS
		5+	2.98	3.00	0.02	0.143	NS
3.	Available printed literature	3+	1.04	1.00	0.04	0.096	NS
		4+	1.17	1.00	0.17	0.213	NS
		5+	1.05	1.00	0.05	0.121	NS
4.	Frequency of play opportunities given	3+	4.05	3.83	0.22	0.213	*
		4+	4.02	3.83	0.190	0.195	NS
		5+	3.95	3.70	0.25	0.280	NS
5.	Opportunities to hear stories	3+	2.41	2.06	0.35	0.567	NS
		4+	2.72	2.20	0.52	0.546	NS
		5+	2.12	1.40	0.72	0.503	*
6.	Frquency of taking the child for outings	3+	3.71	3.50	0.21	0.364	NS
		4+	3.52	3.66	0.14	0.349	NS
		5+	3.12	3.33	0.21	0.463	NS

Contd....

Components	Age (yr)	Experimental T_1	Control T_2	Difference $T_1 - T_2$	C. D. (at 5% level)	Significance
7. Allowing the child to participate in house hold activities	3+	3.00	3.61	0.61	0.459	**
	4+	2.80	3.92	1.12	0.347	**
	5+	3.40	3.57	0.170	0.209	NS
8. Allowed to express his desires	3+	4.95	4.50	0.45	0.297	**
	4+	4.88	4.56	0.32	0.270	*
	5+	4.97	4.56	0.41	0.294	**
9. Extent to which child's curiosity is satisfied	3+	2.44	2.30	0.14	0.364	NS
	4+	2.40	2.03	0.370	0.375	NS
	5+	1.74	1.76	0.02	0.257	NS
10. Extent of entertainment facilities available	3+	3.65	3.60	0.05	0.425	NS
	4+	3.70	3.90	0.20	0.353	NS
	5+	3.82	3.90	0.08	0.285	NS
11. Amount of play material available at home	3+	2.10	2.00	0.10	0.210	NS
	4+	2.11	1.90	0.21	0.246	NS
	5+	2.02	1.86	0.16	0.182	NS
12. Time given to play to children	3+	4.05	4.13	0.08	0.117	NS
	4+	4.00	4.06	0.06	0.85	NS
	5+	4.01	3.86	0.15	0.177	NS
13. Freedom to handle play material	3+	5.00	5.00	0.0	0.0	NS
	4+	4.91	5.00	0.09	0.182	NS
	5+	4.82	5.00	0.18	0.296	NS
14. Amount of money spent on toys	3+	2.62	2.83	0.21	0.455	NS
	4+	2.70	2.40	0.30	0.414	NS
	5+	2.81	2.10	0.71	0.385	**
15. Amount of time spent by parents in childrens' play	3+	1.50	1.43	0.07	0.265	NS
	4+	1.47	1.50	0.03	0.226	NS
	5+	1.55	1.43	0.12	0.233	NS

Age-wise (3+, 4+ and 5+ years) analysis of the mean differences of scores on Home Stimulation Inventory of the experimental and control groups revealed that out of 15 components of the Home Stimulation Inventory in respect of nine, namely, maximum time spent in whose company, availability of printed literature at home, frequency of taking the child for outings, extent to which the child's curiosity was satisfied, extent of entertainment facilities available, amount of play material available at home, time given to children to play, freedom to handle play material and amount of time spent by parents in their children's play activities - the differences in the mean scores between the experimental and the control groups were not significant for any of the three age classes studied.

Out of the remaining components, in respect of four namely - responsibility of bringing up children, frequency of play opportunities given, opportunities to hear stories and amount of money spent on toys there was statistical significance only in the case of one of the three age classes. In respect of the first two, the difference between the mean scores for the two groups was marginal and hence might be considered as negligible. In respect of the other two components, the experimental group of children in the 5+ age had an edge over the corresponding control children.

It was noted that control group of children were allowed to participate in household activities more than their experimental counterparts. On the other hand experimental groups of children scored over their control counterparts in respect of the component factor - expressing their desires/wants freely in the family. These results were true for all the three age classes.

For obtaining an overall view the various items constituting Home Stimulation Inventory were considered together by working out the total scores for

the Home Stimulation Inventory as a whole. The data were pooled over the age classes and the mean differences in the overall scores between the experimental and the control groups were examined separately for each sex. Subsequently the mean differences pooled for both the sexes were studied.

For the male children, the mean of the total score in respect of the Home Stimulation Inventory scale was 48.6 for the experimental group, and 45.9 for the control group, the difference between the two groups being 2.7. For the female children the mean of the corresponding total score was 48.5 for the experimental group and 46.5 for the control group, the difference being 2.0. When scores of both the sexes were pooled the mean of the total score for the Home Stimulation Inventory was 48.6 for the experimental group and 46.2 for the control group, the difference being 2.4. When compared with the overall range of the total score for the Home Stimulation Inventory Scale (1-75), the above differences can be considered as small and unimportant. The mean difference in the total scores for male versus female was practically negligible (0.5 or less) for the experimental and the control groups.

Thus the differences between the experimental and control groups of children in respect of the stimulation provided at home was quite small, thereby implying that a comparison of the cognitive scores between the experimental and control groups of children, if any, was not vitiated by the differences in the home stimulation received by both the groups.

C. Physical Environment and Functioning of Anganwadis

Satisfactory physical facilities greatly assist in developing a challenging and satisfactory learning situation. The design of a centre should fit the goals for the centre. In order to get information regarding building, equipment and facilities like toilet, drinking water etc. children's enrollment their regularity

Picture 6 An Anganwadi Building

Characters		Percentage of AWs
Physical Facilities		
	6. Lighting in rooms :	
	Adequate	88
	Inadequate	4
	No light	8
	7. Ventilation in rooms :	
	Adequate	88
	Inadequate	-
	No ventilation	12
Sanitation		
	1. Drainage Facility :	
	Available	4
	Not available	96
	2. Infestation by flies, insects and animals :	
	Infested	72
	Not infested	28
Decoration		
	1. Decoration of AW room :	
	Decorated	88
	Not decorated	12
	2. Quality of decoration :	
	Satisfactory	20
	Unsatisfactory	80
	3. Placement of charts/posters :	
	Within reach (eye level)	4
	Out of reach	96
Play Space Facility		
	1. Out door space availability : (60-80 sq. feet per child as standard)	
	a. Sufficient	68
	Insufficient	20
	Not available	12
	b. Safety in play yard :	
	Fenced	84
	Unfenced	16

Characters		Percentage of AWs
Play Space Facility		
	c. Shade in play yard :	
	Available	20
	Not available	80
	2. Indoor play space : (25-30 sq. feet per child as standard)	
	Sufficient	80
	Insufficient	8
	Not available	12

Note : The percentage has been calculated over the base number of 25 AWs.

For quality education and congenial physical environment, adequate infra-structural facilities are essential. In case of preschool children, this need becomes all the more important. A stimulating environment of Anganwadi would naturally attract and retain children, therefore, the environment should invite the child to participate in activities and to have experiences through which may be learned the joy of discovering, of exploring, of creating, of experimenting and of obser-ving. This requires many types of materials and equipment in a suitable space.

It is seen from table 31 that, by and large, the physical facilities of the AWs such as physical set up, building condition, size of rooms, light, and ventilation were fairly good, excepting floor condition, sanitation facilities, quality of decoration, placement of charts/posters and shade in the play yard. Special mention may be made of non-availability of sanitary disposal of drainage in as high as 96 per cent of the AWs. Normally the water from kitchen was thrown outside the kitchen area, from where it spreads around the anganwadi resulting in infestation by stray animals and insects - mostly pigs, flies and other insects (Picture 7).

The quality of decoration in AWs was unsatisfactory. In a majority (80%) of the AWs almost all the posters and charts meant for educating children

were placed out of the reach of children which made it impossible for them to see, touch and perceive. Such placements were done, for fear of being torn by the children. The prints and pictures on the charts and posters were also often too small to be seen and comprehended by preschool children. As a result the educational value of these decorations and items was negligible (Picture 8).

Although a majority (84%) of AWs had fenced play yards, children could not play out doors due to non-availability of shade in 80 per cent of the yards. This curtailed the gross motor exercise required for physical well being of preschoolers.

Furthermore, observations revealed that anganwadis lacked storage space; there were no shelves or in-built cupboards. Eighty-eight per cent of the AWs lacked toilet facilities due to which children defecated around the AWs making the entire environment dirty and unhealthy. All the AWs had kitchen facility. Ninety per cent of the AWs had drinking water facility in the kitchen or within easy reach. However, the remaining AWs had to collect water from a distance of about a kilometer.

Equipment and Play Materials

Equipments and play materials form an integral part of the preschool programme as the concept is "teaching through play". Enriched AWs which have colourful, yet cheap, equipment invite attention of children and accelerate their cognitive development through environmental stimulation. Besides this, for the smooth functioning of the AW programmes, the variety of experiences to be provided to the inquisitive minds needs appropriate materials and aids.

A room that is, "efficiently organized in terms of space, orderliness and convenience gives the children better opportunity for working effectively and creatively" (Hoechman, 1958). An analysis of the data in the selected AWs

of the ICDS project revealed that AWs in general, looked desolate and empty; they were not physically inviting. Only moderate amount of indoor play material was available. Since the ICDS programme is a centrally planned and sponsored scheme, all the AWs had similar equipment and play materials. In almost all the AWs, children sat in a row or circle looking bored and disinterested in the programme (Picture 8). Not even a single story or picture book was available for children to handle or look at. Materials required for creative experiences and expressions were totally absent. A disheartening fact was, that even equipments such as consumable articles like slates, pencils and chalks had been supplied to the AW centres as early as in 1983, and no replacements were done thereafter. Thus the play materials and teaching aids had been either exhausted or rendered unusable. The wooden blocks had become discoloured and unattractive. The play material such as paint, brushes, coloured chalks, and beating drum, recommended as per Manual on ICDS (1984) were found wanting. Goswami (1986) has made similar observations in Assam also.

Out door play can contribute much to childrens' physical as well as cognitive devlopment (David and Wright, 1974; Prescot and David, 1976). Which implies that appropriate out door play equipment must be supplied to the AWs for maximizing the play value for children. However, in the AWs outdoor play material and equipment was not available. The teaching aids and play material in general were grossly inadequate both in quality and quantity in all the AWs.

On examining the quality and functionality of some of the remaining materials in the AWs, they were found to be relatively satisfactory. Nevertheless, they could promote only a limited amount of imagination and muscular activities in preschoolers, as they could not be manipulated for a variety of experiences.

Regarding items of general use in AWs, no provision for storage such as racks, closed shelves had been made available, even though these items are

listed in the Manual on ICDS. This deficiency made the storage of files and equipment very difficult. The kitchen equipment provided were adequate. However, cooking on chulha (fire wood hearth) was a very difficult process owing to smoke, non-availability of wood in near proximity and lack of dry wood during rains.

Bath room equipment was adequate in the AWs. But disinfectant fluid, brushes and other cleaning materials had not been supplied to any of the AW centres.

Preparation of Teaching Aids

As widely agreed, teaching aids are essential for catching attention, easy delivery of message and effective learning ; teaching aids are most crucial for preschool education. The ICDS programme, is widespread and massive but the limited funds made available are not equal to the task. Therefore, it becomes imperative on the part of the AWWs to make use of low cost locally available materials for the preparation of teaching aids. According to the Manual on ICDS (1984), "The materials and equipment to be used in Anganwadi for non-formal preschool activities should be of indigenous origin, designed and made by the AWWs. AWWs should play a leading role in designing and making such aids. Materials like sand, clay, seeds, leaves, twigs, water etc. have immense possibilities".

The observations made regarding the preparation of Teaching Aids by the AWWs, showed that only 28 per cent of the AWWs had prepared teaching aids from the locally available materials. Even those prepared aids were kept away safely and were not made available to children, for they kept them to show in the organisers' meetings, especially to the Child Development Project Officers (CDPOs).

Mostly charts, posters, house, radio, paper garland etc. were made. However, as these were made long back to be specific, at the time of AWWs

training much of the prepared aids were useless and no efforts were made to replenish them.

The remaining 72 per cent of AWWs did not make any aids due to the reasons given. Table 32.. Presents the reasons for not making aids out of locally available materials.

Table 32. Reasons for not making teaching aids out of the locally available materials

Reasons for not making aids	Percentage of AWWs
Lack of time	64
Lack of training	28
Not interested	28
Lack of skills	28
Lack of money	24

Lack of time was reported to be the foremost reason for not making the aids by a majority (64%) of AWWs. They mentioned that they had too much record work and other formalities to be carried out daily that the preschool education, its pre-planning and preparation of aids becomes of secondary importance. Their day began by distribution of CARE wheat to the pregnant/ lactating mothers, and gram laddus to children under 2 years; and then they visited door to door to collect the children. By the time they returned along with the preschool children, they were tired and exhausted. This was usually followed by organising the children, prayer and some AW activities like songs etc. At the same time for maintaining the behaviour limits, corporal punishments were given. Side by side along with the preschool activities, other routine activities, like weighing the ingredients for the lunch, their entries in the register, serving lunch, and record keeping were to be done. After lunch when the children were put to rest and sleep, the AWWs had the record work to do or area visits

for various purposes. Thus, they could get hardly any time to devote for pre paring the teaching aids.

Twenty-eight per cent AWWs expressed that they did not have appropriate training for making teaching aids. Similar number of AWWs explained that they did not possess skills to prepare teaching aids, nor were they interested. Training, skills development, and creation of interest, are all related aspects and its mainly the lack of training or the quality of training which was resposible for those deficiencies. It was noted earlier that 24 per cent of the AWWs were not trained at all, and most probably this was the lot who expressed want of training, skills as well as interest. Lack of fund for preparation of such aids was responsible in case of 24 per cent AWWs.

Enrollment, Attendance and Punctuality

Enrollment

The teacher-pupil ratio is a critical factor in the effective working of the preschool programme. The ideal pupil-teacher ratio for the younger age group of children is 1 : 15 and 1 : 20 for the older group, provided an adult helper's services are available to the teacher (Muralidharan and Banerjee, 1984). However, due to the obvious financial limitations and the need for wide coverage of children under the non-formal preschool education programme, the ICDS scheme has set a norm of enrollment of about 40 children in the age group of 3-5 years in the AW for non-formal preschool activities (Manual on ICDS, 1984).

Observations regarding pupil-teacher ratio in the selected AWs indicated that the number of pupils per AWW ranged from 20-54. Table 33 gives detailed break-up of the enrollment range.

Table 33. Enrollment range in Anganwadis

Enrollment range (in No.)	Percentage of AWs
20 - 29	32
30 - 39	24
40 - 49	24
50 - 54	20

Only 56 per cent of the AWs conformed to the recommended norms of enrollment. The remaining 44 per cent AWs exceeded grossly the ICDS norms which resulted in crowding, confusion, mismanagement, and negligence of children. It was impossible to give required individual attention much needed to the preschoolers.

Attendance and Punctuality

Attendance and punctuality of children in selected AWs is given in Table 34.

Table 34. Attendance and Punctuality of children in selected Anganwadis

Percentage children in each class	Average attendance of previous month (% AWs)	Attendance on the day of visit (% AWs)	Punctuality in morning timing (% AWs)
76-100	8	-	40
51 - 75	60	68	40
26 - 50	28	28	12
0 - 25	4	4	8

Table 34 presents the level of attendance and punctuality of children in the selected AWs. It indicates that only in eight per cent of the AWs, the average attendance of children in the previous month ranged from 76-100 per cent. In a majority of the AWs (60%), it ranged between 51-75 per cent.

The analysis of the attendance on the days of the visits was almost in conformity with the average attendance of the previous month. Regarding

punctuality of timings, in 80 per cent of the AWs, above 50 per cent children arrived on time in the morning. The defficiency in respect of the punctuality in other cases was largely due to lack of sense of awareness in respect of the need for punctuality on the part of the parents.

Cleanliness of Children

Cleanliness of children is as important as any other aspect of ICDS programme. In this respect preschool children and the indulgence of the AWWs and helpers were observed. The cleanliness status of children in Anganwadis is presented in Table 35.

Table 35. Cleanliness in the children of the selected Anganwadis

Percentage of children	Cleanliness condition in % of AWs				
	Properly dressed	Cleanliness of dress	Hair well combed	Nails cut	Teeth clean
76 - 100	8	12	32	4	-
51 - 75	52	24	16	24	48
26 - 50	24	44	28	40	32
0 - 25	16	20	24	32	20

In 60 per cent of the AWs, more than 50 per cent of the children were properly dressed. However, in about two-thirds of the AWs, more than 50 per cent of the children were not having clean dresses. This deficiency could be ascribed to poverty as well as inadequate appreciation regarding cleanliness on the part of the parents of children, particularly mothers.

According to the 'Manual on ICDS (1984) among the duties prescribed for the helper cleanliness of young children, namely, combing the hair, cutting the nails, cleaning of nails, eyes and teeth are also included. Only in about 50 per cent of the AWs over 50 per cent children had well combed hair. In about two-thirds of the AWs, a majority of children did not have their nails cut in time and hence cleanliness of nails was not maintained. A majority

of children in every alternative AW did not have clean teeth. It would, therefore, appear that helpers were not carrying out their responsibilities adequately regarding combing children's hair, cutting the nails and cleaning their teeth. It was generally observed that helpers neglected their duties in maintaining the cleanliness of children after their arrival in AWs ; as a result children looked unkempt and often dirty.

Performance and Participation of Children in Preschool Activities

Table 36 presents the pattern of the performance and participation of children in Anganwadis.

Table 36. Performance and participation of children in AW

Percentage of children	Percentage of AWs							
	Participate in preschool activities	Enjoy the preschool activities	Help AWW in distribution/collecting back materials	Help in general cleaning	Do not waste food	Eat by themselves	Wash hands before eating	Wash hands after eating
76 - 100	20	16	4	-	88	84	100	100
51 - 75	48	28	-	-	-	16	-	-
26 - 50	28	52	4	-	-	-	-	-
0 - 25	4	4	92	100	12	-	-	-

In a majority of AWs (68%), 51 - 100 per cent of children participated in preschool activities. However, in respect of 56 per cent of the AWs, a majority of children did not enjoy the preschool activities. This disinterest on the part of children may be attributed to the unstimulating environment, poor method of presentation of activities, lack of interesting play material, lack of interest and involvement of AWWs etc.

In all good early childhood programmes children are expected to take increasing responsibility for themselves and others. As a result children develop greater self confidence, become more self-reliant and gain a sense of

real involvement in their daily lives. This was completely ignored in the AWs. In 92 per cent of AWs, no help was taken from children in distributing, collecting, and putting back the play/teaching materials. Thus children were not at all involved in handling play materials which could have imparted practical education and sense of responsibility, sharing and proper handling. In all AWs only below 25 per cent children were involved in general cleaning of the AW. Children were not expected, directed or encouraged to help. This implies that AWWs lacked the understanding, appreciation and skill of getting children involved in the AW programme and activities. In all the AWs, bulk of the children ate by themselves and did not waste food (Picture 9).

Cent per cent of children in all the AWs washed their hands before and after eating, indicating that children learnt good habits quickly when taught early in life. But the only disheartening fact was gross negligence on the part of the helpers in this respect. The general observation regarding washing hands was that in some AWs all children dipped their hands in a bucket full of water before and after eating, thus diminishing the utility and purpose of washing hands. This perhaps may be because either the helpers lacked the concept of hygiene or they wanted to reduce their work load by placing water in a large pan, rather than pouring water on the hands of every individual child.

Preschool Education Activities of the AW

To acquire information regarding the preschool education activities - its qualitative nature, the time spent for each activity - was studied by way of three observations of the whole programme of the AWs. The preschool education activities in the Anganwadis and the approximate amount of time given to each activity are given in Table 37.

Picture 9 Children Eating by Themselves

Table 37. Preschool education activities in the AWs and the approximate time given to each activity.

Activities	Percentage of AWs giving time to each activity		
	Adequate	Moderate	No time
Rhymes	84	16	-
Story telling	80	20	-
Prayer	96	-	4
Health check-up	12	44	44
Project theme-based	8	56	32
Concept-oriented	28	48	24
Music	60	12	28
Dramatic play	4	-	96
Language stimulating activities	32	28	40
Games	80	20	-
Free play	28	20	52
Field trips	-	-	100
Creative activities	-	8	92

In a majority of AWs, rhymes, story telling and prayers were included daily and adequate amount of time was devoted for them. Where health check-up was concerned, only in 12 per cent of AWs adequate amount time was spent. It was disheartening to note that in 44 per cent anganwadis no time was spent for health check-up. Health being an integral aspect of the ICDS programme, adequate attention is expected from the helpers and AWWs. Perhaps helpers were not conscious of this fact ; hence health aspect did not receive its due attention.

In preschool, programme where concepts are taught through the play-way method, teaching revolves around theme-based projects. It was disappointing to note that only 8 per cent of AWWs had earmarked adequate time for this aspect. In 48 per cent AWs, moderate amount of time was given for concept-oriented teaching. In 60 per cent of the AWs adequate amount of time was given for music. In case of 40 per cent AWs, no time was devoted to language

stimulating activities. The preschool years are called the language age, fo this is the period when maximum language development takes place. The lacuna in the AW programme indicates a wide gap in the basic knowledge and trainin of the AWWs. Observations of the AWs also revealed that in a majority c AWs apart from mechanical, poor narration of story or rhymes, no real communi cation took place between the AWWs and their pupils.

In almost all AWs, adequate time was alloted for games. In 52 pe cent of AWs no time was given for free play. None of the AWs gave any tim for field trips. For creative experiences time was provided in only a negligibl percentage of AWs.

Competence of Anganwadi Workers

The AWW is the kingpin of the ICDS programme. The success of th wide spread venture rests to a larger extent on AWW's ability and capacit to perform her role and responsibilities effectively. Therefore, this is th most crucial area requiring added attention and evaluation of their competenc from time to time. the observations regarding the competence of Anganwa workers are presented in Table 38.

Table 38. Observations on the competence of Anganwadi workers

Competence of AWWs	Percentage of AWWs			
	Usually	Occasionally	Rarely	Never
Ability to organize and conduct simple play and other activities	20	52	28	-
Skilled to arrange and utilize the available resources	16	24	36	24
Skilled to improvise suitable play materials from low-cost locally available materials	4	24	52	20
Conducted the following activities effectively :				
a) Music	32	56	12	-
b) Exercise	52	48	-	-
c) Games	56	44	-	-
d) Story telling	92	-	8	-
e) Dramatization	4	-	8	88
f) Concept teaching	24	16	52	4
g) Creative activities	-	-	8	92
h) Free play	8	24	28	40
Utilized community resources to promote cognitive development in children	4	12	56	28
Used play way method of teaching	8	32	44	16
Enthusiastic in organizing programme	44	20	24	12
Showed liking for children	28	36	12	24
Planned daily programme in advance	4	16	40	40
Laid and maintained necessary limits	32	56	12	-
Could arouse interest in children	36	36	28	-
Talked freely at childrens' level	32	44	20	4
Arranged equipment and play material in order	28	24	24	24

Table 38 reveals that 52 per cent of the AWWs occasionally organise and conducted simple play and other activities. The workers did not show skill

to arrange and utilize the available resources in the interest of the children 60 per cent of the AWWs rarely or never arranged and utilized such resources The AWWs were generally (72%) unskilled / rarely skilled to improvise suitabl play material from low-cost locally available resources.

Only 32 per cent of AWWs usually conducted music/rhymes sessio effectively (Picture 10) ; of the rest, 56 per cent occasionally conducted musi rhymes effectively. It was observed that the AWWs made children sing fc over half an hour the same rhyme, mostly without actions, making it burdensom and boring. The children seemed to loose interest in such repetitive exercise Fifty six per cent of the AWWs conducted exercises well ; the remaining 4 per cent did it only ocassionally. Similar was the situation in respect of game (Picture 11).

