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THE ACTIVITY PREFERENCES OF PRE-SCHOOL
CHILDREN EXPOSED TO AN ENVIRONMENT BASED
ON MONTESSORIAN PRINCIPLES.

by

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CHAPTER 1 : INTRODUCTION

It was once said that a country is only as good as the way it treats its children (Lane, 1987). This makes sense when one considers the old clichè about children of today being the leaders of tomorrow. As the free thinking children of yesterday, the present generation has a moral responsibility to provide circumstances necessary for the optimum development of the leaders of tomorrow since it is these people who will be faced with finding solutions to social, political, economic and environmental problems currently being created.

It therefore becomes incumbent upon the responsible members of the present society not only to take cogniscance of developments on an international level and use this knowledge to facilitate the transition of society as a whole from one stage of being to the next, but also to consider local climates and conditions and work with these, evaluating and updating in order to maintain the present high level of national development.

On a more specific level, there seems to be a growing awareness of the importance of education, particularly pre-school education, on various areas of development.

Evidence of the beneficial effects of pre-school education are legion (Bronson, Pierson & Tivnan, 1984; Finch, 1984; Miller & Bizzell, 1984; etc.). Coming closer to home, a heightened level of awareness of the importance of pre-school education seems to have filtered through all levels of concern right down to where the most benefit can be achieved - namely the classroom practitioner - the teacher. This is evidenced by the number of conferences being held on a national level and aimed specifically at the teacher. (July, 1986 - "To Educate the Human Potential" - conference hosted by the Montessori Society, South Africa at the Johannesburg College of Education; April, 1987 - "Children of Gold" - conference held at the Johannesburg College of Education; July 1987 - "Free to Be" - conference hosted by the South African Association for Early Childhood Education (SAACE) at UCT, Cape Town.) In addition a number of newsletters, magazines and other publications have seen the light of day in recent months in an effort to unite individuals concerned with trends in education. Thus the Montessori Society of South Africa sends out quarterly newsletters; Grassroots sends out a seasonal "Educare Trust Newsheet"; Aspect (Association for Preschool Education Care and Training) sends out regular newsletters; ELRU (Early Learning Resource Unit) has a newsletter; "The Child" is a quarterly published by Education Communications; The St Nicholas Newsletter (Montessori) is sent out monthly - to name but a few - some well established, others of less permanent nature.

The inordinate amount of interest in the field of pre-school education can be seen to stem from two separate sets of circumstances. In the first place there is the growing body of evidence from literature that indicates the importance of the pre-school years in terms of later abilities and

performance. Secondly, in the present political climate of great flux, the process of change is all around. Coupled with this is the fact that pre-school education hitherto has not been part of the state legislated and provided system of education. This has left room for a spirit of free enterprise to flourish in this field - hence the presence of so many divergent points of view.

A further stimulus has been the peculiar circumstance of totally different cultures and needs for the different population groups in South Africa. A large number of privately funded movements have arisen in response to the needs of the environmentally deprived groups of South Africa. An indication of these movements is found