Story telling session was usually conducted in almost all (92%) of th AWs. Regarding the effectiveness of the story telling technique, it was generall observed that almost all the AWWs lacked the knowledge and method of stor telling to the preschoolers. Invariably they stood to narrate the story, holdir a small picture poster about the story. The children got tired by strainir their eyes and necks while trying hard to look at the picture. No other alter native and attractive method and approach such as use of puppets, bold picture live objects, models, specimens, dramatization and sand tray was used durir story telling sessions. In case of dramatization, concept teaching and creativ activities, the results were extremely poor as shown in the table. The concept teaching was rather mechanical. The AWWs did not plan the teaching activitie in advance. Almost all the AWWs drew a small diagram on the black boar which was very difficlut for children to see and comprehend as shown in pictur 8 and 11. None of the AWWs made use of the dramatization technique in concep teaching and no role play was carried out. The play-way method using local available things was rarely used for concept teaching. Creative activitie

Picture 10 Rhyme Session in the Anganwadi

Picture 11 Indoor Games in the Anganwadi

such as scribbling, finger printing, block printing, clay modelling etc. we not offered to the children. It was observed that during the drawing sessi children were directed to draw a certain diagram like sun, moon etc. fo about five minutes only, turn by turn, due to the shortage of slates and chalk which did not provide any chance for children to exercise their imaginati and creativity.

As far as free play was concerned, almost 70 per cent of the AW did not direct free play activities for children, although the children we left free to move about in the room ; they did not have any play mater and equipment to manipulate freely. Teachers were found lacking in the conce and importance of free play. Observations made during free play in most the AWs showed that during free play sessions block building was a comm feature (Picture 12) wherein a few blocks were given to two to three childr who were asked to make a specific structure, mostly house of blocks, wh others sat in a circle surrounding them with a desire and curiosity to han the blocks. Blocks were provided in considerable number to the AW centr but the AWWs and helpers were not giving them freely to the children. T guided block building did not cater to enhancing imagination, eye-hand coor nation or muscular exercises to all children. Neither free expression of childr nor therapeutic/learning value, was evident in the free play sessions.

A majority of AWWs did not utilize materials such as, sand, mud, gra water and waste material like paper, tyre, empty tins, seeds, twigs and on for free play to enhance the cognitive development of children. Only f per cent of AWWs utilised the community resources for promoting the cognit development of children. Thus the AWWs rarely used "play-way" and "ch centered" techniques of teaching. Only 8 per cent used these methods in teach the preschoolers, while the rest more or less practised rote teaching of alphab numbers and some concepts, rendering the programme monotonous, repetit

Picture 12 A Typical Block Building Situation

About 50 per cent of the AWWs were vocal about their being usuall very enthusiastic in organising the AW programme, but a closer look on th aspects which reveal enthusiasm of a worker indicated that the facts wer not as stated because only 28 per cent were found to like children. The res appeared to be unconcerned about the children under their care and som times were just indifferent towards them. Only 4 per cent of the AWWs planne the daily programme of the AW in advance, whereas a bulk (80%) never o rarely planned the daily programme in advance. Fifty-six per cent often se and maintained the limits on the behaviour of children by way of using rud language and corporal punishment. Beating with the ruler was a common practic Only one-third could arouse the interest in the children regarding attendin the AW programme. AWWs and helpers, were also found coming late to th AWs. Similar observation was reported by Goswami (1986), on the basis of her assessment of preschool education in ICDS in Assam.

Only 32 per cent of AWWs usually talked freely with the children a their level. In fact, there was limited communication between the teache and children; they usually stopped the programme of the day after one c two rhymes or a story narrated in a detached manner. Children did not reflec a sense of trust and belonging to the AWWs. Only 28 per cent of the AWWs us ually kept the equipment in a well arranged manner.

Qualification of the AWWs

Percentage distribution of qualification of the AWWs is given in Table 3

Table 39. Qualification of the AWWs

Qualification	Percentage of AWWs
Graduate	Nil
PUC	4
SSLC	96

A majority of AWWs were only SSLC passed. They had not studie any thing about preschool education. Nor did they have any prior knowledg of preschool education activities required to be conducted in the AWs.

Training of the AWWs

The AWW is a crucial functionary for implementing ICDS scheme Her proper training is, therefore, of special significance. As such it is necessar that as soon as the formalities of selection of the AWWs are complete, the are sent for their four months' job training course to the training center identi fied by the State Government, in consultation with the Ministry of Soci Welfare (Manual on ICDS, 1984). The observation regarding the training c AWWs revealed that only 76 per cent of the AWWs had received three month training. The training had been given by fresh Home Science Graduates wh were appointed as ICDS Instructors. These instructors had no other experienc except what they had studied as a major paper on Child Development at Bachelor's degree level. Therefore AWWs training was not upto the mark i terms of quality of preschool teaching. Perhaps trained and experienced ins tructors would have imparted better training to the AWWs.

Only 44 per cent of the trained AWWs had some clear concept of pre school teaching.

D. Impact of ICDS on Health and Nutritional Status of Children

Improving the nutritional and health status of preschool children is a important aim of the ICDS programme. Among the prescribed duties of th AWW, special emphasis has been laid on taking adequate care in respect c these aspects. The ICDS has provision for the following health and nutrition services specifically for preschoolers : (a) supplementary nutrition ; (b) immun zation ; (c) health check-up ; (d) referral services ; (e) treatment of min illness ; and (f) health education.

AWWs are required to help the ANMs in the delivery of these service and maintain records for individual children in respect of immunization, health check-up, episodes of illness, and weight- for-age charts for monitoring the growth and nutritional status of children.

Nutritional Status of Children

For measuring the nutritional status of children, checking the weigh for age procedure was adopted because weight is a measurement of body mass Weight deficiency is one of the best indicators of the prevalence of Protei Energy Malnutrition in children (Gopaldas and Seshadri, 1987). Table 40 present the distribution of children according to their nutritional status.

Table 40. Percentage distribution of experimental and control childre according to their nutritional status

Nutritional grade	Percentage of children of different age classes belonging to							
	Experimental group				Control group			
	3+	4+	5+	Pooled	3+	4+	5+	Pooled
Normal	31.7	35.7	37.4	35.0	23.3	21.3	20.3	21.7
Grade I	29.7	50.0	51.0	43.5	23.3	34.0	40.0	32.4
Grade II	32.8	14.3	11.6	19.6	33.4	35.3	36.7	35.1
Grade III	5.8	-	-	1.9	15.0	9.4	3.0	9.1
Grade IV	-	-	-	-	5.0	-	-	1.7

The percentage of children who were normal or in Grade I was substantiall larger in the experimental group, compared to the control. This was evider in each age class (3+, 4+ and 5+ years). On the other hand, the percentag of children in Grade II, III and IV were substantially higher in the control grou as compared to the experimental group, within each age class. while 79 per cer of the experimental group of children were normal or in Grade I, the corres ponding percentage for the control group was only 54. Another interestir feature was that the percentage of experimental group of children nutritional

graded as normal rose steadily from 31.7 for the 3+ age class to 37.4 f the 5+ age class. On the other hand, the percentage of children in the contr group similarly graded showed a decreasing trend from 23.3 in the 3+ to 20 in the 5+ age class.

In respect of the experimental group, the number of children in Grade were found only in the 3+ age class, and none in any age class labelled Grade IV (malnourished). In contrast in the control group, children labell as Grade III were observed in evrey age class while those labelled as Grade were present in the 3+ age class.

The mean of the pooled scores for the overall nutritional status w also worked out for the experimental and the control groups ignoring sex sin the supplementary nutrition provided to the malnourished male and fema children in the ICDS programme were uniform in every respect. The differen in the nutritional status of experimental and control groups of children shown in figure 5.

The mean overall score of the nutritional status of the experimen group was 4.12 which was higher than that of the control group, 3.63. T mean difference in the overall nutritional status scale of 1-5 was thus 0. which was statistically significant (critical difference at 5 per cent level = 0.1 Similar results have been reported by Gupta (1982); Chakrabarty (1985); Saxe et al., (1985); Masood et al., (1985); Patel (1985) and Subramaniam (198 All these authors point out that cross sectional surveys carried out in IC and Non-ICDS project areas generally indicate a lower prevalence of malnut tion in children receiving the ICDS services when compared to the cont group.

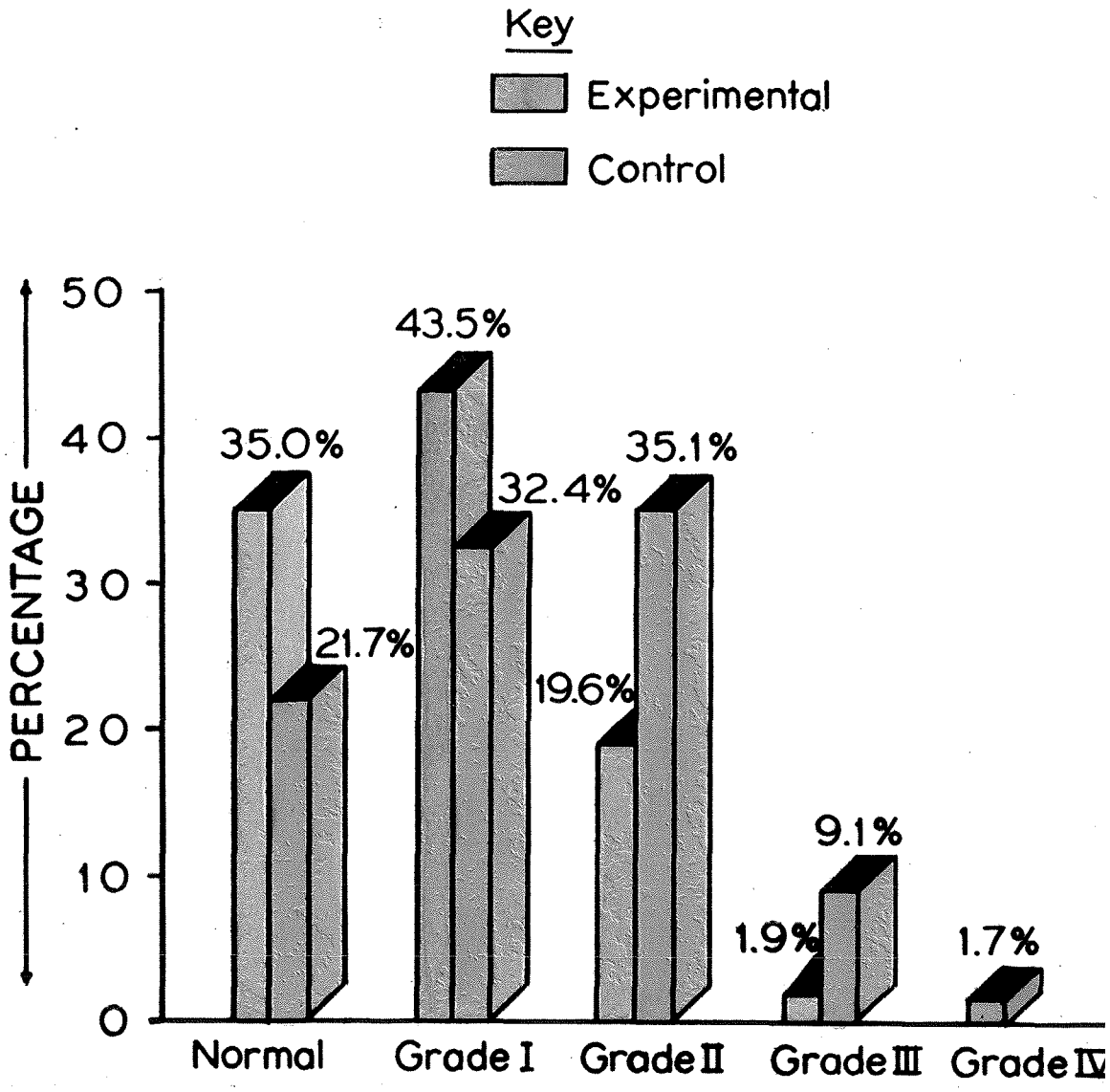
Physical Appearance

The physical appearance of children in both the experimental and cont

Fig. 5. NUTRITIONAL STATUS OF EXPERIMENTAL AND CONTROL CHILDREN.

(Percentage in different grades pooled over age groups 3+, 4+ and 5+)

Scale: 2 cm = 10 %



groups was assessed in terms of their clothing, cleanliness of their hair, nos nails, hands, eyes, skin, feet and legs. The percentage of children in the tv groups falling in the quality classed as good, fair and poor were worked o for each age class (3+, 4+ and 5+ years) and also for the overall in respe of each of the above aspects of physical appearance. The results are presente in Table 41.

Table 41. Percentage distribution of children in experimental and contr groups as per their physical appearance

Aspects	Age	Appearance of percentage of children belonging to					
		Experimental group			Control group		
		Good	Fair	Poor	Good	Fair	Poor
Dress	3+	55.7	5.7	38.6	70.0	-	30.0
	4+	75.7	4.2	20.1	43.3	-	56.7
	5+	41.4	-	58.6	26.6	-	73.4
	Overall	57.6	3.3	39.1	46.6	-	53.4
Hair	3+	29.0	33.0	38.0	70.0	3.3	26.7
	4+	28.5	4.3	17.2	44.0	-	56.0
	5+	42.5	-	58.0	26.6	3.4	70.0
	Overall	49.8	12.4	37.8	46.8	2.2	51.0
Nose	3+	40.0	2.8	57.2	43.4	-	56.6
	4+	61.4	1.4	37.2	23.4	-	76.6
	5+	32.8	-	67.2	10.0	-	90.0
	Overall	44.7	1.4	53.9	25.6	-	74.4
Nails and Hands	3+	32.9	8.5	58.6	46.0	-	54.0
	4+	38.6	3.9	57.5	30.0	-	70.0
	5+	32.9	1.4	65.7	6.6	6.7	86.7
	Overall	34.8	4.6	60.6	27.7	2.3	70.0
Eyes	3+	62.8	4.3	32.9	74.0	3.0	23.0
	4+	75.7	7.1	17.2	44.0	-	56.0
	5+	37.1	-	62.9	16.7	-	83.3
	Overall	58.5	3.8	37.7	44.9	1.0	54.1
Skin	3+	46.0	7.0	47.0	63.3	13.3	23.4
	4+	61.5	3.5	35.0	40.0	3.3	56.7
	5+	33.0	-	67.0	20.0	3.3	76.7
	Overall	46.8	3.6	49.6	41.1	6.6	52.3
Feet and Legs	3+	42.8	6.2	51.0	66.7	6.7	26.6
	4+	56.2	5.2	38.6	40.0	3.4	56.6
	5+	33.0	-	67.0	20.0	3.4	76.6

Table 41 reveals many surprising features and trends. In respect of all th component aspects of physical appearance, the control group of children faire better as compared to their experimental counterparts in the 3+ age class for example, 70 per cent of this age class of children in the control grou were labelled good in respect of their clothes, while only 56 per cent of simila children in the experimental group were labelled so. In respect of combin and cleanliness of hair the disparity was even higher (70% of the control grou children in the 3+ age class were labelled good while the corresponding percent age for the experimental group was only 29). In respect of the 4+ age clas children, however, the experimental group of children were superior to the counterparts in the control group where dress was concerned. As for exampl 75.7 per cent of the experimental group of children belonging to the 4+ ag class were labelled good, whereas, in respect of the control group about 44. per cent of the children only were labelled good. Where hair appearance wa concerned in the 4+ age class only 28.5 per cent of experimental group childre were labelled as good as against those of 44 per cent in control group . Th may be because at home mothers of this age class children in the contr groups were paying more attention to the hair combing of their children. Comi to the 5+ age class the experimental group maintained their superiority ov the control, but were inferior to their experimental counterparts in the 4 age class in all the aspects of physical appearance except with regards hair grooming.

To sum up the effectiveness of the ICDS programme, in respect of impr ving the physical appearance of children was the most pronounced in the 4 age class. Children of 5+ age class in both the groups were inferior to the corresponding counterparts in the 4+ class in both the experimental and contr groups. In the 5+ age class also the experimental group was, better than th control group uniformly.

The differential trend of responses over different age classes was persistent in all the aspects of physical appearance and hence calls for deeper probing for possible explanations. Certain reasons based on the child's readiness to the AW, and attitudes of AWW/helper/parents could be surmised.

Children in the youngest age class (3+) were not adequately attracted to go to the AWs and were inclined to be less cooperative with their parents in preparing them to go to the AWs. Also they were not acquainted adequately with the AW staff, to cooperate with them in maintaining their good physical appearance. On the other hand, the 4+ class children were more adequately accustomed to attend AWs and were willing, rather eager, to cooperate with their mothers as well as the AW staff in preparing them to put up a good physical appearance, partly due to a competitive spirit. In respect of the control children of the 4+ age class such a stimulus was absent and they were inferior to their 4+ counterparts possibly because the mothers tended to devote less attention on the relatively older children. The deceleration noticed at 5+ level both in respect of the experimental as well as control group could be due to the general tendency of naughtiness of older children and the relative fall in the interest bestowed by parents as well as the AW staff. Furthermore it may be explained by the fact that parents and AWWs generally tend to consider 5 year old children mature enough to handle physical cleanliness activities themselves. This attitude may be more in lower strata of society where mothers are over burdened by frequent child births. Possibly the reduction in the interest of the AW staff in the 5+ age class was due to awareness that these children would be leaving the AW soon.

Health Status of Children

Immunization

Immunization against polio, diphtheria, whooping cough, tetanus, measles tuberculosis and small pox is an important aspect of health care under the ICD

programme. The data summarized on the immunization status of the experimental and control groups of children are given in Table 42.

Table 42. Percentage distribution of children according to their immunization status

Immunization	Percentage of children in different age classes belonging to							
	Experimental group				Control group			
	3+	4+	5+	Pooled	3+	4+	5+	Pooled
Polio								
I dose	95.7	98.6	91.4	95.2	76.6	86.7	70.0	77.7
II dose	95.7	98.6	91.4	95.2	76.6	86.7	70.0	77.7
III dose	95.7	98.6	91.4	95.2	74.0	86.7	70.0	76.9
Booster I	57.1	64.2	58.6	59.9	46.7	36.6	36.6	39.9
DPT								
I dose	97.1	98.5	91.4	95.6	76.6	86.6	70.0	77.7
II dose	97.1	98.5	91.4	95.6	76.6	86.6	70.0	77.7
III dose	97.1	98.5	91.4	95.6	74.0	86.6	70.0	76.8
Booster I	45.7	48.5	51.4	48.5	46.7	33.6	33.6	37.9
Booster II	40.0	44.2	35.7	39.9	30.0	20.0	23.3	24.4
BCG	61.4	45.7	48.7	51.9	26.7	43.3	46.6	38.8
Measles	72.8	74.2	57.1	68.0	36.7	43.3	30.0	36.6
Small pox	17.1	5.71	2.85	8.5	10.0	3.3	10.0	7.7

About 95 per cent of the experimental group of children had received the three doses of vaccines in respect of polio as well as DPT. The corresponding percentage in the control group was 77.5. Booster doses were also given to a larger percentage of children in the experimental as well as the control group. About three in five had received booster dose for polio in the experimental group while nearly every alternative child in the same group received a booster dose in respect of DPT. In respect of the control group of children nearly two out of five had received booster dose for polio as well as DPT. A majority of the experimental group of children were also immunized against tuberculosis and measles. In respect of the control group, the percentage

children immunized against these two diseases were in the range of 36-39. Regarding small pox, on an average, less than one in ten were immunized through vaccination in both the experimental and control groups of children. This may be attributed to the successful eradication of the small pox disease in the country.

To sum up immunization levels against polio and DPT can be considered as satisfactory for the experimental group and fairly satisfactory for the control group. Immunization level against tuberculosis and measles were relatively less satisfactory for both the groups.

The immunization percentages for the experimental group was of a higher order compared to their control, indicating that children who were attending the ICDS AW, were better off than their counterparts in the control group who were not attending the AWs, as illustrated in figure 6. Vasudeva et al.,(1983) also concluded that immunization coverage in ICDS Blocks was better than the non-ICDS Blocks.

Episodes of Illness During the Last Six Months

Episodes of illness indicate the health status of children hence data were collected and examined for five diseases, namely, URI, Diarrhoea, Pneumonia, Measles and Whooping cough. The summarized results regarding the distribution of episodes of illness are presented in Table 43.

Fig. 6. IMMUNIZATION STATUS OF EXPERIMENTA AND CONTROL CHILDREN.

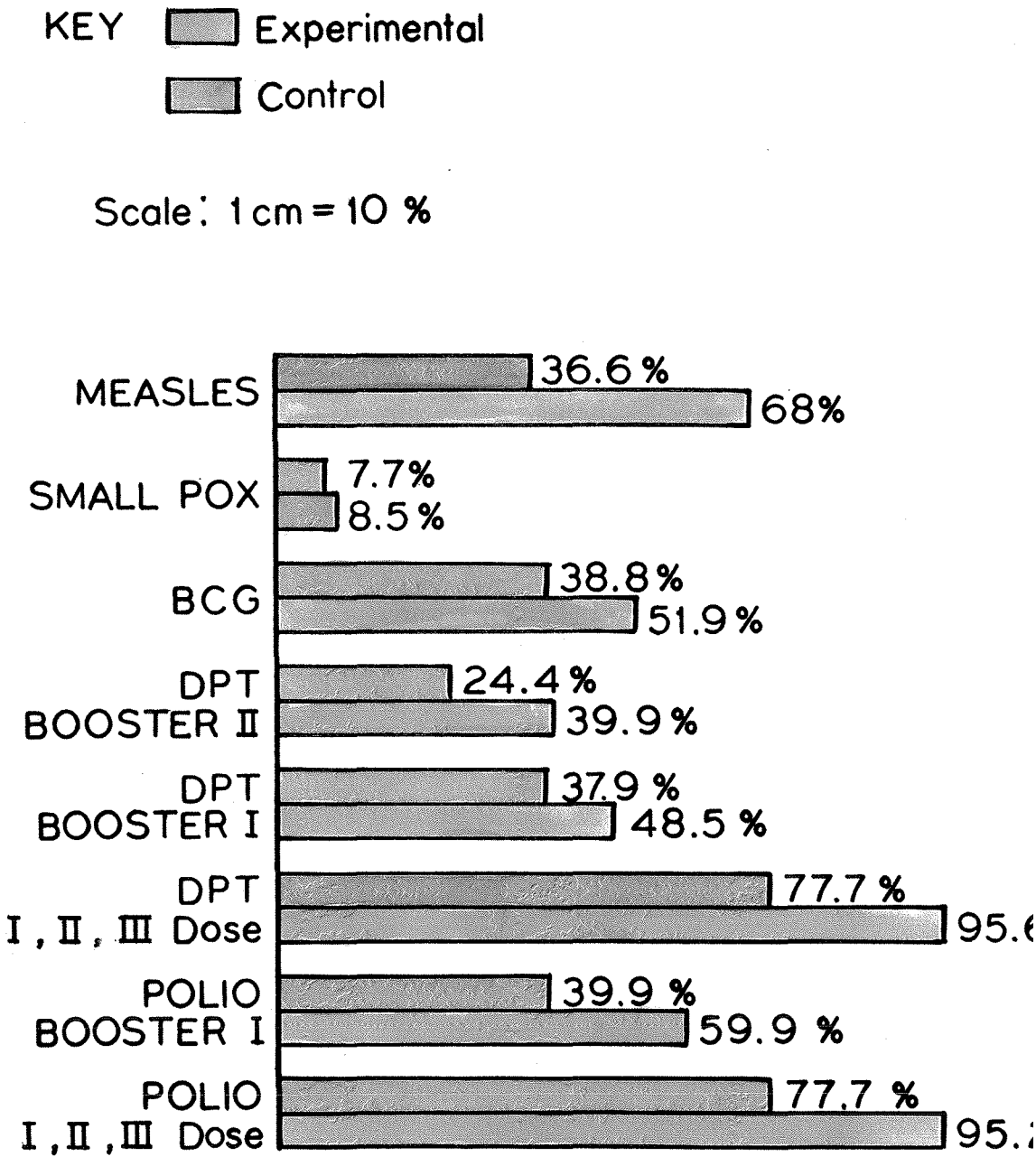


Table 43. Percentage distribution of episodes of illness in experimental and control groups of children

Illness	Age	Number of episodes of illness in percentage children belonging t									
		Experimental group					Control group				
		0	1	2	3	4	0	1	2	3	4
Pneumonia	3+	100.0	-	-	-	-	100.0	-	-	-	-
	4+	100.0	-	-	-	-	100.0	-	-	-	-
	5+	100.0	-	-	-	-	100.0	-	-	-	-
	Overall	100.0	-	-	-	-	100.0	-	-	-	-
Whooping	3+	98.5	1.5	-	-	-	100.0	-	-	-	-
cough	4+	100.0	-	-	-	-	96.0	4	-	-	-
	5+	100.0	-	-	-	-	100.0	-	-	-	-
	Overall	99.5	0.5	-	-	-	98.7	1.3	-	-	-
Measles	3+	81.5	18.5	-	-	-	93.4	6.6	-	-	-
	4+	85.7	14.3	-	-	-	80.0	20.0	-	-	-
	5+	82.9	17.1	-	-	-	50.0	50.0	-	-	-
	Overall	83.3	16.7	-	-	-	74.3	25.7	-	-	-
URI	3+	22.8	68.6	5.7	2.9	-	40.0	50.0	10.0	-	-
	4+	25.7	70.0	4.3	-	-	33.4	63.4	3.2	-	-
	5+	35.0	53.0	8.0	3.0	1.0	63.3	30.0	-	6.7	-
	Overall	27.6	63.8	6.1	2.0	0.5	45.5	47.8	4.4	2.3	-
Diarrhoea	3+	70.0	28.5	1.5	-	-	86.7	13.3	-	-	-
	4+	72.8	25.0	1.2	1.0	-	70.0	30.0	-	-	-
	5+	77.1	18.5	2.9	1.5	-	86.7	13.3	-	-	-
	Overall	73.3	24.0	1.8	0.8	-	81.1	18.9	-	-	-

There was no incidence of pneumonia either in the experimental group c in the control group of children during the six months' period covered by the study Whooping cough was also rare. Regarding measles, 16.7 per cent of the childre in the experimental group and 25.7 per cent in the control group suffered fror the attack once in the course of 6 months covered by the study. URI and diarrhoe incidences were more frequent in the experimental group of children as compare to their control counterparts. This is rather surprising and could possibly hav arisen due to incompleteness of reporting by their parents. It may be mentioned tha

in the case of control group of children data on incidence of diseases were based exclusively on the memory of parents while in the case of the experimental group of children data were extracted from authentic records kept at the anganwadis. It is not unlikely that in case of parents of control children a number of disease incidences for which medical attention was not sought might have been left out due to inadequate appreciation of their importance.

The results of this study clearly show that the ICDS approach is quite successful in delivery of nutritional and health services to preschool children under the project.

E. Sub-Tests of CDT

The CDT comprises of six sub-tests, namely, (i) Conceptual skills, (ii) Information, (iii) Comprehension, (iv) Visual Perception, (v) Memory, and (vi) Object Vocabulary. The scores given for each of the sub-tests were subjected to Analysis of Variance by considering the 12 combinations of classes (Three age classes X two sexes X experimental versus control). These analyses were similar to the one adopted for a Completely Randomized Design. From the ANOVA, 'F' test of significance was carried out for each of the six sub-tests. The results of the ANOVA including those of the 'F' tests are presented in Table 44.

The mean scores between the twelve combinations showed highly significant variation at 1 per cent level of significance for four sub-tests, namely, Conceptual Skill, Comprehension, Visual Perception and Memory. Significance at the 5 per cent level was observed for one more sub-test, that is Information. Variation between the mean scores of the twelve combinations was not significant for only the sub-test Object Vocabulary.

Table 44. ANOVA of scores of various sub-tests

Source of Variation	D.F.	Conceptual Skills		Information		Comprehension		Visual Perception		Memory		Object Vocabulary	
		M. S. (Mean Square)	F (Variance Ratio)	M.S.	F.	M.S.	F	M.S.	F	M.S.	F	M.S.	F
Between Groups	11	165.866	8.169 **	37.748	2.296 *	28.991	10.136 **	26.680	5.231 **	27.591	5.757 **	1.631	2.106 NS
With in Groups	288	20.304		16.437		2.860		5.099		4.792		0.774	

Mean scores and their differences were examined for all the sub-tests and the results are discussed in the following sub-sections.

Conceptual Skills

Mean scores on conceptual skills for experimental and control groups of children and their differences (age-wise and sex-wise) are given in Table 45.

Table 45. Mean scores for experimental and control groups and their differences, age-wise and sex-wise for the sub-test - Conceptual Skills

	Male	Female	Difference	C. D. (at 5% level)	Averaged over sex
	3+ years				
Experimental	16.78	19.17	-2.39*	2.11	17.97
Control	13.50	15.33	-1.83	3.22	14.41
Difference	3.28*	3.84**			3.56**
	4+ years				
Experimental	21.41	21.72	-0.31	2.11	21.56
Control	16.56	13.13	3.43	3.22	14.84
Difference	4.85**	5.59**			6.72**
	5+ years				
Experimental	18.54	18.45	0.09	2.11	18.49
Control	17.66	16.77	0.89	3.22	17.21
Difference	0.88^{NS}	1.68^{NS}			1.28^{NS}
C. D. (Experimental Vs control for every age class)					
(at 5% level)	2.72	2.72			1.92
(at 1% level)	3.62	3.62			2.53
	Averaged over age class				
Experimental	18.91	19.78	0.87	1.22	19.34
Control	15.90	15.07	0.83	1.85	15.48
Difference	3.01**	4.71**			3.86**
C. D. (Experimental Vs control averaged over age classes)					
(at 5% level)	1.57	1.57			1.10

A comparison of the mean scores of male and female sexes in respect of the conceptual skills indicated significant differences between sexes only for the experimental group in the 3+ age class, the female children scored over the males. For the control group of children in the 3+ age class and for both the experimental and control children in the 4+ and 5+ age classes the mean score for conceptual skills did not indicate sex effect. When averaged over the 3 age classes the mean scores for conceptual skill did not differ between male and female sexes even in the experimental group. Thus in the present study, sex effect on conceptual skill can be considered as absent/ negligible.

The mean scores of conceptual skill for the experimental group of children for the three age classes 3+, 4+ and 5+ were respectively 17.97, 21.56 and 18.49. The corresponding mean scores for the control groups of children was 14.41, 14.84, and 17.21 respectively. In respect of each of the three age classes the experimental group of children were superior compared to their corresponding control counterparts. The difference in the mean scores was the highest (7.72) for the 4+ age class and the lowest 1.28 for the 5+ age class. For the experimental group there was an increase in the mean score from the 3+ to the 4+ age class but a fall subsequently at the 5+ stage. In respect to control group, however, there was a negligible increase from 3+ to 4+ age group and a moderate increase (2.87) from 4+ to 5+ age class. Even though the conceptual skill scores for the control children continued to rise from 4+ to the 5+ stage, the control children even at the 5+ stage were inferior to the experimental group of children at 4+ as well as 5+ age class. When averaged over both sex and age the mean score of conceptual skill was 19.3 for the experimental group and 15.5 for the control group. The relative superiority of the experimental group over the control group was of the order of 25 per cent. These positive results in respect of the experimental group of children indicate the

importance of AW experience in the life of the preschool child. The decline in the conceptual skill scores of 5+ children in the ICDS, may be due to the under stimulation of children of this age class in the AWs or over attention to 3+ and 4+ age class children.

Information

Mean scores on information for experimental and control group of children and their differences (age-wise and sex-wise) are given in Table 46.

Table 46. Mean scores for experimental and control groups and their differences, age-wise and sex-wise for the sub-test-Information

	Male	Female	Difference	C. D. (at 5% level)	Averaged over sex
	3+ years				
Experimental	2.97	3.82	0.85^{NS}	1.89	3.39
Control	1.60	2.13	-0.53^{NS}	2.90	1.86
Difference	1.37^{NS}	1.69^{NS}			1.53^{NS}
	4+ years				
Experimental	5.40	4.88	0.52^{NS}	1.89	5.14
Control	2.20	1.66	0.54^{NS}	2.90	1.93
Difference	3.20*	3.22**			3.21**
	5+ years				
Experimental	3.22	3.00	0.22^{NS}	1.89	3.11
Control	2.26	2.60	-0.34^{NS}	2.90	2.43
Difference	0.96^{NS}	0.40^{NS}			0.68^{NS}
C. D.(Experimental Vs control for every age class)					
(at 5% level)	2.45	2.45			1.73
(at 1% level)	3.26	3.26			2.27
	Averaged over age class				
Experimental	3.86	3.90	-0.04^{NS}	1.09	3.88
Control	2.02	2.13	-0.11^{NS}	1.67	2.07
Difference	1.84*	1.77*			1.81**
C. D. (Experimental Vs control averaged over age classes)					
(at 5% level)	1.41	1.41			1.00
(at 1% level)	1.86	1.86			1.32

There was no sex effect on the sub-test - Information. In respect of every age class, as well as when averaged over the three age classes, for the experimental group as well as the control group of children mean difference between sexes in the score for Information was less than 0.9. Considering that Information was measured in an eight unit scale, the experimental group of children only in the 4+ age class can be considered as performing well (mean score 5.14). It was rather surprising, that when pooled over the sexes, 5+ age class of children in the experimental group secured the least mean scores (3.11) which was at par with their 3+ counterparts. At the 5+ stage the difference in the mean scores secured by the experimental and the control groups of children was not significant. The difference between the experimental and control groups of children was evident only at the 4+ stage.

Comprehension

Mean scores on Comprehension for experimental and control group of children and their differences (age-wise and sex-wise) are given in Table 4

Table 47. Mean scores for experimental and control groups and their differences, age-wise and sex-wise for the sub-test-Comprehension

	Male	Female	Difference	C. D. (at 5% level)	Averaged over sex
	3+ years				
Experimental	3.17	3.42	-0.25^{NS}	0.79	3.29
Control	1.60	1.93	-0.33^{NS}	1.21	1.76
Difference	1.57**	1.49**			1.53**
	4+ years				
Experimental	5.05	4.74	0.31^{NS}	0.79	4.89
Control	3.00	1.80	1.20^{NS}	1.21	2.40
Difference	2.05**	2.94**			2.49**
	5+ years				
Experimental	4.08	3.42	0.66^{NS}	0.79	3.75
Control	2.60	2.53	0.07^{NS}	1.21	2.56
Difference	1.48**	0.89^{NS}			1.19**
C. D. (Experimental Vs control for every age class)					
(at 5% level)	1.02	1.02			0.72
(at 1% level)	1.35	1.35			0.95
	Averaged over age class				
Experimental	4.10	3.86	0.24^{NS}	0.46	3.98
Contorl	2.40	2.08	0.32^{NS}	0.70	2.24
Difference	1.70**	1.78**			1.74**
C. D. (Experimental Vs control averaged over age classes)					
(at 5% level)	0.59	0.59			0.42
(at 1% level)	0.68	0.68			0.56

There was no evidence of sex effect on Comprehension. As in the case of 'Information' the effectiveness of ICDS AW was the highest at the 4+ stage. The mean score obtained by the experimental group of children in this age class was more than double compared to their corresponding control counterparts. However, the experimental group of children in the 3+ and 5+ stages also

performed better in respect of Comprehension, compared to their corresponding control counterparts. Averaged over both age and sex, the mean score secured by the experimental group was 3.98 as against 2.24 for the control.

Visual Perception

Mean scores on Visual Perception for the experimental and control groups of children and their differences (age-wise and sex-wise) are presented in Table 48.

Table 48. Mean scores for experimental and control groups and their differences, age-wise and sex-wise for the sub-test - Visual Perception

	Male	Female	Difference	C. D. (at (5% level)	Averaged over sex
	3+ year				
Experimental	2.68	3.14	-0.46^{NS}	1.05	2.91
Control	0.93	2.33	-1.40^{NS}	1.61	1.63
Difference	1.75*	0.81^{NS}			1.28*
	4+ years				
Experimental	4.28	4.05	0.23	1.05	4.16
Control	2.73	1.53	1.20^{NS}	1.61	2.13
Difference	1.55*	2.52**			2.03**
	5+ years				
Experimental	3.45	4.34	-0.89^{NS}	1.05	3.89
Control	2.00	2.20	-0.20^{NS}	1.61	2.10
Difference	1.45*	2.14**			1.79**
C. D. (Experimental Vs control for every age class)					
(at 5% level)	1.36	1.36			0.96
(at 1% level)	1.80	1.80			1.27
	Averaged over age class				
Experimental	3.47	3.84	-0.37^{NS}	0.60	3.65
Control	1.88	2.02	-0.14^{NS}	0.92	1.95
Difference	1.59**	1.82**			1.70**
C. D. (Experimental Vs control averaged over age classes)					
(at 5% level)	0.78	0.78			0.55
(at 1% level)	1.04	1.04			0.73

There was no evidence of sex effect on Visual Perception both in the experimental and the control group. The experimental group of children at 4+ stage performed the best in respect of Visual Perception also. The mean score for the control group of children in every age class was about 2.1 or less. In every age class the experimental group of children were superior to their corresponding control counterparts. When averaged over the three age classes, the mean score for Visual Perception was 3.65 for the experimental group of children and 1.95 for the control group.

Memory

Mean score on Memory for the experimental and control groups of children and their differences (age-wise and sex-wise) are given in Table 49.

Table 49. Mean scores for experimental and control groups and their differences, age-wise and sex-wise for the sub-test-Memory

	Male	Female	Difference	C. D.(at 5% level)	Averaged over sex
	3+ years				
Experimental	2.94	3.51	-0.57^{NS}	1.02	3.22
Control	2.33	2.86	-0.53^{NS}	1.56	2.59
Difference	0.61^{NS}	0.65^{NS}			0.63^{NS}
	4+ years				
Experimental	5.25	5.11	0.14^{NS}	1.02	5.18
Control	3.33	2.26	1.07^{NS}	1.56	2.79
Difference	1.92**	2.85**			2.39**
	5+ years				
Experimental	4.93	4.31	0.63^{NS}	1.02	4.62
Control	3.13	3.93	-0.80^{NS}	1.56	3.53
Difference	1.81**	0.38^{NS}			1.09**
C. D. (Experimental Vs control for every age class)					
(at 5% level)	1.32	1.32			0.93
(at 1% level)	1.74	1.74			1.23
	Averaged over age class				
Experimental	4.38	4.31	0.07^{NS}	0.58	4.34
Control	2.93	3.01	-0.08^{NS}	0.90	2.97

	Male	Female	Difference	C.D.(at 5% level)	Averaged over sex
C. D. (Experimental Vs control averaged over age class)					
(at 5% level)	0.76	0.76			0.53
(at 1% level)	1.00	1.00			0.70

There was no evident sex difference on the memory of experimental and control children. Age-wise analysis indicated that the experimental group of children at 4+ age performed the best in respect of 'Memory' also. Experimental group of children at 5+ stage were statistically at par with their 4+ age counterparts. Mean scores in respect of memory of control children showed increasing trend upto the 5+ stage. In respect of every age class the experimental group of children secured better scores than their control counterparts.

Averaged over the three age classes, the mean score for the experimental group was 4.34 compared to 2.97 obtained by control group. The results of the various sub-tests indicated broad consistency with one another. The experimental group of children performed better than their control counterparts in every age class as well as when averaged over the three age classes. Sex effect was negligible in respect of all the tests.

Object Vocabulary

The analysis of variance performed on the data relating to Object Vocabulary did not reveal significant differences between the 12 combinations. In the six point scale adopted for this sub-test, the mean score secured by the children in every one of the 12 combinations was 5.1 or more. Thus the performance of children of either sex in every age class for the experimental as well as the control groups should be considered as remarkably good so far as Object Vocabulary was concerned. The effect of the ICDS programme was the best in the 4+ age group. On the other hand, in respect of the control

group of children, improvement, though on a very moderate scale was noticed from the 3+ stage right upto 5+ stage. Performance in respect of Object Vocabulary was uniformly good. The control group of children at the 5+ stage were inferior to the experimental group of children at the 4+ as well as the 5+ stages. So far as the experimental group of children were concerned, even though there was consistent reduction in the level of their performance relating to various sub-tests from the 4+ to the 5+ stage, their superiority over the corresponding control was still maintained at the 5+ stage.

F. Difference in Cognitive Development of Children Between Experimental Vs Control, Male Vs Female and Between Age Classes of Children

The present section of the study included the following closely related two objectives :

1. To study the differences in the cognitive development between the preschoolers participating in the ICDS Anganwadi programme, and their non-participating counterparts ; and
2. To study level of cognitive development among AW participating and non-participating preschoolers according to their sex and age differences at 3, 4 and 5 years.

To draw appropriate inferences relating to these two objectives, ANOVA was carried out based on a Completely Randomized Design. The 'F' value was highly significant (12.285**). The appropriate three-way table of mean cognitive scores for different combinations of age, sex and experimental versus control are given in Table 50.

Table 50. Mean cognitive scores for different combinations of age, sex and experimental versus control

Groups	Age class					
	3+		4+		5+	
	Male	Female	Male	Female	Male	Female
Experimental	33.7	38.7	47.5	46.3	40.4	38.1
Control	25.0	29.6	33.8	25.5	33.3	33.5
Difference	8.7**	9.1**	13.7**	20.8**	7.1*	4.6^{NS}

From the three-way table, relevant two-way tables were formed which are discussed below. An examination of cognitive scores of children from the experimental and control groups indicated superiority of the former compared to the latter. As against the mean score of 40.7 for the experimental group, the mean score of the control group was only 30.3. Similar results have been reported by Gray and Klaus (1970), who have pointed out that black disadvantaged children who participated in the Early Training Project (ETP) had gained about 11 IQ points, on the average over the non-participants.

Garber and Hebner (1975) support these results by asserting that the experimental children had scored consistently higher than the comparison children. All these results highlight the beneficial influence of preschooling through the integrated approach.

The sex effect was studied separately for the experimental and control groups. The mean score was nearly of the same order both for male and female children (35.6 score for male and 35.2 for female). Thus there was no perceptible sex effect. Bee (1981) also opined that in mental ability sex difference is not very impressive in early years. The appropriate two-way analysis relating to the above inference is given in Table 51.

Table 51. Mean cognitive scores for combinations of sex and experimental Vs control (pooled over age class)

Sex	Experimental group	Control group	Overall average
Male	40.5	30.7	35.6
Female	41.0	29.5	35.2
Overall average	40.7	30.3	35.5

The difference in the cognitive scores of children in the experimental group vs control within 3+, 4+ and 5+ age group was examined. Table 52 gives relevant two-way data.

Table 52. Mean cognitive scores for combinations of age groups and experimental vs control

Age class	Experimental group	Control group	Average
3+	36.2	27.3	33.5
4+	46.9	29.6	41.7
5+	39.2	33.4	37.5

For young children in the 3+ age group, the mean cognitive score was higher for the experimental group by 8.9 points over the control group. The corresponding difference for the 4+ age group of children was much higher, being 17.3 points. However, for the relatively older children (5+) the score difference (Experimental less control) narrowed down to 5.8 points. It would thus appear that the favourable influence of the experimental group compared to the control group on the cognitive development of children were the largest for the children of middle age group namely, 4+. An interesting feature of this study was that the cognitive scores of control children steadily increased with the increase in the age of children, while for the experimental group, cognitive scores increased from 3+ to 4+ age class, but subsequently decreased for the 5+ age class which is clearly indicated in figure 7.

The apparent changes in the cognitive scores of the experimental group of children with age may be due to the fact that when the child from the lower economic strata first comes to the AW, he finds many materials for exploration, which he had not seen before or handled. So he explores them and finds the environment stimulating; but later stagnation appears to take place possibly due to :

a) the lesser attention or incompetence of the AWWs ;
b) lack of stimulating environment ;
c) monotonous and unchallenging nature of activities of the preschool programme ;

d) absence of diversity in the activities for different age classes and the failure to meet the special growth needs of the relatively older children (5+ age class) ; and

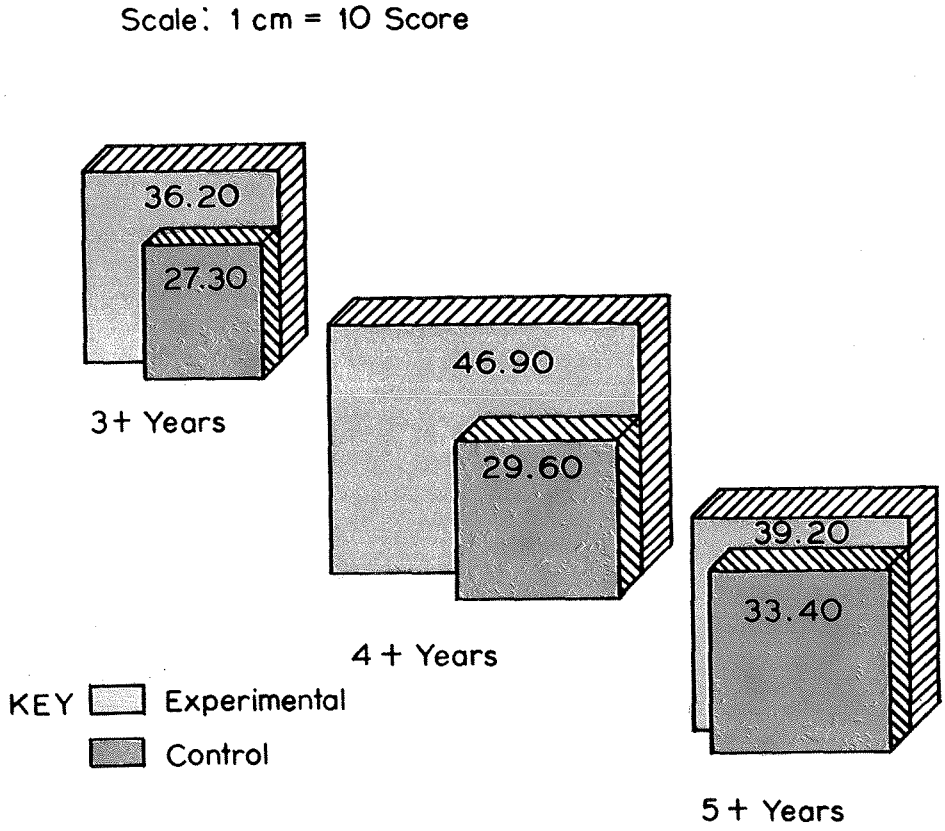
e) burden of baby sitting at home or household work.

Thus in the case of 5+ age class of children in the Anganwadis, spending long period of time in extremely restricted environment and with poor quality of mental stimulation may have resulted in decreased intellectual performance. Research data reported by Jenson (1969) have also shown marked changes (both improvement and decrement) upto 20 IQ points or more under certain conditions. Spending ones preschool years in a restricted environment constantly limits intellectual development.

Hendrick (1984) has also drawn attention to the need to offer various levels of difficulty in activity materials for different age classes of children. A dearth of stimulating, fresh curricula is the most common cause of children being destructive and uninterested in the programme. He further pointed out that children need changes of pace during the day to avoid monotony and fatigue and to maintain a balance of kinds of experiences for them. A programme of hurried stress or unalleviated boredom, unless coped with thoughtfully and modified, can ultimately have only deleterious effect on children.

Although the preschool education component of the surveyed Anganwadis appeared neither appealing physically nor stimulating mentally, the performance of the experimental group children on the cognitive tasks and thereby the total scores were found to be significantly higher than those of their controls. This indicates that ICDS AWs are certainly better than their homes, with at least some play materials and a number of children to communicate and socialize. This factor may be contributing towards their learning to some extent. The fact speaks of the positive influence of the AWs. The

Fig. 7. COGNITIVE SCORES OF EXPERIMENTAL AND CONTROL CHILDREN (AGE WISE)



educational implications of the findings are evident. The general conclusion is that to accelerate the cognitive development of children stimulation in preschool years in AW is essential.

Still one important fact remains which calls immediate attention of the organizers and the Government. If the disadvantaged children of India are to attain optimal level of cognitive development, the quality of preschool education under ICDS needs to be improved urgently. Unless a concrete measure to this affect is taken by way of educating the AWWs, improving their honorarium, providing more play material and out door equipment in the AWCs the investment made on ICDS may not give the desired dividend.

G. Influence of Family Background on Cognitive Development of Children

One of the objectives of the present study was to investigate whether or not cognitive development scores of the children were influenced by the family background : namely, parent's age, and education, and family size, income and type.

In respect of each of the above factors, two-way tables with the concerned factor levels as one-way and the cognitive score class of children as the other way, were formed for the purpose of carrying out Chi square (χ^2) analysis. This was done at the first instance for each age class-3+, 4+ and 5+ respectively (pooling over experimental and control groups children). Subsequently pooled tables over the age classes were also prepared. χ^2 was also carried out for the experimental and control groups of children separately (pooling over the age classes). From the data on the various two-way tables χ^2 analysis was carried out and tested for significance. Percentages of children falling in the various cognitive score class were also worked out at each of the levels of the different factors examined. Based on the χ^2 analysis and the percentages worked out, the salient conclusions which emerged

Association Between Fathers' Age and Cognitive Development in Children

Association between fathers' age and cognitive development in children was worked out taking into consideration children of all the three age classes 3+, 4+ and 5+ years together. The appropriate two-way data pooled over age classes of children (3+, 4+ and 5+) are given in Table 53.

Table 53. Two-way table of age of father and cognitive scores of children (pooled over for sex, age class and experimental vs control)

Cognitive scores of children (%)	Fathers' age group (in years)						Total
	20 - 30		31 - 40		41 - 50		
	No.	%	No.	%	No.	%	
0 - 50	51	47.7	36	24.8	8	17.8	95
51 - 75	39	36.5	79	54.5	23	51.1	141
76 - 100	17	15.8	30	20.7	14	31.1	61
Total	107	100	145	100	45	100	297

χ^2 = 21.2**, 4 df.

The χ^2 value was found to be highly significant (at 1% level). The age of fathers' had influenced the cognitive development of children. Children of young fathers (i.e. in the age group of 20-30 years) were inferior in respect of cognitive scores (47.7% of children scored 50% or less, 36.5% of them scored between 51-75% and the remaining 15.8% scored 76% and above).

However, in respect of both the middle and the upper age group fathers, the concentration was in the score class 51-75 per cent (54.5% and 51.1% of the children constituted the middle class in respect of the cognitive scores of children corresponding to the fathers' age groups 31-40 and 41-50 years respectively).

It, therefore, follows that elderly fathers (age range 40-50) were able to bring about better cognitive development in children compared to young fathers below 30. This tendency was further substantiated by the higher percentage

age group of 41 - 50 years, compared to the moderate percentage (20.7%) of such children corresponding to the fathers age group of 31 - 40 and the low percentage (15.8%) of children of young fathers below 30 years of age.

The data relating to individual age class of children were also examined in respect of the association of fathers' age with the cognitive scores of children. χ^2 analysis indicated significant, highly significant and non-significant association respectively for 3+, 4+ and 5+ years age class of children respectively.

The relevant two-way data, individually for 3 and 4 years old children, are given in Table 54 and 55 respectively.

Table 54. Two-way table age of fathers' and cognitive scores of children (3 years old)

Cognitive scores of children (%)	Fathers' age group (in years)				Total
	20 - 30		31 - 40		
	No.	%	No.	%	
0 - 25	5	10.4	4	7.7	9
26 - 50	20	41.6	10	19.3	30
51 - 100	23	47.9	38	73.0	61
Total	48	100	52	100	100

χ^2 = 6.97*, 2 df.

Note : For working out χ^2 the four cognitive score classes of children were reduced to three suitably in order to ensure adequate cell frequencies.

The χ^2 was significant at 5% level. Percentage of children scoring above 50 per cent cognitive scores was higher for older fathers, being 73 per cent as against only 47.9 per cent for young fathers.

Table 55. Two-way table of age of father and cognitive scores of children (4 years old)

Cognitive scores of children (%)	Fathers' age group (in years)				Total
	20 - 30		31 - 40		
	No.	%	No.	%	
0 - 50	14	41.2	7	10.8	21
51 - 75	9	26.5	35	53.8	44
76 - 100	11	32.3	23	35.4	34
Total	34	100	65	100	99

χ^2 = 13.559**, 2 df.

In respect of four years old a majority (41.7%) of children of younger age group fathers fell in the score class 0 - 50 per cent whereas a majority (53.84%) of children of older fathers fell in the 51 - 75 per cent score class. Percentage of children scoring above 76 per cent was also slightly higher in case of older fathers, i.e. 34.40 per cent as against 32.36 per cent for young fathers.

Although χ^2 analysis of data on 5 years old children was not-significant, it supported the inference drawn from the pooled data. In this respect also a clearly rising trend is indicated i.e. cognitive scores of children increased with increase in fathers age. Percentage of children scoring above 76 per cent was 16 when the fathers were between 20-30 years; whereas in case of fathers between 41 - 50 years, as many as 31.81 per cent children scored above 76 per cent.

To sum up, there existed a positive association between the higher age of fathers, and cognitive scores of children. This showed a trend consistent with the inference based on the data pooled over the three age classes of children.

Association Between Mothers' Age and Cognitive Development in Children

An attempt was also made to find out whether mothers' age and cognitive scores of children were independent. For this purpose, taking into consideration children of all the three age classes (3+, 4+ and 5+ years) together, χ^2 analysis was worked out. The χ^2 was found to be highly significant (at 1% level) - indicating that the age group of mothers influenced the cognitive development in children.

For young mothers as much as 38 per cent of children fell in the lowest cognitive score class of 0 - 50 per cent, while for the relatively older mothers the corresponding percentage was 17.8. This reduction was accompanied by a higher percentage of children of older mothers falling in the cognitive score class 51 - 75 per cent and 76 - 100 per cent. Percentage of children getting cognitive scores higher than 75 per cent was of the order of 17.7 per cent for young mothers while it was 28.8 per cent for older mothers. The appropriate two-way data pooled over age classes (3+, 4+ and 5+ years) are given in Table 56.

Table 56. Two-way table of age of mothers and cognitive scores of children (pooled over sex, age class and experimental and control)

Cognitive scores of children (%)	Mothers' age group (in years)				Total
	20 - 30		31 and above		
	No.	%	No.	%	
0 - 50	86	38.05	13	17.80	99
51 - 75	100	44.25	39	53.40	139
76 - 100	40	17.70	21	28.80	61
Total	226	100	73	100	299

χ^2 = 11.122**, 2df.

The data relating to individual age class of children were also examined in respect of the association of mothers' age with the cognitive scores of children. χ^2 analysis indicated non-significance for 3+ and 4+ age classes but significant association was indicated for the 5+ age class of children. The relevant two-

way data for this age class of children are given in Table 57.

Table 57. Two-way table of age of mothers' and cognitive scores of children (5 year old)

Cognitive scores of children (%)	Mothers' age group (in years)				Total
	20 - 30		31 and above		
	No.	%	No.	%	
0 - 50	31	49.9	6	19.3	37
51 - 75	27	39.2	17	54.8	44
76 - 100	11	15.9	8	25.9	19
Total	69	100	31	100	100

χ^2 = 6.14*, 2df.

In respect of young mothers of 5+ age class of children, the highest percentage (49.9) of children were in the cognitive score class 0 - 50 per cent. The percentage of children of older mothers falling in the same class was, however, much lower being only 19.3. A majority (54.8%) of children of older mothers fell in the cognitive score class 51 - 75 per cent. Percentage of children scoring above 75 per cent cognitive scores was also higher for older mothers, being 25.9 per cent as against only 15.9 per cent for young mothers.

To sum up a favourable influence of maturity of mothers, as indicated by age, was clearly perceptable in 5+ years age class of children, but not in the lower age classes of children. Pooled data over the three age classes of children also confirmed the positive influence of the maturity of mothers on the cognitive development of children.

Association Between Fathers' Education and Cognitive Development in Children

χ^2 analysis on data pertaining to 3+ and 5+ age classes as well as that on pooled basis, did not reveal significant association between fathers' education and cognitive scores of children. However, the χ^2 analysis for the 4+ age class indicated a marginal significance. An examination of the percentage of children

scoring above 75 per cent in this age class indicated that nearly 40 per cent of the children having illiterate fathers, as well as those having fathers with middle school passed, secured cognitive scores above 75 per cent. The two-way table relating to pooled data over age classes are given in Table 58.

Table 58. Two-way table of education level of fathers and cognitive scores of children (pooled over sex, age class and experimental and control)

Cognitive scores of children (%)	Education level of father								Total
	Illiterate		Primary		Middle		Secondary		
	No.	%	No.	%	No.	%	No.	%	
0 - 50	32	42.70	28	33.35	29	30.85	8	18.18	97
51 - 75	28	37.30	41	48.80	44	46.80	24	54.54	137
76 - 100	15	20.00	15	17.85	21	22.35	12	27.28	63
Total	75	100	84	100	94	100	44	100	297

$\chi^2 = 8.02^{(NS)}$, 6 df.

From the pooled data it is evident that better education of fathers' had effected some increase in the cognitive scores of children at the lower level. In respect of children of illiterate fathers, the lowest cognitive score class i.e. 0-50 per cent accounted for the largest percentage of children (42.7), while in respect of children of the highest educational level of the fathers (secondary) a majority of children (54.5%) fell in the middle cognitive score class of 51 - 75 per cent. However, in respect of children falling in the cognitive score class 76 - 100 per cent the changes were only marginal. The above tendency should be considered as weak since the χ^2 analysis did not indicate a significant association.

The reason for the weak association between the educational level of fathers and cognitive scores of selected children in this investigation, may be possibly due to occupational exertion of fathers out side the house ; as a result they may not be finding time/energy for providing mental stimulation to children

at home. Their contact with their children perhaps was limited ; consequently their influence on the cognitive development of children was also likely to be limited.

Association Between Mothers' Education and Cognitive Development of Children

The X^2 analysis carried out on the data on individual age class, as well as pooled over age classes of 3+, 4+ and 5+ years children, indicated that mothers' educational level of the selected children did not significantly influence the performance of children as measured by their cognitive scores. In other words, even mothers with relatively good educational level (middle and above) were not able to provide the necessary stimulation required for cognitive development, as compared to illiterate mothers or those with primary education only. Possibly the low economic standard of the sampled families of all the children (irrespective of the standard of education of mothers) was responsible for the ineffectiveness of mothers' education level on their children's cognitive development.

The relevant two-way data on level of education of mothers and cognitive scores of children are given in Table 59.

Table 59. Two-way table of educational level of mothers and cognitive scores of children (pooled over sex, age classes and experimental and control)

Cognitive scores of children (%)	Education level of mother						Total
	Illiterate		Primary		Middle and above		
	No.	%	No.	%	No.	%	
0 - 50	58	40.5	23	27.4	19	26.4	100
51 - 75	60	42.0	44	52.3	34	47.2	138
76 - 100	25	17.5	17	20.3	19	26.4	61
Total	143	100	84	100	72	100	299

$X^2 = 7.22^{(NS)}$, 4 df.

There was an increasing tendency in the percentage of children scoring above 75 per cent with the increase in the educational standard of mothers'. However, even for the highest educational class of mothers, only one in four of their children has scored above 75 per cent. Thus the association was weak which explains the non-significance of χ^2.

Association Between Family Type and Cognitive Development of Children

Association between family type and cognitive development of children was examined for the 3+, 4+ and 5+ age class of children, individually as well as on the pooled data over the age classes. The two-way data pooled over age classes of children (3+, 4+ and 5+ years) are given in Table 60.

Table 60. Two-way table of family type and cognitive scores of children (pooled over sex, age class and experimental and control)

Cognitive scores of children (%)	Family type				Total
	Joint		Nuclear		
	No.	%	No.	%	
0 - 50	23	29.1	78	35.3	101
51 - 75	41	51.90	93	42.0	134
76 - 100	15	19.0	50	22.7	65
Total	79	100	221	100	300

$\chi^2 = 1.85^{(NS)}$, 2 df.

The largest concentration of children from the joint as well as nuclear families was in the middle cognitive score class (51 - 75%). Again in both the family types, only about one fifth of the children scored above 75 per cent Thus the family type did not significantly affect the cognitive development of children. The test for individual age classes, as well as pooled over 3+ 4+ and 5+ years, also confirmed this result.

Association Between Family Size and Cognitive Development in Children

The χ^2 analysis indicated significant and positive association between

family size and cognitive scores only for the 3+ age class of children. For this age class the percentage of children scoring above 51 per cent steadily increased with the increase in the family size. It was 44.8 per cent for families with 3-4 members, 64.2 per cent for families with 5-6 members, and 72.4 per cent for families with 7-8 members. This increasing pattern was absent for the 4+ as well as 5+ age class of children. A possible explanation is that the relatively young children (3+) develop faster in the environment obtained in bigger families where elder siblings were also present. When the children advance in age and reach 4+ and above, their development was not favourably influenced by the larger family size. The two-way data for the 3+ age class, as well as the pooled table over the three age classes are given in Table 61. and 62 respectively.

Table 61. Two-way table of family size and cognitive scores of children (3+ age group)

Cognitive scores of children (%)	Family size (in numbers of members)						Total
	3 - 4		5 - 6		7 - 8		
	No.	%	No.	%	No.	%	
0 - 25	3	10.4	4	7.5	2	11	9
26 - 50	13	44.8	15	28.3	3	16.6	31
51 - 100	13	44.8	34	64.2	13	72.4	60
Total	29	100	53	100	18	100	100

$X^2 = 5.05^*$, 4 df.

Table 62. Two-way table of family size and cognitive scores of children (pooled over age classes)

Cognitive scores of children (%)	Number of family members						Total
	3 - 4		5 - 6		7 - 8		
	No.	%	No.	%	No.	%	
0 - 50	31	37.8	48	33.4	23	31.0	102
51 - 75	35	42.7	66	45.8	34	46.0	135
76 - 100	16	19.5	30	20.8	17	23.0	63
Total	82	100	144	100	74	100	300

There is a clear marginal rise in the cognitive score of children falling in the score classes 51 - 75, and 76 - 100 per cent as the size of their family increases. The results of the present study are in contrast to those put forth by Belmont and Marolla (1973); Zajonic and Markus (1975); Kelley (1981) who showed that the average IQ of children declined as the number of children in the family goes up.

The possible explanation for the differential results of the present investigation may be that in poor households, where birth rate is higher and subsequent children arrive soon, the first born does not have ample chances of getting the affection, attention, food and care from the parents. Soon he is weaned from the breast and later made baby sitter. In these households no doubt the later borns tend to benefit as they receive more attention, care as well as learning experiences from parents as well as siblings.

Association Between Family Income and Cognitive scores of Children

The χ^2 analysis worked out independently for each age class, as well as pooled over 3+, 4+ and 5+ age classes of children, failed to reveal an association between the family income level and the cognitive scores of children. This is possibly due to the narrow range of the family income. The appropriate two-way data between family income and cognitive scores of children are given in Table 63.

Table 63. Two-way table between family income and cognitive scores of children (pooled over the age classes, sex, experimental and control)

Cognitive scores of children (%)	Family income (in rupees)				Total
	upto 700		Above 700		
	No.	%	No.	%	
0 - 50	89	33.4	12	36.4	101
51 - 75	124	46.4	12	36.4	136
76 - 100	54	20.2	9	27.2	63
Total	267	100	33	100	300

$\chi^2 = 1.40^{(NS)}$, 2. df.

As the family income increased the percentage of children scoring above 75 per cent also increased, while reverse tendency was observed relating to the percentage of children in the cognitive score class of 51 - 75 per cent. However, these trends are not adequate enough to be established by the test of significance. χ^2 analysis carried out separately for experimental and control groups indicated similar results as for the combined ones, except for mothers' age and family income. In the first case χ^2 for the experimental group was non-significant, while for the experimental and control groups combined it was significant. χ^2 for control group alone was not worked out since all the cell frequencies under the age class 31 - 40 was less than 5.

In respect of family income χ^2 for experimental group only was significant. It was not significant for the control, as well as for the experimental and control together. Even in this case one of the cell frequencies was less than 5. Considering these limitations the discussion given in the earlier part of this section, based on experimental and control together, may be considered as stable.

H. Other Factors Which Influence Cognitive Development

Besides sex and age of the experimental versus control groups which have been examined in section F., the cognitive development of children are likely to be influenced by two other types of factors, the first relating to the home and the individual children such as their nutritional status, stimulation available at home, health status, socio-economic status and birth order, and the second, relating to the Anganwadi such as AWWs competence, time given to preschool education activities by the AWWs/time spent by children on various preschool education activities in AWs. The nature and extent of the influence of these factors on the cognitive development of children are examined in this section. For studying the influence of the above two types of factors on the cognitive development, linear correlation and regression techniques were used. In interpreting the results of correlation analysis an important aspect to be kept in view is the relative role of this analysis and the one based on the means. When comparisons are made between different groups and classes on the basis of the means the conclusions depend upon central tendency and they donot take into consideration the variation present within each group or class. Even if the mean of a character for a particular group is low there is high probability that some of the individuals in the group may be showing high value for the character. It should also be rememebered that even within a group having a high value for the mean there may be individuals showing low character value. The analysis based on the means essentially brings out the performance of bulk of the unit in the group. The type of conclusions which will emerge through a correlation analysis is however different. It only brings out the nature of the relative variation between two variables, irrespective of the level of the mean value of the two characters. Even if the mean values for two characters are relatively low in a group it is quite possible that a high positive correlation may occur.

Similarly a low correlation may occur even if the mean value of two characters in some other group is high. Thus sometimes apparent contradictions may be seen between the conclusions drawn from the two types of analyses. Strictly the two types of statistical analyses highlight different aspects of the data.

For the first type of factors data relating to the experimental and control groups were used separately. To have adequate data age classification was ignored. The second type of factors were studied naturally for experimental group only since control group of children were not availing the AW facilities. The mean cognitive score obtained by each of the three age classes of children were related to the scores on selected AW parameters.

a. Home Related Factors and Cognitive Development of Children

Of the first type, five factors were considered : 1) nutritional status, 2) home stimulation, 3) health status, 4) socio-economic status, and 5) birth order. The correlation of these characters with the overall cognitive scores for different combinations of sex and experimental versus control (pooled over age class are presented in Table 64.

Table 64. Correlation of different characters with overall cognitive scores for combinations of sex and experimental versus control (pooled over age classes)

Character with which cognitive score is core-related	Experimental group		Control group	
	Male (n = 105)	Female (n = 105)	Male (n = 45)	Female (n = 45)
Nutritional status	0.099$^{(NS)}$	0.089$^{(NS)}$	0.110$^{(NS)}$	0.346*
Home stimulation	0.258*	0.241*	0.660**	0.388*
Health status	0.294**	0.439**	0.503**	0.544**
Socio-economic status	-0.173$^{(NS)}$	0.045$^{(NS)}$	0.032$^{(NS)}$	0.389*
Birth order	-0.065$^{(NS)}$	-0.140$^{(NS)}$	0.187$^{(NS)}$	0.019$^{(NS)}$

The correlation of health status with the overall cognitive score ranged between 0.294 to 0.544 for the four combinations and all four correlations were positively and highly significant at 1% level.

On the other hand, when correlation was worked out taking into account only nutritional status (one aspect of health) of children, the extent of correlation was not of sufficient magnitude to be identified as significant. However surprisingly marginally significant correlation (0.346) was observed only in one case, namely, control female. Possibly the reason for the significant correlation observed for control children (females) may be that the nutritional status of the experimental children both male as well as female children is generally maintained at satisfactory level by supplementary feeding at AWs. Hence nutritional deficiencies do not develop to an extent affecting adversely the cognitive development. On the other hand, nutritional deficiencies afflict large number of control children particularly females. If improvement in the nutritional status of female children of the control group can be affected the correlation between the cognitive scores and the nutritional status for them can be expected to weaken or

disappear. It thus appears that cognitive development of the female children in the control group would be relatively more influenced by improving their nutritional status.

The correlation between stimulation provided at home and cognitive score was significant and positive in all the four cases. It was highest (0,660) for the control male, followed by the control female (0.388). In respect of the experimental group, the magnitude of correlation was of a lower order, namely, 0.258 for male and 0.241 for female. It thus appears that cognitive development of control children is relatively more influenced by the stimulation provided at home than that in the case of the experimental group. In the case of the experimental group children AW is also an influencing factor. In both the experimental and control groups the magnitude of correlation was higher for males compared to females.

In respect of socio-economic status and cognitive scores, somehow significant correlation was observed only for control female (0.389). It implies only for this single group that a higher socio-economic status perhaps boosts the cognitive development. These results are consistent with those obtained for the nutritional status. Possibily nutritional deficiencies occur more in poor families of large size and adverse affect is more pronounced in respect of cognitive development of female children. For the other three, namely male and female in the experimental group and the male in the control group, the socio-economic status did not appreciably influence the cognitive scores.

In respect of birth order and cognitive scores in all four cases the correlations were negligible . Studies of Galbraith (1982); McCall and Johnson (1972) have also reportedly found no birth order effect on cognitive development of children.

Of the five factors investigated, only health status and mental stimulation provided at home consistently influenced the cognitive scores. In respect of the former the influence was the highest for the control female and for the latter it was so for the control male.

Simple linear regression equations were fitted considering the cognitive score as the dependent variable and the scores given to the Home Stimulation and Health status as independent variables. Using these equations regression lines were drawn which are presented in figure 8 and 9. The rate of growth of the cognitive score value with the increase in home stimulation was the highest for control male, followed by experimental male, control female and the experimental female. It, therefore, appears that responses of male children (experimental as well as control) to higher mental stimulation at home was superior to that of the corresponding female children.

In respect of the growth rate of cognitive score value with the increase in health status, the highest rate was recorded for the experimental female, followed by the control male, the experimental male and control female. The range of the regression coefficient on health status was much narrower (0.400 to 0.65) compared to the range in the regression coefficient for home stimulation (0.47 to 1.02).

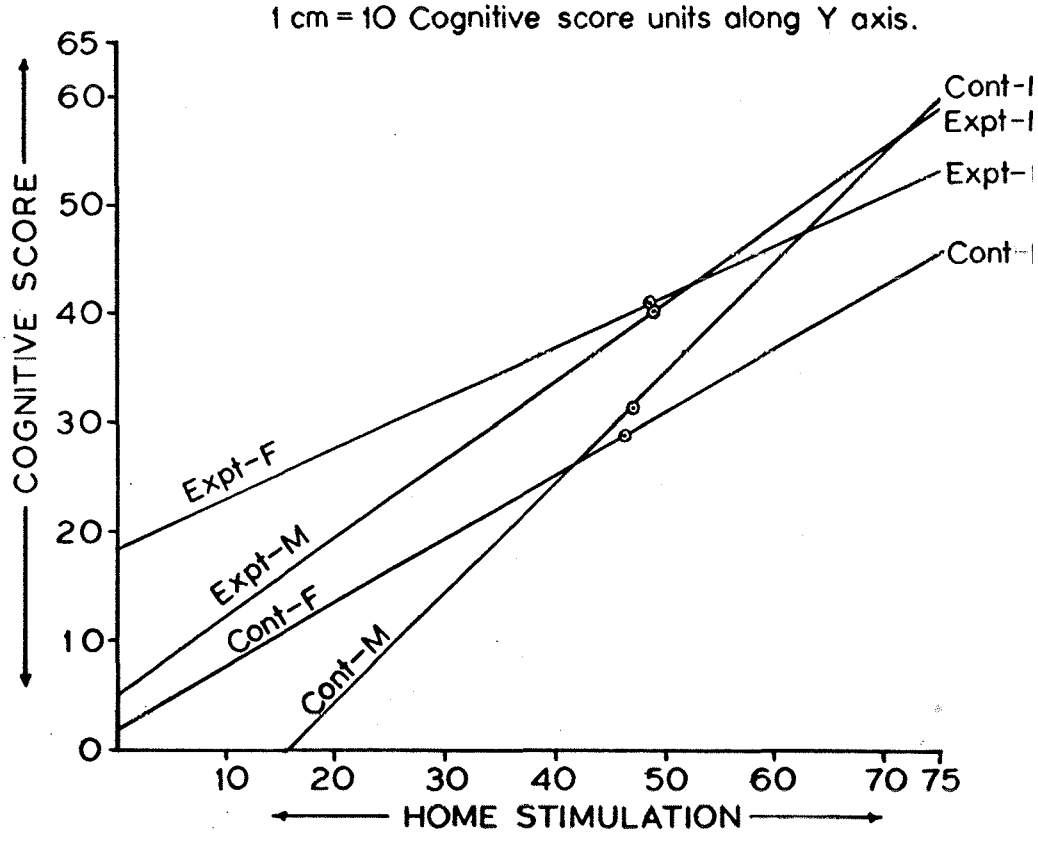
In order to find out the combined influence of the five factors considered above in this section on the cognitive scores obtained by children, multiple correlation coefficients were worked out and these are given in Table 65.

Table 65. Multiple correlation coefficient (with five independent variables)

	Experimental group		Control group	
	Male	Female	Male	Female
Multiple correlation coefficient (with five independent variables)	0.419	0.464	0.701	0.597
'F' value	4.23**	5.44**	7.52**	4.33**

Fig. 8 . REGRESSION OF COGNITIVE SCORE ON HOME STIMULATION.

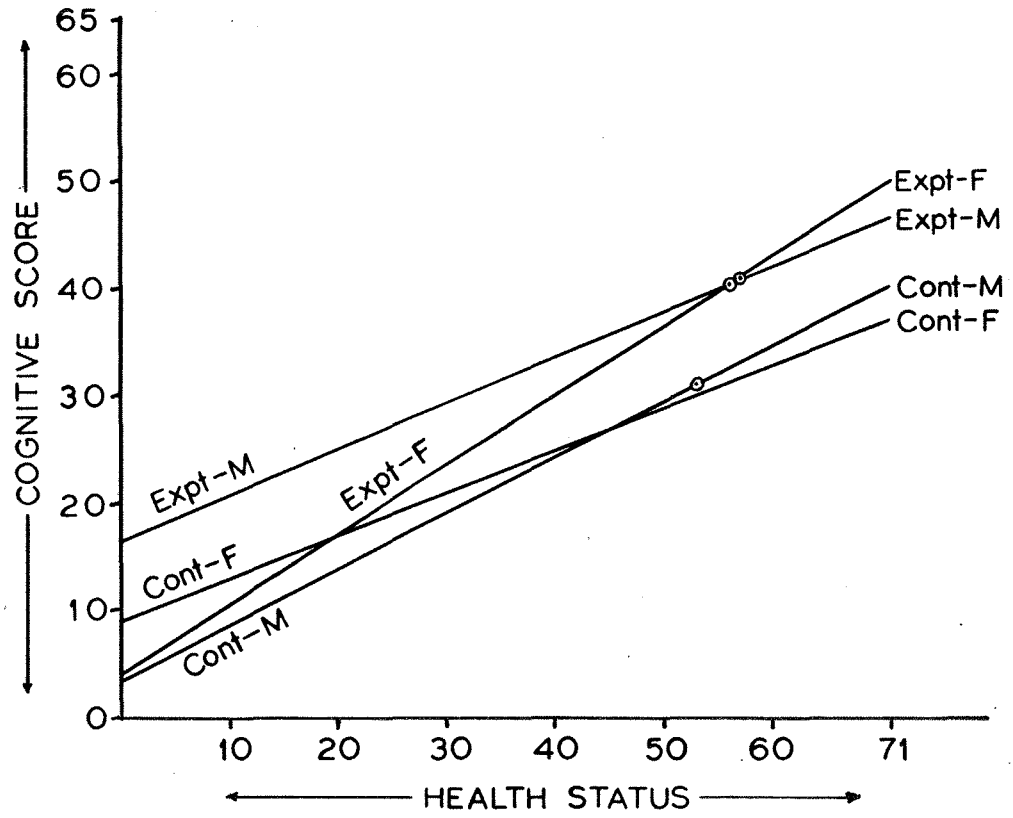
Scale: 1 cm = 10 Score units of home stimulation along X axi
1 cm = 10 Cognitive score units along Y axis.



		REGRESSION EQUATIONS
EXPERIMENTAL	(EXPT.)	EXPT. – M . Y = 4.84 + 0.732
CONTROL	(CONT.)	EXPT. – F . Y = 18.25 + 0.472
MALE	(M)	CONT. – M . Y = 16.06 + 1.019
FEMALE	(F)	CONT. – F . Y = 1.89 + 0.587

Fig. 9. REGRESSION OF COGNITIVE SCORE ON HEALTH STATUS.

Scale: 1 cm = 10 Score units of health status along X axis.
1 cm = 10 Cognitive score units along Y axis.



REGRESSION EQUATIONS

EXPT. − M . Y = 16.29 + 0.430 X
EXPT. − F . Y = 4.08 + 0.650 X
CONT. − M . Y = 3.63 + 0.515 X
CONT. − F . Y = 8.92 + 0.400 X

All the above multiple correlation coefficients were highly significant The magnitude of the multiple correlation was the highest for the control male followed by the control female. The square of the multiple correlation indicates the proportion of the variation in the cognitive scores explained by the independent variates considered, namely, the five factors : a) nutritional status, b) mental stimulation provided at home, c) health status, d) socio-economic status, and e) birth order.

Since mental stimulation provided at home and the health status of the children were the only two factors which influenced the cognitive development scores of children consistently in all the groups, multiple correlation coefficient and multiple regression equations were worked out with the home stimulation and health status as independent variables and cognitive scores as dependent variable. The multiple correlation coefficents for the 4 groups of children are given in Table 66.

Table 66. Multiple correlation coefficient (with two independent variables)

	Experimental group		Control group	
	Male	Female	Male	Female
Multiple correlation coefficient (with 2 independent variables)	0.344	0.461	0.675	0.553
'F' value	5.86**	13.74**	17.63**	9.26**

All the four multiple correlations were highly significant. As expected, these multiple correlation coefficients are less than those presented in table 65 giving multiple correlation coefficients with five independent variables. However, the magnitude of the reduction were not substantial, when account is taken of the fact that the number of independent variables was reduced from five to two.

The multiple regression equations of cognitive score of children regressed

simultaneously on the home stimulation and the health status scores for the four groups are given in Table 67.

Table 67. Multiple regression equations of cognitive scores of children regressed simultaneously on the home stimulation and the health status scores for the four groups

Group	Equation (Y =)		
	Constant	Partial Regression coefficient on Home Stimulation	Partial Regression coefficient on Health Status
Experimental male	-4.47+	0.531 X_1	+0.340 X_2
Experimental female	-13.39+	0.368 X_1	+0.643 X_2
Control male	-17.28+	0.838 X_1	+0.181 X_2
Control female	-13.05+	0.244 X_1	+0.607 X_2

From the multiple regression equation predicted value of Y the cognitive score can be obtained for any desired combination of the independent variables, namely, the scores of Home Stimulation and Health Status. For each of the four groups viz. experimental male, experimental female, control male and control female predicted values of the cognitive scores for 36 selected combinations were worked out which are presented in Table 68.

Table 68. Predicted cognitive scores for different combinations of score values for Home Stimulation and Health Status

X_1	X_2	Health status scores					
		40	45	50	55	60	65
		A. Experimental Male					
Home Stimulation scores	40	30.4	32.1	33.4	35.5	37.2	38.9
	45	33.0	34.7	36.4	38.1	39.8	41.5
	50	35.7	37.4	39.1	40.8	42.5	44.2
	55	38.3	40.0	41.7	43.4	45.1	46.8
	60	41.0	42.7	44.4	46.1	47.8	49.5
	65	43.7	45.4	47.1	48.8	50.5	52.2
		B. Experimental Female					
Home Stimulation scores	40	27.1	30.3	33.5	36.7	39.9	43.1
	45	28.9	32.1	35.3	38.5	41.8	45.0
	50	30.7	34.0	37.2	40.4	43.6	46.8
	55	32.6	35.8	39.0	42.2	45.4	48.7
	60	34.4	37.6	40.8	44.1	47.3	50.5
	65	36.3	39.5	42.7	45.9	49.1	52.3
		C. Control Male					
Home Stimulation scores	40	23.5	24.4	25.3	26.2	27.1	28.0
	45	27.7	28.6	29.5	30.4	31.3	32.2
	50	31.9	32.8	33.7	34.6	35.5	36.4
	55	36.1	37.0	37.9	38.8	39.7	40.6
	60	40.2	41.2	42.1	43.0	43.9	44.8
	65	44.4	45.2	46.2	47.2	48.1	49.0
		D. Control Female					
Home stimulation scores	40	21.0	24.0	27.1	30.1	33.1	36.2
	45	22.2	25.3	28.3	31.3	34.4	37.4
	50	23.4	26.5	29.5	32.5	35.6	38.6
	55	24.7	27.7	30.7	33.2	36.8	39.8
	60	25.9	28.9	31.9	35.0	38.0	41.0
	65	27.0	30.1	33.2	36.2	39.2	42.3

As evident from table 68 there was a steady growth in the cognitive development as measured by cognitive scores with the increases in the scores of home stimulation as well as the health status. Hence substantial improvement in the cognitive development of children can be achieved by providing adequate mental stimulation at home and by taking proper health care of children. In respect of the male children (belonging to the experimental as well as the control groups) the rate of growth in the cognitive score was higher with the increase in home stimulation, than for health status, while for the female children (the experimental as well as control group) the cognitive scores showed relatively faster rate of growth with the increase in the health status. This was also supported by the correlations relating to health status with cognitive scores presented in Table 64. This phenomenon seems to occur because in the case of female children a general neglect in respect of their health and nutrition is found and when such condition is improved the rate of growth in the cognitive scores is likely to be relatively more pronounced.

For the experimental group (both male and female) the predicted cognitive score value corresponding to the combination of home stimulation and health status scores each at 65 level was 52 - 53. On the other hand the predicted cognitive score value for the control children at the same combination levels of home stimulation and health status was only 49.0 for control male and 42.3 for control female. These results indicate that even with adequate stimulation at home and proper health care, the potentiality for cognitive development was much higher in respect of the experimental group children as compared to the control group of children. Thus the benefit accruing to children participating in the ICDS programme, is higher than what should be expected from home stimulation and proper health care.

b. Anganwadi Related Factors and Cognitive Development of Children

In section 'C' of the Findings and Discussions Chapter the overall picture of the functioning of the selected AWs was discussed. In that section analysis was based on the mean scores only. In the present section relationship of AW characters, namely, Anganwadi workers competence, time given to various preschool education activities by the AWWs/time spent by children on various preschool activities in AWs with the overall cognitive scores for different age classes were examined. For this purpose correlation coefficients were worked out with the overall cognitive scores for different age classes of children and the scores of the AWWs on above mentioned characters. The correlation of mean scores obtained by children on CDT with mean scores obtained by AWWs on different Anganwadi characters (age-wise) are given in Table 69.

Table 69. Correlation of mean scores obtained by children on CDT with mean scores obtained by AWWs on different Anganwadi characters (age-wise)

Anganwadi characters	Age class		
	3+	4+	5+
Anganwadi workers competence and cognitive scores	$r = 0.449^{NS}$	$r = 0.552^{*}$	$r = 0.827^{**}$
Time spent by children on various preschool activities in AWs/ Time given to various preschool education activities by the AWWs	$r = 0.211^{NS}$	$r = 379^{NS}$	$r = 0.703^{**}$

The results of age-wise analysis indicate that there was a significant positive relationship between the Anganwadi workers competence and the cognitive scores of children, especially in the 4+ and 5+ age classes. There was significantly positive correlation in case of 4+ at 5% level and a highly significant correlation at 5 years age group (at 1% level). Even though for the 3+ age class the magnitude of the correlation was marginally below the 5% level of significance the difference between the correlation coefficient for the 4+ and 3+ was not statistically significant.

Regarding the correlation between time given to various preschool education activities by the AWWs/Time spent by children on various preschool education activities and childrens' cognitive scores, it was found that at 5 years of age the correlation was highly significant and positive (0.703). In the case of the 3 year age class and 4 year age class also the correlation was positive but was of smaller order and non-significant. Age-wise analysis of 'r' values revealed that the magnitude of correlation positively increased from 3 years to 5 years of age, ($r = 0.211$ for 3 years age class, $r = 0.379$ for 4 years age class and $r = 0.703$ for the 5 years age class), indicating that the time spent by children on various challenging preschool education activities over the years tended to increase the cognitive level of children. Though the effectiveness of this AW character was seen even after one year of AW attendance but it was very marked in 2 years time period.

On the whole, only in the 5+ age class the linear relationship between the cognitive scores on the one hand and the competence of AWWs as well as time given by them to various preschool activities/time spent by children on various preschool education activities in the AW on the other was highly significant and also of a high order i.e. 0.827 and 0.703 respectively. In the 4+ age class also the correlation between cognitive scores and the AWWs competence was significant and its magnitude was moderate (0.552). The similar correlation for the 3+ age class was below the conventional significance level, its magnitude being only slightly less compared to 4+. All the correlations discussed above were positive indicating that the cognitive scores of children increased with the respective AW characters.

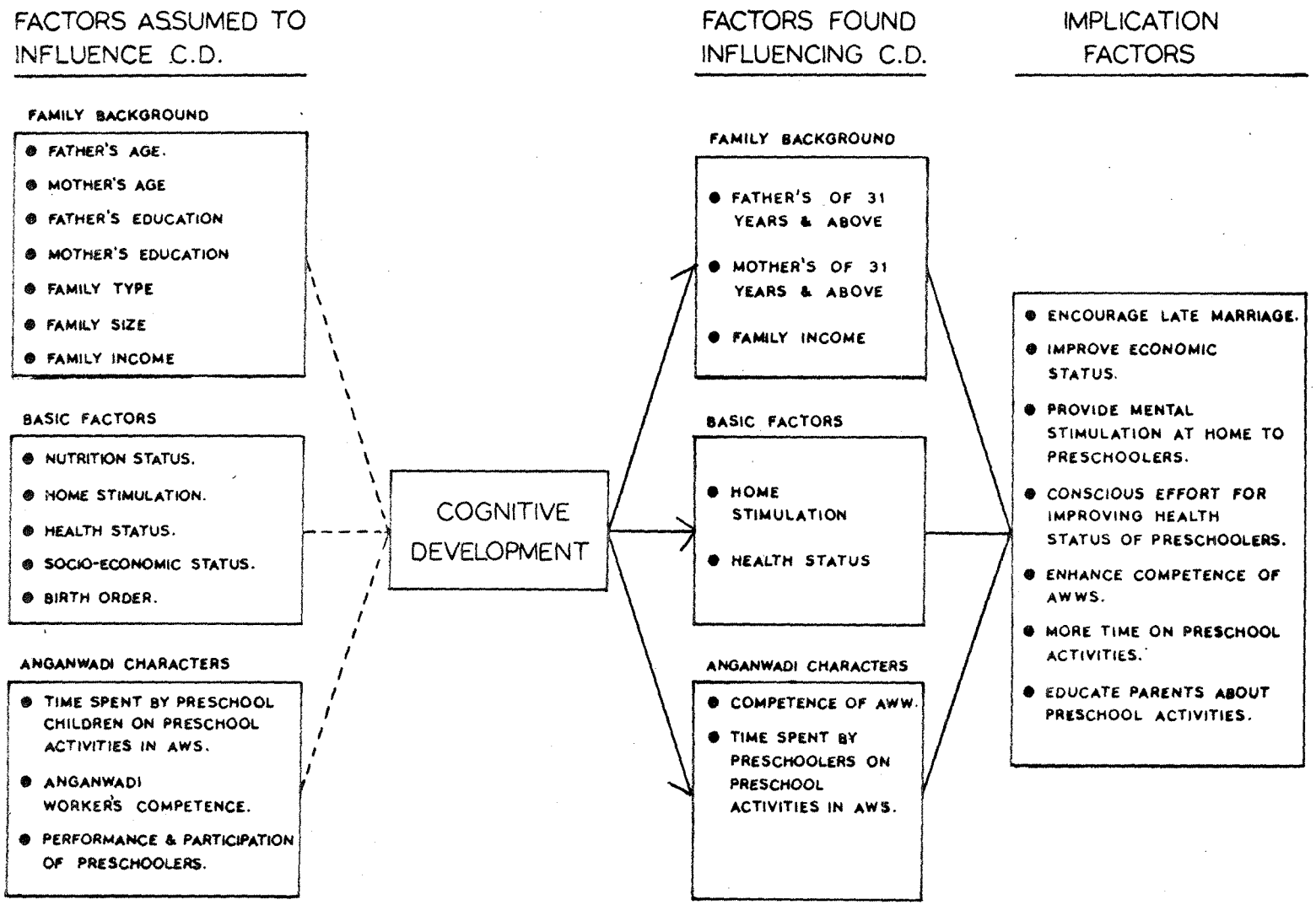
The above results highlight the positive relationship of better functioning AWs and competent AWWs from among the total AWs studied on the cognitive development of children. Further, the correlation analysis indicates the direct

relationship of cognitive development in children attending AW with the competence of the AWWs and the length of time spent by children on the appropriate preschool education activities.

Figure 10 presents a Paradigm of overall factors influencing cognitive development (C.D.) in preschool children. These factors have been classified under three major heads : i) Factors assumed to influence C. D. ; ii) Factors found influencing C. D. ; and iii) Implication factors. The factors which emerged to have direct implications on C. D. were :

- encouraging late marriage ;
- improving economic status of parents ;
- providing adequate mental stimulation at home to preschoolers ;
- making conscious efforts for improving health status of preschoolers ;
- enhancing competence of AWWs ;
- devoting more time on preschool education activities in the AWs; and
- educating parents about preschool activities and the ways of conducting such activities at home.

Fig. 10. PARADIGM OF FACTORS INFLUENCING COGNITIVE DEVELOPMENT (C.D.) IN PRESCHOOL CHILDREN



Summary and Conclusion

V SUMMARY AND CONCLUSION

Children are the most important national resource for human development. However, a large majority of India's 272 million children live in impoverished economic, social and environmental conditions, which impede their physical and mental development. In order to meet the basic needs of this vast and vulnerable population, the Government of India introduced, in 1975, the Integrated Child Development Services (ICDS). The ICDS is the most ambitious and comprehensive plan of the Government of India to increase child survival rates among the poorest of preschool children and their mothers and to enhance the health, nutrition and learning opportunities for them. The plan was launched in only 33 projects on an experimental basis. Within 12 years, the programme has been extended to 1615 ICDS projects all over the country, in the rural, tribal and urban sectors. Thus, more than one-fifth of the country has been covered by ICDS.

The impact of the health and nutrition components of the ICDS is more visible in terms of growth of children. This aspect has been studied extensively, whereas, information regarding the impact of social components of the ICDS, specially its preschool education component, is inadequate.

Cognitive development is one of the major outcomes expected of preschool education, the measurement of which, is relatively difficult. There are not adequate tools, standardized in India for the purpose. Therefore, the present study on the "Impact of the Preschool Education Component in Integrated Child Development Services Programme on the Cognitive Development of Children", was undertaken keeping in view the above limitations, future scope and importance of ICDS. The specific objectives of the study were to :

A. Construct and standardize a Cognitive Development Test (CDT) for preschool children ;

B. Study the infrastructure, working environment and functioning of selected AWs in ICDS and the extent of childrens' participartion and involvement in their preschool activities ;

C. 1. Study the differences in cognitive development between preschoolers participating in the ICDS AW programmes, and their non-participating counterparts ;

2. Study the level of cognitive development among AW participating and non-participating preschool children according to their sex and age differences at 3, 4 and 5 years ;

3. Study whether or not cognitive scores of the child and age and education of parents, and size, income and type of the family were independent ;

4. Study the correlation between cognitive scores of children and (a) birth order of the child, (b) socio-economic status of the family, (c) stimulation provided at home, (d) child's health status (e) child's nutritional status, (f) time given to various preschool education activities by the AWWs, (g) performance and participation of children in AW activities, (h) AWWs competence ; and (i) AW attendance of the child ;

5. Study the differences between (1) stimulation provided at home, (2) health status, (3) immunization status, (4) nutritional status, and (5) personal hygiene and illness status of AW participating and non-participating children at 3, 4, and 5 years of age ;

6. Study the differences between AW participating and non-participating boys and girls at 3, 4 and 5 years of age, in their performance on sub-tests of the CDT - conceptual skills, information, comprehension, visual perception, memory and object vocabulary; and

D. Make recommendations based on the findings of this study, to augment the preschool education component of the ICDS for optimum cognitive development of children.

Design and Methodology

This study was undertaken in Coimbatore City of Tamil Nadu State. For this purpose out of the four urban ICDS projects operating in Coimbatore City, Project Number four at Singanallur was selected, since Sri Avinashilingam Home Science College had already established rapport with this project, maximum cooperation was expected to facilitate collection of the appropriate and relevant data.

Purposive sampling procedure was adopted for selecting the samples.

The samples were identified for both the experimental and control groups of children. The sample selected for the final data collection was entirely new; it was not included in any other stage of the study. An eligible child for the experimental group was defined as "any child aged three to five years, who had been attending an ICDS AWC regularly at least for a period of 6 months". An eligible child for the control group was defined as "a child aged three to five years, who did not attend ICDS AWC or any other Child Welfare Programme". These two groups of children were matched in respect of age, sex and socio-economic status for making the groups comparable.

Out of 90 AWs of ICDS Project Number four, 25 were selected for collecting data on the required number of experimental group children. An AW Observation Schedule was used for selecting the AWs. Cumulative scores were provided each AW. Out of these 25 selected AWs, eight fell in the first class, eight in the second class and the remaining nine in the third class. Thus, the 25 AWs selected, represented a good cross-section of excellent, good and fair Anganwadis.

The experimental group comprised 6.6 per cent of the total population of the children enrolled and participating in the ICDS AWs of Project Number Four (i.e. 210 out of 3170 children). For the control group, children were selected from those who were registered under ICDS AWs, but were not attending it at all. This decision was taken because it was not possible to get children for the control group elsewhere as in Tamil Nadu State, the Hon'able Chief Minister's Nutritious Meal Programme and the ICDS are committed to cover all the preschoolers, under their wings. This sample consisted of 13.13 per cent of the population i.e. 90 out of 650 subjects who constitute the gap between the registration in the AWs and the actual attendance.

There were two major dimensions of this study : (A) Constructing and

Standardizing an instrument for measuring the cognitive development of pre-schoolers ; and (B) Studying the impact of the preschool education component of the ICDS programme on the cognitive development of children.

A. Constructing and Standardizing Cognitive Development Test (CDT) for Pre-schoolers

1. A new Cognitive Development Test was designed and standardized for assessing the cognitive development level of three, four and five years old children. The instrument was standardized on 270 children. The validity of the instrument constructed was determined by correlating the standard scores obtained by the validation sample on the constructed instrument, with their IQ scores obtained on Stanford-Binet Scale. The correlation was 0.80. Test re-test reliability was carried out on 100 subjects, which was 0.95. Norms for 3 years, 4 years and 5 years old children were also developed.

2. Apart from the CDT, the following structured interview schedules were also prepared, pretested and finalised to be used in the present study :

a. Personal Data Sheet,
b. Home Stimulation Inventory,
c. Anganwadi Observation Schedule, and
d. Health Status Inventory.

B. Studying the Impact of the ICDS

For studying the impact of the preschool education component of the ICDS programme on cognitive development of children, data were collected, using the Socio-Economic Scale by Vendal (1981), and all the above mentioned schedules and CDT.

Analysis of Data

For the analysis of data, the statistical techniques used were : (a) Descriptive analysis ; (b) Reliability and validity tests ; (c) Analyses of Variance (ANOVA) on a Completely Randomized Design (CRD) ; (d) 'F' tests, normal and the 't'

tests ; (e) Simple Correlation and Simple Regression analysis ; (f) Multiple Correlations, Partial Regression Coefficients, Multiple Regression Equations and their test of significance 'F' test ; and (g) the Chi-square test of independence.

The analysis of the study included the following aspects :

A. Information on family background of children ;
B. Mental stimulation received at home by children ;
C. Physical environment and functioning of Anganwadis ;
D. Impact of ICDS on health and nutritional status of children ;
E. Sub-tests of CDT ;
F. Difference in cognitive development between experimental Vs control, male Vs female and between age classes of children (3+, 4+ and 5+ years);
G. Influence of family background on cognitive development of children ; and
H. Other factors which influence cognitive development.

Major Findings

A. Information on Family Background of Children

a) Bulk of the mothers of the experimental as well as control group of children were in the age group of 20 - 30 years, illiterate and generally unemployed.

b) A majority of fathers of both the groups were below 40 years, had education upto primary school level and unskilled workers.

c) Bulk of the households of children of either group were of nuclear type with family size ranging from 3 to 6 and belonged to the income level below rupees 700 per month.

d) The mean scores of SES between the experimental and the control groups or between male and female sexes were nearly of the same order.

e) An appreciable proportion (13.13%) of children registered under the ICDS were not attending the AWs.

B. Mental Stimulation Received at Home by Children

a) The responsibility of bringing up of almost all the experimental as well as control group of children rested with both their parents. But mothers' gave company mostly.

b) Almost all the families of the experimental as well as the control group of children (over 95%) did not possess any printed literature.

c) A majority of the experimental as well as the control group of children had frequent opportunity to go out with their parents.

d) Two out of every five children of the experimental as well as the control group had only rare opportunities to hear stories at home. Only about one in three from either group had such opportunities regularly.

e) The experimental group of children participated less in household activities than the control group.

f) Ninety four per cent of the experimental and 81 per cent of the control group of children were allowed freedom to express their desires/wants at home fully with their parents.

g) Parents of majority of children satisfied the curiosity of their children only slightly.

h) Cinema and radio facilities were available as entertainment to most of the families.

i) None of the control group children and a negligible percentage of the experimental group had sufficient play material at home.

j) Almost all the children of either group were given sufficient time to play and freedom to handle the limited play material available at home.

k) In a majority of cases for either group the money spent for purchase of toys or picture books for the children was low and the time spent by the parents with them in their play activities was inadequate.

C. Physical Environment and Functioning of AWs

a) Regarding the infrastructural facilities/condition of the AWs, by and large, the physical facilities of the AWs such as physical set up, building condition, size of rooms, light and ventilation was fairly good, excepting floor condition,

sanitation facilities, quality of decoration, placement of charts/posters and shade in the play yard. AWs also lacked storage space, inbuilt cupboards and toilet facilities.

b) The AWs in general looked desolate and empty ; they were not physically inviting.

c) Only 28 per cent of the AWWs had prepared teaching aids from the locally available materials.

d) As regards enrollment, 56 per cent of the AWs conformed to the recommended norms of the ICDS ; the rest of the AWs grossly exceeded the norms.

e) In 60 per cent of the AWs more than 50 per cent of the children were properly dressed.

f) In a majority of AWs (68%), over 50 per cent of children participated in preschool activities. However, in respect of 56 per cent of the AWs, a majority of children did not enjoy the preschool activities. Also in 92 per cent of AWs, no help was taken from children in distributing, collecting and putting back the play/teaching materials, thus children were missing the opportunity to be responsible, helpful and sharing.

g) Cent per cent of children in all the AWs washed their hands before and after eating, indicating that children learn good habits quickly. However, the purpose of washing hands was not adequately realized in some AWs since all children dipped their hands in the same bucket of water before and after eating.

h) In a majority of AWs adequate amount of time was devoted in the daily programme for rhymes, music, story telling and prayers. However, only in the case of 8 per cent of the AWWs the method of story telling was found to be appropriate, and about one third of the AWWs usually conducted rhymes/music session effectively.

i) The concept teaching was rather mechanical. AWWs rarely used 'play-way' and 'child-centered' techniques of teaching. Merely 8 per cent of the

AWWs earmarked adequate time on ' play-way' methods and theme based projects.

j) In about 40 to 50 per cent of the AWs no time was devoted to laguage stimulating activities or concept oriented teaching.

k) For health check-up no time was spent in 44 per cent of the AWs.

l) Although the children were left free to move about in the room in almost all AWs but only 30 per cent of the AWWs directed free-play activities for children which could serve as a learning media.

m) In almost all the AWs indoor games were allotted adequate time. The absence of shade in the play yard generally limited the out door play activities.

n) Fifty two per cent of the AWWs occasionally organized and conducted simple play and allied activities.

o) Sixty per cent of the AWWs never or rarely utilized locally available resources for play and teaching activities. Only 4 per cent of them usually utilized the community resources for promoting cognitive development of children.

p) Only 20 per cent of the AWWs planned their teaching programme in advance and only a similar per cent kept the equipment in a well arranged manner.

q) A majority of the AWWs were only SSLC passed and had not studied anything about preschool education.

r) Only 76 per cent of the AWWs received three-months job training course. The training was given by ICDS instructors who were fresh Home Science Graduates with only one major paper on child development.

D. Impact of ICDS on Health and Nutritional Status of Children

a) About 79 per cent of the experimental group of children were normal or in Grade I while the corresponding percentage for the control group was 54. This was observed for each age class also (3+, 4+ and 5+)

b) The percentage of experimental group of children nutritionally graded

as normal rose steadily from 31.7 for the 3+ age class to 37.4 for the 5+ age class. On the other hand the percentage of control group of children similarly graded decreased from 23.3 in the 3+ to 20.3 in the 5+ age class.

c) In respect of experimental group, Grade III children were found to be only in the 3+ age class and there was none in any age class labelled as Grade IV (malnourished). However, in respect of the control group, children labelled as Grade III occurred in every age class and those labelled as Grade IV also occurred in 3+ age class.

d) The mean score for the overall nutritional status was higher for the experimental group of children over their control counterparts.

e) In respect of all the seven components of the physical appearance, control group of children in the age class 3+ faired better than their experimental conterparts. In the 4+ age class, however, the pattern was reversed, the experimental group of children being far superior. Coming to the 5+ age class, the experimental group maintained their superiority over the corresponding control, but were inferior to the experimental counterparts in the 4+ age class.

f) Immunization percentage in respect of all the diseases was higher for the experimental group of children compared to their control counterparts.

g) There was no incidence of pneumonia and whooping cough was also rare for both the experimental and control group of children. Measles incidence was relatively lower for the experimental group, but URI and diarrhoea incidences were higher for the experimental group of children as compared to the control ones.

h) The overall health status, assessed by combining the scores of the four components, viz., nutritional status, physical appearance, immunization and episodes of illness in children, was superior for the experimental group as compared to the control (56.5 and 52.2 scores respectively).

E. Sub-Tests of the CDT

a) Sex effect was absent for all the six sub-tests viz., conceptual skills information, comprehension, visual perception, memory and object vocabulary

b)The conceptual skills of the experimental group of children was superio to the control group in every age class.

c) In respect of sub-test on information, the experimental group of childre scored about 55 per cent more on an average than their control counterparts The difference between the two groups was specially marked for 4+ age class

d) The sub-tests on comprehension, visual perception and memory indicate significant superiority of the experimental group over the control in ever age class.

e) The level of performance in respect of object vocabulary was uniforml good for all the 12 combinations of age, sex and experimental versus control

F. Difference in Cognitive Development of Children Between Experimental Versus Control, Male Versus Female and Between Age Classes (3+, 4+ and 5+

a) CDT carried out on the pooled data of different component character indicated significant superiority of the experimental group over the control The mean difference of the cognitive score observed between the two group varied with age class of children, being the highest for the 4+ children (17. points), followed by 3+ children (8.9 points). It was the least for the 5+ childre (5.8 points). Thus the favourable influence of the ICDS was the maximum o the 4+ age class of children.

b) The difference in cognitive development between the male and femal children was negligible.

G. Influence of Family Background on Cognitive Development of Children

a) Elderly fathers were able to bring about superior cognitive developmen in children compared to young fathers below 30. This tendency was substantiate

by the higher percentage (31.1) of children scoring 75 per cent correspondin to the fathers' age group of 41 - 50 years of age. Examination of the dat relating to each age class of children also indicated a positive association bet ween older age of fathers and cognitive scores obtained by children.

b) Mothers' age also influenced the cognitive development of children

c) Fathers' education level did not influence substantially the cognitive deve lopment of children. The association between mothers' educational level an the cognitive development of children was also weak.

d) Family type (joint or nuclear) also did not materially influence the cogni tive development of children.

e) There was a significant and positive association between family size an the cognitive score obtained by children only in the 3+ age class.

f) Family income level did not influence the cognitive development of the children in the present investigation.

H. Other Factors Which Influence Cognitive Development

1) Home Related Factors

a) Correlation and regression analyses indicated that childrens' health statu and mental stimulation provided to them at home consistently influenced the cognitive development. In respect of the male children (belonging to the experi mental as well as the control groups) the rate of growth in the cognitive scor was higher with the increase in home stimulation, than for health status, whil for the female children (the experimental as well as the control group) th cognitive scores showed relatively faster rate of growth with the increas in the health status.

For the experimental group (both male and female) the predicted cognitiv score value corresponding to the combination of home stimulation and healt status scores each at 65 level was 52 - 53. On the other hand the predicte cognitive score value for the control children at the same combination level

of home stimulation and health status was only 49.0 for control male and 42.3 for control female. These results indicate that even with adequate stimulation at home and proper health care the potentiality for cognitive development was much higher in respect of the experimental group as compared to the control children. Thus the benefit accruing to the children participating in the ICDS programme is much more than what should be expected from home stimulation and proper health.

2) Anganwadi Factors

a) There was a significant positive relationship between the AWWs competence and the cognitive scores of children, especially in the 4+ and the 5+ age classes. Correlation coefficient ranged from 0.45 for the 3+ age class to 0.83 for 5+ age class. The increasing tendency observed between cognitive scores of children and AWWs competence with the age of children showed that the influence of AWWs increased with the longevity of association with children.

b) The cognitive scores of children positively correlated with the time given to the various preschool education activities by the AWWs/time spent by children on various preschool education activities, and the correlation level increased steadily from the 3+ age class of children to 5+ age class ($r = 0.21$ for 3+ and $r = 0.70$ for 5+). The effectiveness of this AW character was the highest for the 5+ age class indicating that the time spent by children on various preschool education activities over the years tended to increase the cognitive level of children.

The findings of the present study have brought to light the superior nutritional and health status and cognitive development in children, who attended the ICDS programme as compared with their control counterparts, belonging to the same socio- economic background.

On the basis of these findings it can be concluded that preschool children

from the poverty background have profited considerably from systematic learnin interpersonal experiences and adequate health care. Cognitive abilities ca be increased during the preschool years by providing appropriate learning ex periences at AWs by competent AWWs.

Recommendations and Suggestions for Future Research Studies

On the basis of the observations made in and the findings of this investigation, the following recommendations are made and areas are identified for future research :

Recommendations

1. Physical facilities such as proper drainage, toilet and storage need t be provided in all the AWs. Provision must also be made for availability o out door and indoor play materials as well as safety and shade in the pla yards.

2. Basic training of all the functionaries including the CDPO, supervisor AWWs and helpers should be strengthened specially with regards to the preschoc education component in the ICDS.

3. The preschool education training of the AWWs needs to be more practicall oriented, geared towards increasing the efficiency and skills of the AWW Greater emphasis must be laid on methods of preschool teaching, in order t give the AWWs a clear concept of preschool education activities and the com ponents of this programme. After theoretical orientation they should be give practical training in conducting preschool education in good experimental pre schools for a period of at least two months, where the emphasis should be on "how to make use of low cost, inexpensive and waste material for preschoc teaching".

4. The AWWs must be taught ways of using the ENVIRONMENT as a rich resource for teaching the preschoolers.

5. Teachers and students from Home Science Colleges should be involvec in participating in the ICDS AWs in order to give exposure of preschool teachinc to the AWWs in their own settings. They should also help in making low cost teaching material for children and donate teaching material made for thei experimental Nursery School.

6. A model AW could be set up under each ICDS project with the help o staff from the Home Science Colleges, where demonstrations about improvisinc the toys and teaching aids from the locally available material could be giver to the AWWs. This could serve as a model training centre for the in-servic training of the AWWs and other functionaries in the ICDS.

7. Highly competent and qualified child development professionals shoul be appointed as CDPOs. The present practice deviates from this principle Most of the time the Mukhyasevikas or the like extension workers are promotec to this post. To improve the standard of activities they should supervise th AWs regularly.

8. Refresher courses for the in-service CDPOs, Supervisors, AWWs and helper should be organised state/region-wise once or twice in a year to enhance thei skills and knowledge. For this purpose Home Science Colleges/Department in the country can be utilized as training centres.

9. Only trained and qualified AWWs and helpers must be appointed in th AWs. Job responsibilities of the AWWs need to be carefully assessed so tha they have time to concentrate on their primary responsibility of providin preschool education activities. Incentives and recognition should be given fo good work done by AWWs. There is a need to revise/formulate regulation to include the benefits of medical leave and other kinds of leave for the AWW and helpers. Their honorarium also needs to be raised.

10. AWs and their programme needs to be made more attractive by plannin

of the daily programme, providing variety of experiences, making the programm more challenging as per the maturity and increased competence of childre and by proper placement of materials and equipments in order to attract, re tain and stimulate the preschoolers.

11. AWWs and helpers need to make efforts to talk, interact with childre and encourage healthy ways of socialization and communication in order t lay the proper foundation for socio-psychological development of preschooler

12. Activities like giving science and creative experiences, free play session dramatization, field trips and concept teaching need to be incorporated urgent in all the AWs.

13. For improving the cognitive abilities, improvement in nutritional and heal status of all children is imperative. But in the case of female children th is all the more important because they have been relatively neglected in t families with regards to above parameters.

14. While the results of this investigation have brought to light that the prop health care and adequate mental stimulation at home improve the cogniti development in preschool children, it also strongly supports the necessity preschooling for all children for maximizing their cognitive potentialities.

15. The findings also imply that the families especially the disadvantag ones, need to be educated about their roles in providing mental stimulati to preschoolers, including the details about mental stimulation processes using "waste materials available in the house", through appropriate traini and guidance.

Suggestions for Future Research

1. Studies utilizing the constructed CDT in this study may be undertak in different regions of the country, effecting suitable modifications if necessar

2. Similar studies may be conducted in other states also where data c

consolidated and national efforts could be made to understand the gaps ar assets of the preschool education component of the ICDS in particular.

3. Impact of Home Stimulation viz-a-viz AW stimulation on cognitive develo ment of preschoolers.

4. Impact of preschool education on social development, habit formatic and leadership qualities.

5. Impact of preschool education on language and motor development.

6. Follow-up studies on children subsequent to preschool education and t impact on primary education - enrollment, retention, achievement.

7. Follow-up studies on duration of the retention of the benefit of gai made through preschool education.

8. Studies on the training needs of the AWWs and their achievement motivation.

References

REFERENCES

Abhichandani, P. A. 1970 — A Study of Growth and Development in the First Eightee Months of Life. Unpublished Ph. D. Thesis, AIIMS, New Delhi.

Abraham, M., and Prasannan, K. C. 1982 — Role of Mothers' Education in Raising the Mental Healt Level of the Child. Journal of Education Researc and Extension, XIX, 2, p. 80.

Adish, et al., 1985 — The Impact of ICDS on the Intellectual Status of Childrer Unpublished M. D. Thesis, (PSM), Rohtak.

Agarwal, et al., 1985 — Nutrition and Immunization Status of Children in ICD and Non-ICDS Blocks. Department of Paediatrics BHU, Abstracts of Research Papers, IX Annual Conver tion of ICDS, Central Technical Committee on Healt and Nutrition, AIIMS, New Delhi.

AIIMS 1985 — Annual Survey Report of Central Technical Committe on ICDS. New Delhi.

Aiken, L. R. 1982 — Psychological Testing and Assessment. Allyn and Beco Inc., London, pp. 4-6, 9-10, 13, 33, 36, 43, 44, 4 56-59, 131.

Altus, W. D. 1967 — Birth Order and its Sequence. International Journa of Psychiatry, 3, pp. 23-36.

Anastasi, A. 1976 — Psychological Testing. Collier - MacMillan Publisher London, pp. 9, 23, 25, 103, 110, 112, 122, 124, 13 140, 151, 198, 199, 265-267, 306-308.

Annapoorni, A., and Chandramani, R. 1972 — The Status of Preschools in Coimbatore. Indian Journa of Home Science, VII, I, pp. 24-26.

Bagby, J. W. 1957 — Dominance in Binocular Rivalry in Mexico and th United States. Journal of Abnormal and Social Psychology 54, pp. 331, 334.

Bai, I. 1983 — Introduction of Solid Foods in Children of ICDS Bloc in A. P. Abstracts of Research Papers, AIIMS, New Delh p. 14.

Baldwin, A. L. 1961 — Behaviour and Development in Childhood. Holt, Rineha and Winston, New York, pp, 123-126, 334, 345, 35 406, 409.

Baley, N. 1970 — Comparison of Mental and Motor Test Scores for age 1-15 Months by Sex, Birth Order, Race, Geographic Location, and Education of Parents. Child Developmer 36, pp. 379-411.

Barnettee, W. L. (Jr) 1955 — Survey of Research done with Psychological Tests India. Psychological Bulletin, 52, 105-121.

Basu, C. K. 1985 — Inservice Teacher Education for Universal Primary Education : An Experimental Model from Bangladesh Child, Family, Community, VIII', UNESCO, pp. 8-9

Becker, N. W. 1974 — The Relationship Between Parent-Child Reciprocity and the Child's Mental Development. Diss. Abstr. Int. (Jan), 34 (7-A), p. 3978.

Bee, H. 1981 — The Developing Child. Harper and Row Publishers New York, p. 202.

Belmont, L., and Marolla, F. A. 1973 — Birth Order, Family Size and Intelligence. Science, 182 pp. 1101.

Bennett, et al., 1964 — Chemical and Anatomical Plasticicity of Brain. Science 146, pp. 610-619.

Berbaum, et al., 1982 — A Close Look at Galbraith's "Closer Look". Developmenta Psychology, 18, pp. 181-191.

Bernstein, B. 1960 — Language and Social Class. British Journal of Sociology 11, pp. 271-276.

Bhandari, B., et al., 1981 — Nutritional and Immunization Status of Children i an ICDS Block. Indian Paediatrics, Vol. 18, (3), pp. 187-19

Bhatia, H. R. 1965 — A Text Book of Education and Psychology. Asia Publishin House, New York, pp. 426-430.

Binet, A., and Simon, T. 1916 — The Development of Intelligence in Children. (E.S. Kit Trans.) Williams and Wilkins, Baltimore, p. 2.

Bloom, B. S. 1964 — Stability and Change in Human Characteristics. Joh Wiley and Sons, Inc., New York.

Boaz, G. D. 1971 — General Psychology. Boaz Institute of Psychology Service Madras, pp. 178-179, 196-199, 208-209.

Borbora, D. 1987 — A Comparative Study on Mental Ability of Preschoo Children in Urban, Rural and Tribal Areas. Unpublishe M.Sc. Thesis, Bharathiar University, p. 42.

Borg, W. R., and Gall, M. D. 1983 — Educational Research - An Introduction. Longman, Ne York, pp. 272-273, 281-286, 289-300.

Bosque, C. R. 1973 — The Education of the Preschool Child. Children in th Tropics, VII, 86, p. 26.

Brar, P. S. 1985 — Training in Clear Thinking, Educational Review, XVI, p. 55.

Breedlove, C., and Weikart, P., & Schweinwart, L. J. — Perry Preschool Project. Paper presented at Souther Governor's Conference, Hilton Island, South Carolir (Balak J. of IAPE, Vol. X, No. 3, Aug. pp. 11-12.

Broman, S. H., Nichols, P. L., and Kennedy, W. A. 1975 — Preschool IQ Prenatal and Early Developmental Correlate John Wiley and Sons, London, p. 2.

Broota, K. D., and Ganguly, H. C. 1975 — Cultural Differences in Perceptual Differences in Percep tual Selectivity.Journal of Social Psychology, 95, pp. 153-163.

Brown, F. G. 1970 — Principles of Educational and Psychological Testing. Th Dryden Press Inc., Illinois, pp. 2, 31-36, 37-38, 42-43 46, 98, 106, 160, 162-163, 169-171, 176, 327, 331.

Bruner, J. S. 1971 — The Cognitive Consequences of Early Sensory Deprivatior In Solomen, P. et al., (Eds.), Sensory Deprivation. Harvar University Press, Cambridge, pp. 195-207.

Burt, C. 1955 — The Evidence for the Concept of Intelligence. Britis Journal of Educational Psychology, Vol. 25, pp. 158-177

Chakrabarty, M. K. 1985 — Impact of the ICDS Programme in Elevating the Immuni zation as well as Nutritional Status of the Childrer Calcutta National Medical College, Abstracts of Researc Papers, IX Annual Convention of ICDS, Central Technica Committee on Health and Nutrition, AIIMS, New Delh

Chowdhry, D. P. 1980 — Day Care Services in India. Social Welfare, XXVII, 8 pp. 11-13.

Cohen, G. 1983 — Psychology of Cognition. Academic Press, Londor pp. 65, 75, 128.

Cole, M., and Bruner, J. S. 1971 — Cultural Differences and Influence about Psychologica Processes. American Psychologist, 26, pp. 867-876

Craig, G. J. 1979 — Child Development. Prentice Hall Inc., New Jersey pp. 68, 87.

Cronbach, L. J. 1984 — Essentials of Psychological Testing. Harper and Ro Publishers, New York, pp. 26, 145-148, 177-178, 208

David, T. G., and Wright, B. E. 1974 — Learning Environments. University of Chicago Pres Chicago.

Dennis, W. 1975 — The Mental Growth of Certain Foundlings Before an After Adoption. In H. C. Lindgren (Ed.), Educationa Psychology in the Class Room. Oxford University Pres New York, 1980, pp. 92-93.

Department of Child Development, M. S. University, Baroda 1978 — Effect of short Term Enriched Programme. Balal IAPE, 3-2, pp. 5-10.

Desai, K. G. 1954 — The Construction and Standardization of a Battery c Group Test of Intelligence in Gujrati for the Age Grou

Deutsch, M. 1965 — The role of Social Class in Language Development Cognition. American Journal of Orthopsychiat. pp. 78-88.

Devadas, R. P. 1977 — Abstracts of the Lectures Delivered under the Prograr of National Lectures of UGC. pp. 1-2.

Devadas, R. P., and Jaya, N. 1984 — A Text Book on Child Development. MacMillan India L New Delhi, pp. 98-108.

Devi, I., and Yaimbe 1983 — Study of two ICDS Projects in Manipur. Report National Conference on Research on ICDS, NIPC p. 95, 1986.

Dove, L. A. 1985 — The Development and Training of Teachers for Ren Rural Schools in Less Developed Countries. Child, Far Community, X, p. 1.

Duncan, O. D. 1982 — Ability and Achievement. Social Biology, (Fall-W Vol. 29, (3-4), pp. 208-220.

Dworetzky, J. P. 1984 — Introduction to Child Development. West Publishing Company, New York, pp. 343, 360-362.

Elkind, D. 1976 — Piagetian and Psychometric Conceptions of Intellige In N. S. Endler, L. R. Boulter, and H. Osser (e Contemporary Issues in Developmental Psychology, F Rinehart and Winston, New York, pp. 529-541.

Eson, M. E. 1972 — Psychological Foundation of Education. Holt Rine and Winston, Inc., New York, p. 128.

Eyken, W. V. 1977 — The Preschool Years. Penguin Publishers, Engl p. 29-30.

Fowler, W. 1962 — Cognitive Learning in Infancy and Early Childh Psychological Bulletin, 59, pp. 52, 116.

Freeman, F. S. 1976 — Theory and Practice of Psychological Testing. Ox IBH Publishing Co., New Delhi, pp. 46, 51-52, 64, 66 69, 97-99, 112-113, 280-281, 315.

Galbraith, R. C. 1982 — Sibling Spacing and Intellectual Development : A C Look at the Confluence Models. Developmental Psy logy, 18. pp. 151-173.

Garber, H., and Heber, R. 1975 — The Milwankee Project : Early Intervention as a Techr to Prevent Mental Retardation. In H. C. Lindgren (Educational Psychology in the Class Room. Ox University Press, New York, 1980, pp. 193-194.

Gardener, D. D. 1964 — Development in Early Childhood - The Preschool Y Harper and Row, New York, pp. 319, 331.

Garrett, H. E. 1983 — Statistics in Psychology and Education. Vakils, Feffer and Simoi Pvt. Ltd., Bombay, pp. 312-313, 337-340, 351, 354-356, 361, 369.

Gerow, J. R. 1980 — Performance on Achievement Tests as a Function of the Orde of Item Difficulty. Teaching of Psychology, Vol. 7, pp. 93-9

Glasser, A. J., Zimmerman, J. L. 1967 — Clinical Interpretation of the Wechsler Intelligence Scale fc Children. Grune and Stratton, New York, pp. 39-102.

Goldfarb, W. 1945 — Psychological Privation in Infancy and subsequent Adjustmen American Journal of Orthopsychiatry, 15, pp. 247-255.

Goldschmidt, M. L. 1971 — Early Cognitive Development and Preschool Education. Inte national Journal of Early Child Education, 3 : 1, pp 5 -

Good, C. V. 1959 — Dictionary of Education. McGraw Hill Book Company, Ne York, p. 107.

Gopaldas, T., and Seshadri, S. 1987 — Nutrition Monitoring and Assessment. Oxford University Pres Delhi. p. 103.

Ghosh, S. 1977 — The Feeding and Care of Infants and Young Children, Voluntai Health Association of India, New Delhi p. 7.

Goswami, K. 1986 — Impact of Preschool Education in ICDS. NIPCCD Region Centre, Gwahati, Report of National Conference on ICD NIPCCD, New Delhi, p. 166.

Grant, J. P. 1984 — The state of World's Children. United Nations Childrens' Fun Oxford University Press, U. K. pp. 24-25.

Grant, J. P. 1987 — India : ICDS and the Nation. The state of World's Childre UNICEF., Division of Information and Public Affairs, Ne York, p. 36.

Gray, S. W., and Klaus, R. A. 1965 — An Experimental Preschool Programme for Culturally Depriv Children, Child Development, 36, pp. 887-898.

Gray, S. W., and Klaus, R. A. 1970 — The Early Training Project : A Seventh Year Report. Chi Development, 41, pp. 909 - 924.

Greenfield, P. M., Reich, L. C., and Oliver, R. R. 1966 — On culture and Equivalence. In J. S. Bruner, et al., (eds Studies in Cognitive Growth, Wiley, New York, p. 28.

Guilford, J. P. 1973 — Fundamental Statistics in Psychology and Education. McGrav Hill Kogakusha Ltd., New Delhi, pp. 396-397.

Guilford, J. P. 1956 — The Structure of Intellect, Psychological Bulletin, Vol. 5 p. 211.

Gupta, J. P. et al. 1979 — Integrated Child Development Services Scheme : A Study o its Health Component in Delhi AW. Indian Journal of Public Administration, 25, (3), pp. 735 - 749.

Gupta, S. B. 1982 — Study of Health Status of Children in a Rural ICDS Area as Compared to Adjoining Area not Covered by ICDS. Unpublished M. D. Thesis, University of Lucknow.

Gupta, S. B., and Srivastava, B.C. 1982 — Study of Health Status of Children Below 6 years of Age in a Rural ICDS Block in Comparison to Non ICDS Block. Report on National Conference on Research on ICDS, NIPCCD, p. 96, 1986.

Gupta, R., and Rahgir 1984 — A Comparative Study of the Routine and Modified Balwadi Programme under the ICDS Scheme in a Selected Block. Report of National Conference on Research on ICDS, NIPCCD, p. 46 1986.

Gupta, S. P. 1985 — Statistical Methods. Sultan Chand and Sons, New Delhi, pp A-3-21.

Guruge, W.P., and Berstecher, D. G. 1984 — Training and Orienting Educational Personnel. Child, Family, Community, IX, p. 115.

Halmes, D.B., and Turner, J. J. 1976 — Exploring Child Behaviour, W. B. Saunders Co., London, p. 156

Henson, R. A. 1975 — Consistency and Stability of Home Environmental Measure Related to IQ. Child Development, 46, pp. 470 - 480.

Harper (Jr.), A.E. 1960 — Recent Advances in Psychology. Silver Jubliee Volume o Vidya Bhawan Society, Udaipur.

Haward, L.C.R., and Ronald, W.A. 1954 — Some Inter-Cultural Differences on the Draw-a-Man Test Goodenough Scores. Man, 54, pp. 86-88.

Haward, L.C.R. and Ronald, W.A. 1955 — Some Inter-Cultural Differences on the Draw-a-Man Test Conclusion. Man, 55, pp. 40 - 42.

Hendrick, J. 1984 — The Whole Child : Early Education for the Eighties. Tim Mirror/Mosby, College Publishing, Toronto, p. 18.

Hess, D. R., and Croft, D. J. 1972 — Teachers of Young Children, Houghton Mifflin Company, N York, pp. 92 - 93.

Hess, R., and Shipman, V. 1965 — Early Experiences and the Socialization of Cognitive Mode Children. Child Development, 36, pp. 869 - 885.

Hilgard, E. R. 1975 — Introduction to Psychology. Oxford and IBH Publishing C New Delhi, p. 601.

Hoechman, V. 1958 — Kindergarten - Primary Rooms Reflect Interests, in Space Arrar ment Beauty in School. ACEI. Washington, D.C., p. 7

Horten, C. P., and Crump, P. E. 1962 — Growth and Development. XI Descriptive Analysis of backgrounds of 76 Negro Children whose scores are above Below on the Merrill-Palmer Scale of Mental Tests at Th Years of Age. Journal of Genetic Psychology, 100, 255-2

Hothersall, D. 1985 — Psychology. Charles E. Merrill Publishing Co., London, p. 4

Hudson, W. 1960 — Pictorial Depth Perception in African Groups. Journal of So Psychology, 52, pp. 183, 208.

Hunt, J.McV. 1961 — Intelligence and Experience. The Ronald Press and Co., N York, p. 112 - 113.

Hunt, J. McV. 1964 — The Psychological Basis for Using Preschool Environment as Antidote for Cultural Deprivation, Merrill-Palmer Quarte 10, 209 - 48.

Hunt, J. McV. 1967 — Intelligence and Experience. In Intelligence and Aucbilit Wiseman, S. (ed.) Penguin Modern Psychology, p. 320.

Hurlock, E. B. 1985 — Developmental Psychology A Life Span Approach. Tata McGr Hill Publishing Company Ltd., New Delhi, p. 2.

ICCW. 1976 — News Bulletin, ICCW., New Delhi, p. 26.

Indira, R. 1971 — Correlation Between Teachers Training and Children's Behav in the Preschools. Unpublished thesis, University of Mac

Inhelder, B. 1969 — The Early Growth of Logic in the Child. Harper and Row, I York, p. 208.

Jachuck, K., and Mohanty, A. K. 1974 — Low SES and Progressive Retardation in Cognitive Skills : A of Cumulative Deficit Hypothesis. Indian Journal of Me Retardation, 7, pp. 36 - 45.

Jadoha, G., Deregowski, J.B., and Sinha, D. 1974 — Topological and Euclidean spatial Features Noted by Childr A Cross Cultural Study. International Journal of Psycholog pp. 159, 172.

Jayam, et al., 1985 — Impact of three years ICDS services on Health and Nutriti Status of Children. Madras, Abstract of Research Papers, Annual Convention of ICDS, Central Technical Commi on Health and Nutrition, AIIMS, New Delhi.

Jenkins, G. G., Schacter, H., and Bauer, W. W. 1963 — These are Your Children. Foresman Publishers, Chicago, pp. 323.

Jensen, A. R. 1974 — Interaction of Level I and Level II Abilities with Race Socio-Economic Status. Journal of Educational Psychology pp. 66, 111.

Jensen, A. R. 1969 — How much can we Boost IQ and scholastic Achievements Harvard Educational Review, 39, pp. 1 - 123.

Kagan, J. 1966 — Reflection - Impulsivity : The Generality and Dynamics Conceptual Tempo. Journal of Abnormal Psychology, 71, pp. 17 - 24.

Kamath, V. V. 1967 — Measuring Intelligence of Indian Children. Oxford Univers Press, pp. 11 - 21.

Kaul, S. 1986 — Child in India, Journal of Educational Research, IV, 2, p.

Keller, S. 1963 — The Social World of the Urban Slum Child : Some Early Findir American Journal of Orthpsychiatry, 33 pp. 813 - 822.

Kelly, T. L. 1964 — The Selection of Upper and Lower Groups for the Validat of Items. Educational Psychology, Vol. 30, pp. 17 - 24.

Kelly, K. 1981 — An Introduction to Psychology. Prentice Hall Inc., New Jers pp. 215 - 225.

Kennedy, W. A., Wan De Riet., and White, J. C. Jr. 1963 — A Normative Sample of Intelligence and Achievement of Ne Elementary School Children in the South Eastern United Stat Mònograph of the Society for Research in Child Developme 28, No. 90. p. 6.

Khosla, R. 1986 — Impact of Preschool Education in ICDS. Report of Natic Conference on Research on ICDS, NIPCCD, New Delhi, p. 1

Kilbride, et al., 1977 — Social Class, Birth Order, and New Born Experience. Cl Development, 48, pp. 1686 - 1688.

Kulshreshtha. S. K. 1971 — Stanford-Binet Intelligence Scale Form L - M, 1960. H Adaptation, Manas Seva Sansthan, Allahabad.

Lal, S., et al., 1977 — Mid Course Assessment of Impact of ICDS Programme on Nu tional Status of Preschool Children in Kathura (Haryana). Inc Journal of Preventive Social Medicine, 8, pp. 129 - 131.

Lalitha, N. V. 1983 — Integrated Child Development Services in Chavara - A c study. Report of National Conference on Research on IC NIPCCD, New Delhi, p. 167.

Lalita, S. 1986 — Study of Creative Abilities of Tribal Children in Relation Their Sex and Socio-Economic Status. Journal of Educatic Research, X, 1, p. 20.

Lewis, O. L. V. 1965 — Pureto Rican Family in the Culture of Poverty. Randome Ho New York.

Lindgren, C. H. 1980 — Educational Psychology in Class Room. Crunned Sons I New York, pp. 392 - 394.

Long, L., and Mehta, P. H. 1966 — The First Mental Measurement Handbook For India. Cen Bureau of Educational and Vocational Guidance, NCERT, N Delhi, pp. 24 - 74.

Lord, F. M. 1953 — Speeded Tests and Power Tests - an Empirical Study of Validi E. T. S. Research Bulletin 53, p. 12.

Lorten, J. W., and Walley, B. L. 1979 — Introduction to Early Childhood Education. D. Van Nastra Co., New York, pp. 64, 65, 103 - 105.

Maiseh, H. 1972 — Encyclopedia of Psychology. Hender and Hender, New Yc p. 177.

Masood, J., and Surbi, B. N. 1985 — Impact of ICDS Scheme on Nutrition and Immunization Sta of Children (1-5 years) of an Urban Slum of Calcutta. India Institute of Hygiene and Public Health, Calcutta, Abstr of Research Papers, IX Annual Convention of ICDS, Cent Technical Committee on Health and Nutrition, AIIMS, New De

Matejcek, Z., and Langmeier, J. 1965 — New Observations on Psychological Deprivation in Institutio Children in Czechoslovakia. The Slow Learning Child, 12, 20 - 37.

Mathew, J. S., Devadas, R. P., and Baradha, G. 1983 — Assessment of Health Status of Children in AWs. Abstr of Research Studies, Department of Child Development, Avinashilingam Home Science College, Coimbatore, pp. 29 -

Mathur, G. P. et al., 1983 — Follow-up of Grade III and IV Malnourished Children in Ur Slums of Gorakhpur City under ICDS Scheme - ICDS selec abstracts of Research Papers, Central Committee on Hea and Nutrition, AIIMS, p. 19.

McCall, J. N., and Johnson, O. G. 1922 — The Independence of Intelligence from Family Size and Bi Order. Journal of Genetic Psychology, 121, pp. 207 - 2

McCandless, B. R. 1973 — Children and Youth : Psychological Development. The Dry Press, USA, p. 23.

McConnell, R. E. 1977 — The Origin of Mental Tests. Education, 50, p. 464.

McDonald, J. 1969 — The Open School : Curriculum Concepts, Open Education, NAE Washington, D. C., p. 26.

McKay et al., 1978 — Improving Cognitive Ability in Chronically Deprived Childı Science, 200, pp. 270 - 278.

Mehrotra, P. N. 1972 — Construction and Standardization of a Group Mixed Test Intelligence for Children from 11 to 17 years. Ph. D. The Agra University.

Meler, G. W. 1961 — Infantile Handling and Development in Siamese Kittens. Jour of Comparative and Physiological Psychology, 54, pp. 284 - 2

Menzel, E. Q. 1956 — The Use of New Type of Tests in India. Oxford Univer Press, London.

Migliorino, G. 1974 — Heredity and Environment in the Development of Intellige (Fren.) Carnets De L' Enfance, 25, pp. 62 - 71.

Ministry of Social Welfare 1982 — Integrated Child Development Services Scheme (Revised). Gove ment of India, New Delhi, pp. 7 - 8.

Ministry of Social and Women's Welfare 1985 — Compilation of Guidelines and Instructions. Government India, New Delhi, pp. 46 - 48.

Ministry of Human Resource Development 1986 — A Decade of ICDS Integrated Child Development Servi Department of Women's Welfare, Government of India, 3, 7, 22.

Ministry of Human Resource Development 1987 — Annual Report. Part IV, Department of Women and Child Deve ment, Government of India, p. 2, 5, 32.

Minton, H. L., and Schneider, F. W. 1980 — Differential Psychology. Montery, Calif. : Books, p. 23.

Mishra, R. 1985 — A Study of Professional Attitude of Teachers in Relation Their Teaching Behaviour. Journal of Educational Resea and Extension, XXI, 3, p. 165.

Mistral, G. 1974 — Quotation. Young Children, ACEI, Washington, D. C., p.

Mitra, S. K. 1961 — Research Needs In The Development of Different Types Tests in India. In T. K. N. Menon (Ed.), Recent Trends in Psyc logy. Orient Longmans, Calcutta.

Montessori, M. 1964 — The Montessori Method, Schooken, New York, cited by C Lindgren, in Educational Psychology in Class Room. New Y Grunned Sons Inc., pp. 392 - 394.

Morris, J. J., and Clarizio. 1977 — Improvement in IQ of High Risk, Disadvantaged Presc Children Enrolled in Developmental Programme. Psycholog Reports, 41, pp. 1111 - 1114.

Muralidharan, R. 1970 — Home Stimulation and Child Development. Indian Educati Review, 5(2), pp. 43 - 51.

Muralidharan, R., and Banerjee, U. 1974 — Effect of Preschool Education and Training on Intellec Development of Under Privileged Children. Journal of Educa and Psychology, 32-1, pp. 10-15.

Muralidharan, R., et al., 1984 — The Impact of an Intervention Programme on the Langu and Cognitive Development of Preschool children from Tr and Urban Slums. Report of National Conference on Resea on ICDS. NIPCCD. pp. 44 - 45, 1986.

Muralidharan, R. 1986 — Review of Research Studies in Preschool Education in ICD Report of National Conference on Research on ICDS, NIPCCI pp. 38 - 53, 166.

Nand, P. C., Das, J.P., and Mishra, H. K. 1965 — Discrimination of Geometrical Patterns in Tribal, Rural a Urban Children. Journal of Social Psychology, 67. pp. 197 - 20

NCERT. 1977 — Effect of Preschool Education on School Readiness of the Und Privileged Children in Delhi, pp. 4 - 6.

Nehru, J. 1958 — Jawaharlal's Speeches, Government of India, Ministry of Info mation and Broadcasting, New Delhi. p. 21.

NIPCCD. 1984 — Manual on Integrated Child Development Services, NIPCC New Delhi, pp. 5, 20, 26, 53, 55, 105, 114, 115, 186.

NIPCCD. 1986 — National Conference on Research on ICDS - A Report. Ne Delhi. p. 11, 51.

NIPCCD. 1987 — Manual on Monitoring Social Components of ICDS, Natior Institute of Public Cooperation and Child Development, Ne Delhi, p. 1.

Nunnally, J. C. 1959 — Tests and Measurements, Assessment and Prediction. Mc Gra Hill Book Co., New York, pp. 196 - 197.

Oliver, R. A. 1974 — Parental Influence on Children's Cognitive Style. Diss. Abs Int., (July), 35 (1-B), p. 485.

Oxford Press, 1985 — The Concise Oxford Dictionary. Oxford University Press, Del p. 181.

Patel, R. B. 1985 — Immunization and Nutritional Status of Children in ICDS Bloc Compared to Non-ICDS Blocks. Bombay, Abstract of Resear Papers, IX Annual Convention of ICDS, Central Technic Committee on Health and Nutrition, AIIMS, New Delhi.

Prescot, E., and David, T. G. 1976 — Effects of the Physical Environment on Day Care. Paci Oaks College, Pasadena, California.

Rao, R. 1974 — Distribution of Progressive Matrices Scores Among Pupils XI Standard. Unpublished Research, University of Madr

Ratnaike, J. 1981 — Child Family Community Unit for Co-operation with UNIC and WFP, UNESCO., Paris, p. 1, 11.

Ratnakumari, S. 1976 — A Comparative Study of the Mental Abilities of Urban a Rural Preschool Children. Unpublished M.Sc., Thesis, Univers of Madras.

Ray, V. F. 1953 — Human Colour Perception and Behavioural Responses. Tra actions of New York Academy of Sciences, 16, pp. 98, 1

Reese, H. W., and Lipsitt, L. P. 1973 — Experimental Child Psychology. Academic Press, New York. p. 479.

Ribble, 1943 — The Rights of Infants. Columbia University Press, New York.

Robb, G. P., Bernardoni, L.C., and Johnson, R.W. 1972 — Assessment of Individual Mental Ability. Intext Educational Publishers, New York, pp. 1-3, 9, 14, 75-76, 188, 190.

Rosenzweig, et al., 1966 — Effects of Environmental Complexity and Training on Br Chemistry and Anatomy: A Replica of Extension. Jour of Comparative Physiological Psychology, 55, No. 4, 429, 437.

Rouf, A. 1985 — A Study of Immunization and Nutritional Status of Child In ICDS and Non-ICDS Blocks. Srinagar, Abstracts of Resea Papers, IX Annual Convention of ICDS, Central Techni Committee on Health and Nutrition, AIIMS, New De

Sadka, N. L. 1984 — Integrated Child Development Services. UNICEF, Regio Office for South Central Asia, New Delhi, pp. 3, 31.

Sahni, S., and Agarwal, S. 1984 — Study of an Intervention in On Going ICDS Programme Promote Cognitive Abilities of Preschoolers. M.Sc. The Haryana Agricultural University, Hissar.

Santhanakrishnan, B.R., and Madhusudan, B. 1985 — Knowledge, Attitudes, Practices of Young Mothers in ICDS Project. Abstracts of Research Papers, IX Annual Convent of ICDS, Central Technical Committee on Health and Nu tion, AIIMS, New Delhi.

Santrock, J. W. 1984 — Life-Span Development. Wm. C. Brown Company Publish IOWA, p. 20.

Sattler, J. M. 1986 — Assessment of Children's Intelligence and Special Abili Allyn and Bacon, Inc., London, pp. 17 - 19, 21.

Saxena, et al., 1985 — Impact of ICDS Services on Immunization and Nutritio Status of Children in ICDS Blocks when Compared to N ICDS Blocks. Lucknow, Abstract of Research Papers. Annual Convention of ICDS, Central Technical Commit on Health and Nutrition, AIIMS, New Delhi.

Scarr, S., and Weinberg, R. A. 1976 — IQ Test Performance of Black Children Adopted by W Families. American Psychologist, 31, pp. 726 - 739.

Schaimberg, L.M., and Smith, K.U. 1981 — Human Development. McMillan Publishing Co., Inc., N York, p. 650.

Schiff, et al., 1978 — Intellectual Status of Working-Class Children Adopted E into Upper-Middle Class Families. Science, 200, pp. 1503-1

Sehgal, S. P. 1972 — Preschool Teacher Education, A Creative Approach. Presc Teacher Education, IAPE, Bangalore, pp. 66-69.

Sharma V. P. 1974 — Mental Development in Preschool Years. Archives of C Health, Vol. 16, No. 6, p. 216.

Simon, W. E., and Simon, M. G. 1975 — Self-Esteem, Intelligence and Standardized Academic Achi ment. Psychology in the Schools. 12(1), 97 - 100.

Singh, R. N. 1971 — Construction and Standardization of a Battery of Test: Verbal, Abstract and Numerical Reasoning. Ph.D. I Magadh University.

Singh, A. K. 1976 — Social Disadvantage, Intelligence and Scholastic Achieven Paper Presented at the 14th Annual Conference of the Ir Academy of Applied Psychology, IIT, Kharaghpur.

Singh, D. 1981 — Older Children in Mobile Creche. Social Welfare, XX 6 - 7, p. 4.

Skodak, M., and Skeels, H. M. 1949 — A Final Follow-up Study of One Hundred Adopted Chil Journal of Genetic Psychology, 75, pp. 85-125.

Smilansky, S. 1968 — The effects of Socio-Dramatic Play on Disadvantaged Chil John Wiley and Sons, Inc., New York.

Stoddard, G. D. 1943 — The Meaning of Intelligence. The MacMilllan Company, York.

Subramaniam, K. 1985 — Comparision of Nutritional Status and Immunization St of Children in the Age Group 0-5 years in ICDS and I ICDS. Madras, Abstracts of Research Papers, IX Ar Convention of ICDS, Central Technical Committee on He and Nutrition, AIIMS, New Delhi.

Swaminathan, I. 1972 — Development of Observational Skills in the Student Tea Preschool Education, IAPE, Bangalore, p. 75.

Tandon, et al., 1981 — Integrated Child Development Services in India, Object Organization and Baseline Surveys of the Project Popula Indian Journal of Medical Research, AIIMS, 73, p. 374.

Tandon, et al., 1981 — Integrated Child Development Services in India : Evalu of the Delivery of Nutrition and Health Services and Effect on Nutritional Status of Children. Indian Jo of Medical Research, AIIMS, 73, pp. 385-394.

Tandon, B. N. 1984 — Evaluation of the Health Component of the ICDS, ICCW Ne Bulletin, Aug.-Sept., pp. 24, 26 - 27.

Terman, L. M., and Merrill, M. A. 1960 — Stanford-Binet Intelligence Scale : Manual for the Third Revision : Form L-M. Houghton Mifflin Company, Boston, p. 11.

Thomas, M. R. 1981 — Educational Personnel Inefficiency in Developing Nation Causes and Solutions. Child, Family, Community, UNESCC Pub., USA, p. 2.

Thurstone, L. M. 1946 — Theories of Intelligence. Psychological Manual, Vol. pp. 101 - 102.

Tripathi, R. B. 1970 — The Influence of Rural-Urban Background on Test Sco Journal of Gujrat Research Society, 32, pp. 125-128.

Uchat, D. 1982 — Study on the Relationship of Intelligence Level with Numl of Siblings. Journal of Educational Research and Extensi XIX, 1, p. 55.

Van den Daele, L.D. 1976 — A Cook's Tour to Development. Journal of Genetic Psycl logy, p. 128.

Vasudeva, et al., 1983 — A Comparison of Immunization Status of Children in IC and Non-ICDS Blocks, Abstracts of Research Papers, Cent Committee on Health and Nutrition, AIIMS, New Delhi, p.

Vendal, N. 1981 — A Study of Achievement in School in Relation to Cert Social Organizational and Individual Factors. Unpublis Ph.D. Thesis, Madras University.

Vernon, P. E. 1969 — Environmental Handicaps and Intellectual Developm British Journal of Educational Psychology, 35, pp. 1-

Wadhera. 1985 — Focus on Educational Purposes and Teacher's Equipme Journal of Indian Education, XI, 4, pp. 25-29.

Wall, W. D. 1973 — The Development of Intelligence in Early Childhood. Child in Tropics, No. 86, pp. 1 - 2.

Wallace, P. 1974 — Complex Environments : Effects on Brain Developme Science, 185, pp. 1035-1037.

Wechsler, D. 1958 — The Measurement and Appraisal of Adult intelligen Williams and Wilkins, Baltimore, p. 7.

Wechsler, D. 1975 — Intelligence Defined and Undefined. American Psycholog 30, pp. 135 - 139.

Werner, E. E., Bierman, J.M., and French, F. E. 1971 — The Children of Kauai. University of Hawaii Press, Honol

Wershow, H. J. 1975 — A Social Scientists Counsel on Nutrition and Mental Develo ment. Ecology of Food and Nutrition, Vol. 4, No. 1, p 49 - 52.

Wesman, A. G. 1968 — Intelligence Testing. American Psychologist, Vol. 23, p 267 - 274.

Whiting, A. 1970 — Parental Expectations for Independent Behaviours a Achievement of Elementary School Boys. Unpublished Pap Presented at the Western Psychological Association, L Angeles.

Wilson, M., Warren, J. M., and Abbott, L. 1966 — Infantile Stimulation, Activity and Learning by Cats. Ch Development, 36, pp. 843 - 853.

Witty, M. A. 1979 — Sex-Related Differences in Cognitive Functioning, Develc mental Issues, Academic Press, New York, pp. 4, 165, 168, 171, 199, 204.

Zajonic, R. B., and Markus, G. B. 1975 — Birth Order and Intellectual Development. Psychological Review, 82, pp. 75 - 88.

Zigler, R., and Butterfield, E. C. 1968 — Motivational Aspects of Changes in IQ Test Performar of Culturally Deprived Nursery School Children. Ch Development, 39, pp. 1 - 14.

Appendices

APPENDIX - I

PERSONAL DATA SHEET

Experimental/Control

I. Identification

1. ICDS Anganwadi started on _____
2. Anganwadi Address _____
3. Name of the Anganwadi worker _____
4. Distance of Anganwadi from the PHC/PHC sub-centre _____
5. Date of testing _____
6. Date of retesting _____

II. Background Information

A. The Child

1. Name of the Child _____
2. Home Address of the Child _____
3. Age - 3, 4, 5 years
4. Sex-Male/Female
5. Birth order - 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
6. Duration of Anganwadi attendance _____
7. If not attending Anganwadi, give reasons :

   a) Anganwadi is far from the house

   b) Parents not interested in/not convinced of the benefits of the Anganwadi Programme

   c) Child looks after younger siblings

   d) Child afraid of the teacher

   e) Child was suffering with infectious disease

APPENDIX - II

SOCIO ECONOMIC STATUS SCALE

FAMILY PARTICULARS (Please mark (_/) the appropriate answer)

Sl. No.	Particulars	Scores	Mother	Father
1.	Name			
2.	Age			
3.	Education			
	i) Illiterate	0		
	ii) Primary	1		
	iii) Middle education	2		
	iv) Secondary education	3		
	v) Graduate / Diploma	4		
	vi) Post-graduate	5		
4.	Occupation			
	i) Not employed	0		
	ii) Unskilled	1		
	iii) Semi-skilled & Skilled	2		
	iv) Clerical	3		
	v) Supervisory and middle management	4		
	vi) Professional and Management	5		
5.	Family income			
	Rs.			
	50 - 125	1		
	126 - 150	2		
	151 - 700	3		
	701 -1350	4		
	1351 and above	5		
6.	Size of the family			
	1 - 2 members	2.50		
	3 - 4 "	2.00		
	5 - 6 "	1.50		

7.	Type of family	:	Joint/Nuclear	
8.	Religion	:		
9.	Caste	:		
10.	Social Status	:	a) Living in rented/own house	0.50
			b) Hosting feasts regularly	0.50
			c) Paying income-tax	0.50
			d) Going to resorts for taking rest	0.50

Maximum score = 19.50

APPENDIX III

HOME STIMULATION INVENTORY

(Please mark _/ any one of the following) Score

1. Who is responsible for bringing up children

   a) Both parents 5

   b) Mother or father 4

   c) Own relations 3

   d) Distant relatives 2

   e) Un-related persons 1

2. In whose company does the child spend most of the time ?

   a) Father and mother (both parents) 5

   b) Only father 4

   c) Only mother 3

   d) Some close relatives 2

   e) Some distant relatives 1

3. How much printed literature is available in the home (books, paper, magazines)

   a) Plenty of books, newspapers and magazines 5

   b) A few books magazines and daily use of newspaper 4

   c) Newspaper only regularly 3

   d) Only news paper occasionally 2

   e) None of the above 1

4. Opportunity given to the child to play and recreation

   a) Very fre quently 5

   b) Frequently 4

   c) Occasionally 3

   d) Infre quently 2

   e) Rarely 1

	Scores
5. How frequently the child is taken outside the house ?	
(a) Most frequently	5
(b) Frequently	4
(c) Occasionally	3
d) Insufficiently	2
e) Rarely	1
6. Opportunities given to the child to hear stories at home.	
a) Very frequently	5
b) Frequnetly	4
c) Occasionally	3
d) Infrequently	2
e) Rarely	1
7. How frequently the child is allowed to participate in suitable household activities ?	
a) Very frequently	5
b) Frequently	4
c) Occasionally	3
d) Infrequently	2
e) Rarely	1
8. Do you allow the child to express his desires/wants in the family ?	
Allowed to express :	
a) Fully	5
b) Partially	4
c) Moderately	3
d) Occasionally	2
e) Rarely	1

Scores

9. Extent to which the child's curiosity or need for knowing things is satisfied.

   a) Fully 5

   b) Partially 4

   c) Moderately 3

   d) Slightly 2

   e) Least 1

10. Facilities available to the family for entertainments.

   a) Cinema, Radio, Play house, TV, record players. 5

   b) Cinema and radio 4

   c) Only radio 3

   d) Only some local sports, games 2

   e) No facilities 1

11. Whether the play material available to the child are :

   a) More than sufficient 5

   b) Sufficient 4

   c) Average 3

   d) Insufficient 2

   e) Extremely insufficient 1

12. Time given to the child to play

   a) More than sufficient 5

   b) Sufficient 4

   c) Average 3

   d) Insufficient 2

   e) Extremely insufficient 1

13. How freely the child is allowed to handle play materials ?

   a) Allowed to handle freely 5

   b) Allowed to handle carefully 4

Scores

c) Allowed to handle in the presence of elders 3

d) Allowed to see without touching 2

e) Not allowed to handle at all 1

14. Approximate amount of money spent on toys and children's books per year ?

Rs. - 25 5

Rs. - 15 4

Rs. - 10 3

Rs. - 5 2

Rs. - 0 1

15. Approximate amount of time spent per day by the parents with children in their play activities.

a) 4 hrs 5

b) 3 hrs 4

c) 2 hrs 3

d) 1 hr 2

e) 1/2 hr 1

Total scores = 75

Score obtained . . . . . .

APPENDIX IV

ANGANWADI OBSERVATION SCHEDULE

No. and name of the Project :

Place :

Name of the Anganwadi worker :

Date of observation :

SECTION - I

A - Score card for Evaluating Anganwadi Building

		Scores
1.	Is the Anganwadi located near safe location	Yes (1) No
2.	Is the Anganwadi accessible to the weaker section	Yes 1 No
3.	Is the Anganwadi infested with flies/ insects/ stray animals.	Yes 0 No
4.	Physical set-up of the anganwadi	Pucca 2 Katcha
5.	Condition of the building	Good 2 Roof leaky
6.	Floor condition	Cement plastered Concerete Mud
7.	Total number of rooms	2
8.	Size of the room	Adequate Inadequate
9.	Lighting in the rooms	Adequate Inadequate No light
10.	Ventilation in the room	Adequate Inadequate No Ventilation
11.	Shelve height	Low High No shelves
12.	Toilet facilities	Available Not available

13. Drinking water facilities	Available Not available	(1) (0)
14. Kitchen facilities	Available Not available	(1) (0)
15. Sanitary disposal of drainage	Available Not available	(1) (0)
16. Have the rooms been decorated ? Is the work O. K. ?	Yes (1) No Yes (1) No	(0) (0)
17. Placement of teaching aids/charts and posters.		
a) Children's eye level and within reach		(1)
b) Out of reach too high		(0)
18. Out door play space	Sufficient Insufficient Not available	(3) (2) (1)
19. Provision of safety and comfort for children in the play-yard.		
a) Safety in play area	Fenced Unfenced	(1) (0)
b) Shade in the play yard	Available Not available	(1) (0)
20. Indoor play space	Sufficient Insufficient Not available	3 2 1
	Total score	37
	Score obtained	

B - Equipment and Play material in the Anganwadi

	Adequate	Moderate	Not available
21. Indoor play material	2	1	0
22. Out-door play material	2	1	0
23. Material for creative activities	2	1	0
24. Quality and functionability of the available material			
a) Durability	2	1	0
b) Easy handling	2	1	0
c) Suitability	2	1	0

	Adequate	Moderate	Not available
d) Promotes imagination and creativity	2	1	0
e) Variety	2	1	0
f) Promotion of muscular activities	2	1	0

25. Equipment for Anganwadi (Listed out as per Manual on ICDS 1984).
(Mark (/) the available material. Give one score for each material)

Item for General Use

Small mats or Durries
One closed shelf for storing equipment
One or two wooden racks
Low wooden chair and table for the Anganwadi worker
Mud vessel for keeping drinking water
Files, register, records and health cards.

Kitchen equipment

Tumbler, plates and spoons
two or three vessels with lids for cooking
Kerosene wick stove.

Bath room equipment

Two buckets or vessels for storing water
Two mugs
Two soap containers
Four towels
Disinfectant fluid
Broom, brushes and other cleaning material

Indoor play equipment

Wooden building blocks of different sizes
Counting frames
Paints, brushes and coloured chalk sticks
One dholak (beating drum)
Three scissors

26. Is the kit being constantly used by the AWW — Yes (1) No (0)

27. Has the Anganwadi worker prepared the teaching aids from the locally available material — Yes (1) No (0)

If no, give reasons :

a) Lack of time

b) Lack of training

c) Not interested

d) Lacks skills

If yes, specify :

Total score 40

Score obtained . . .

C. Observation about children

1. Attendance

28. a) Number of children on the roll _____

	Almost all (76-100%)	About 3/4 (51-75%)	About 1/2 (50-26%)	Less tha 1/2(0-25
b) Percent of children present on the day of visit	4	3	2	1
29. Average attendence of the last month (check-up from the attendance register)	4	3	2	1
30. Did the children come on time in the morning	4	3	2	1

Total score = 12

Score obtained . . . .

2. Cleanliness of children

	Almost all (76-100%)	About 3/4 (51-75%)	About 1/2 (50-26%)	Less tha (0-25%)
31. Are the children				
1) Properly dressed	4	3	2	1
32. Is the dress of children				
1) Clean	4	3	2	1

33. General cleanliness of children

1)	Hair well combed	4	3	2	1
2)	Nails clean and cut	4	3	2	1
3)	Teeth clean	4	3	2	1

total score = 20

Score obtained . . . .

3. Performance and participation

	Almost all (76-100%)	Three fourth (51-75%)	Half (50-26%)	Less than half (0-25%)
34. Observation about children (performance and participation of children)				
a) Participated in preschool activities.	4	3	2	1
b) Enjoys the preschool activities	4	3	2	1
c) Help Anganwadi worker/helper in distributing/collecting/putting back materials	4	3	2	1
d) Help in general cleaning	4	3	2	1
e) Do not waste food	4	3	2	1
f) Eat themselves	4	3	2	1
g) Washes his/her hand before eating	4	3	2	1
h) Washes his/her hand after eating	4	3	2	1

Total score = 32

Score obtained . . . .

D-Preschool Education Activities

35. Activities for preschool education (observe the activities on a particu day of the visit and write down these)

Activities	Approximate time given to activiti: Adequate	Moderate	No time
Rhymes	2	1	0
Story telling	2	1	0
Creative activities	2	1	0
Prayer	2	1	0
Health check up	2	1	0
Project theme based	2	1	0
Concepts oriented	2	1	0
Music	2	1	0
Dramatic play	2	1	0

	Adequate	Moderate	No time
Language stimulation activities	2	1	0
Games	2	1	0
Free play (matching games) puzzles, block building	2	1	0
Field trips	2	1	0

Total score = 26

Score obtained . . . .

36. Observation about the Anganwadi workers

		Usually	Often	Rarely	Neve
1.	Is able to organize and conduct simple play and other activities for physical, social emotional intellectual and language development of children	3	2	1	0
2.	Is skilled to arrange and utilise the available facilities/resources	3	2	1	0
3.	Is skilled to improvise suitable play material from low-cost and locally available material.	3	2	1	0
4.	Can conduct the following activities effectively :				
	Music	3	2	1	0
	Exercise	3	2	1	0
	Games	3	2	1	0
	Story telling	3	2	1	0
	Dramatization	3	2	1	0
	Concept teaching	3	2	1	0
	Creative activities	3	2	1	0
	Free play	3	2	1	0
5.	Utilizes community resources to promote cognitive development of children	3	2	1	0
6.	Uses play way method of teaching	3	2	1	0
7.	Enthusiastic in organizing programme	3	2	1	0
8.	Shows a liking and enjoyment of children	3	2	1	0
9.	Plan and prepares for the programme of the day in advance	3	2	1	0
10.	Sets and maintains necessary limits	3	2	1	0
11.	Is able to arouse the interest and curiosity of the children	3	2	1	0

13.	Talks freely with children on their levels	3	2	1	0
13.	Arranges the equipment/play material in an orderly manner	3	2	1	0

14. Has clear concept of the preschool education — Yes (1) No (0)

Qualification of the AWW — Score

SSLC	1
PUC	2
Graduate	3
Trained	1
Untrained	0

Total score = 65

Score obtained . . . . .

			Score obtained
A -	Total scores on infrastructure	37	----------
B -	Total score on equipment and play material	40	----------
C -	Total scores on observation about children		
	1. Attendance	12	----------
	2. Cleanliness of children	20	----------
	3. Performance and participation	32	----------
D -	Total score on time given on preschool activities	26	----------
E -	Total scores on observation about the Anganwadi worker (teacher competence)	65	----------

Maximum Total Score = 232 — Score obtained ----------

APPENDIX V

INTERVIEW SCHEDULE TO ASSESS THE HEALTH STATUS OF PRESCHOOLERS IN ANGANWADI

1. Name of the child :
2. Father's name :
3. Anganwadi No. :
4. Age :

II. Details regarding health

1. Immunization

Sl. No.	Immunization	I Dose	II Dose	III Dose	Booster I	Booster II
a)	Polio	1	1	1	1	
b)	DPT	1	1	1	1	1
c)	BCG	1				
d)	Small pox	1				
e)	Measles	1				

2. Nutritionalgrade (determined on the basis of chart supplied by the UNICEF) (Please _/ mark only one grade)

1.	Normal	5
2.	Grade I	4
3.	Grade II	3
4.	Grade III	2
5.	Grade IV	1

3. Personal hygienic condition (Please _/ the most appropriate condition)

Sl. No.	Personal hygiene	Good 3	Fair 2	Poor 1
1.	Dress			
2.	Hair			
3.	Nose			
4.	Nails and Hands			
5.	Eyes			

4. Episodes of illness in the last 6 months (please _/ the number of episodes)

Sl No.	Illness	Number of episodes				
		0	1	2	3	4
		5	4	3	2	1
1.	URI (upper respiratory infection)					
2.	Diarrhoea					
3.	Pneumonia					
4.	Measles					
5.	Whooping cough					
6.	Others (specify)					

Maximum score = 68

Score obtained ----------

APPENDIX VI

COGNITIVE DEVELOPMENT TEST FOR PRESCHOOLERS

1. Conceptual Skills

Sl. No.	Test items	Material used	Procedure	Total score	Item score	Score obtained
1.	2.	3.	4.	5.	6.	7.
1.	Concept of shape	3 pieces each of round, triangle, square plastic blocks	Mix all the pieces of shapes and place before the child, ask him to "group the similar types of blocks in different places". Order of grouping 1. Group the round pieces ; 2. Group the square pieces ; 3. Group the triangles	3	1 1 1	
2.	Concept of colour (matching colour and labelling them)	Two cubes whose six sides are colou - red with white, black, yellow, blue, green, red	Ask the child to match the colour on one cube with the colour on the second cube and then label the colour also (give 1/2 score for colour matching and 1/2 for labelling it) keep 1st three scores for matching and 2nd set of three scores for identification. Order of presentation of colour : Red, Green, Blue, White, Black, Yellow, present the colour in the same order in both cases.	6	1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	
3.	Concept of time 1. Day 2. Night	Cards showing 1. Sun & brightness 2. Moon & stars	Ask the child "when do you see moon and stars ?" "When is the sky dark ?" When do you see sunlight ?"	2	1 1	
4.	Classification	Bengal gram (whole) Black gram (whole) Pea (whole) 1. Bengal gram and Black gram 2. Above three pulses	1. Give the child two different pulses and ask to sort them "Seperate these two pulses" 2. Give the child three different pulses and ask to sort them "Separate these three pulses" on the basis of three different colours	2	1 1	

1.	2.	3.	4.	5.	6.	7.
5.	Concept of number	10 buttons	Place the buttons in front of the child and ask "give me" i) 2 buttons ii) 4 buttons iii) 6 buttons iv) 10 buttons	4	1 1 1 1	
6.	Concept of Serialisation 1. Seriation	3 sticks of unequal length	Place the three sticks of unequal length in front of the child. Ask the childto "first place the smallest stick, then the bigger, and then the biggest one".	1	1	
7.	Concept of weight	Rubber ball Plastic ball	Place the balls in the child's hands and ask "which is heavier among the two ?"	1	1	
8.	Concept of size a) Thick and thin	Three sticks of different thick-ness	Place the material in front of the child ask him to "point out thick and thin sticks out of three sticks" as well as to "point out the biggest and smallest balls"		1	
	b) Big and small	Three balls of different sizes		2	1	
9.	Concept of texture a. soft b. rough	A card on which cotton & sand paper is glued	Place the card in front of the child and ask him "touch and point out which is soft and which is hard texture ?". or 1. the texture of cotton 2. the texture of sand paper	2	1 1	
10.	Recognising coins	A card with 5, 25, 50 paise coins glued on it	Ask the child "what is this coin ?" (showing one after the other) "With which coin can we buy maximum number of toffees ? (Showing all the coins together)	4	1 1 1 1	

1.	2.	3.	4.	5.	6.	7.
II	11. INFORMATION	Oral questions	Ask the following questions			
			i) What is this ? (Showing your thumb)		1	
			ii) What are eyes for ?		1	
			iii) What do you get from a coconut tree ?		1	
			iv) What is the colour of the grass ?		1	
			v) How many ears do you have ?		1	
			vi) What is dosai made of ?		1	
			vii) How many legs does a dog have ?		1	
			viii) Why should not you play with a match box ?	8	1	
III	COMPREHENSION					
	12. Verbal perception	Oral questions	Ask the following question			
			i) Point out your right ear ?		1	
			ii) What should you buy to go by bus ?		1	
			iii) What does the postman bring ?		1	
			iv) Why do you come to school ?		1	
			v) Where does the fish live ?	5	1	
	13. Listening comprehension	Oral directions	Give the following directions to the child asking him to follow it			
			3 Instructions : Keep this book on the table ; close the door, and give me the book placed over there (pointing to it)		1	
			4 Instructions : Pick up the book (in front of the child) ; take that piece of paper lying in the corner ; Take that ball (near the teacher); and keep them on the book (keep every thing at a little distance from the child so that he has to walk up to them)	2	1	
IV	VISUAL PERCEPTION					
	14. Which one is different	Cards with the following groups of 4 objects	Show the child the following cards with a group of 4 objects and ask "which one is different ?"			
	a. Big and small		i) 3 small buttons and one big button		1	
	b. Fruits and vegetables		ii) 3 types of fruits and one vegetable		1	
			iii) Pictures of lion, dog, cow and bird	3	1	

1.	2.	3.	4.	5.	6.	7.
15.	Copying button pattern	7 black, 7 red coloured , same size buttons glued in the following pattern on the card	Ask the child "With these buttons make the same pattern as I have"			
			1. 2 buttons ● ○		1	
			2. 3 buttons ● ○ ●		1	
			3. 4 buttons ○ ● ● ○		1	
			4. 5 buttons ○ ○ ● ●	4	1	
V	MEMORY					
16.	Memory for digits	Oral expression	Ask the child to "repeat the following digits at the rate of 1 digit per second			
	a) Four digits		1) 1-6-9-1		1	
	b) Five digits		2) 8, 4, 3, 6, 5	2	1	
17.	Memory for words	Oral expression	Ask the child to repeat what I say, "You must repeat it in the same words"			
			1. Ramu climbed the coconut tree and plucked coconuts	1	1	
18.	Memory for objects removed	4 objects Coin, thread, comb, key	Place the objects under item 1 before the subject and ask; "What is this ?" After a few seconds cover the object with a screen and remove the key, then ask "What is missing ?"		1	
		5 objects Match box, block button, bangle, pencil	The above mentioned procedure is followed for item 2, also where in the button in removed	2	1	
19.	Memory for story	Oral story	Story telling and asking 5 questions Once upon a time there were 3 goats one of them made a house of grass. A fox came and blew at the house, which broke. A second goat made a house of wood. The fox came and blew again and the house broke. The third one made the house of bricks. The fox again blew at the house,(blowing)			

1.	2.	3.	4.	5.	6.	7.
			1. How many goats were there ?		1	
			2. With what did they make their houses ?		1	
			3. Who blew at their houses ?		1	
			4. Which house did not break ?		1	
			5. Why ?	5	1	
VI	OBJECT VOCABULARY					
	20. Object identification and description	Following objects/ models/pictures	Show the objects to the child and ask him a) "to name each of them" (1/2 marks) b) "What each is used for ?" (1/2 marks) Give 1/2 score for each correct answer of identification, then repeat the items in the same order and ask what each is used for Give 1/2 score for each correct answer for use.			
			i) Pencil		1/2	1/2
			ii) Knife		1/2	1/2
			iii) Key		1/2	1/2
			iv) Watch		1/2	1/2
			v) Umbrella		1/2	1/2
			vi) Spectacles	6	1/2	1/2
			Total score . . . . . = 65			
			Score obtained ----------			

COGNITIVE DEVELOPMENT SCORE CARD

Centre No./Name & Address of the Anganwadi/Nursery School _____

Place _____ Name of the Child _____

Sex _____ Age _____

Home Address _____

Date of testing _____ Date of retesting _____

Sl. No.	Test	Total Score	Item Score
I	Conceptual Skills		
1.	Concept of Shape	3	1 1 1
2.	Concept of colours'	6	1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1,
3.	Concept of time	2	1 1
4.	Classification	2	1 1
5.	Concept of numbers	4	1 1 1 1
6.	Concept of seriation	1	1
7.	Concept of weight	1	1
8.	Concept of size	2	1 1
9.	Concept of texture	2	1 1
10.	Concept of Coins	4	1 1 1 1
II 11.	Information	8	1 1 1 1 1 1 1 1
III	Comprehension		
12.	Verbal perception	5	1 1 1 1 1
13.	Listening comprehension	2	1 1
IV	Visual perception		
14.	Differenciation/ Disimiliarities	3	1 1 1
15.	Copying button pattern	4	1 1 1 1
V	Memory		
16.	Memory for digits	2	1 1
17.	Memory for words	1	1
18.	Memory for objects removed	2	1 1
19.	Memory for story	5	1 1 1 1 1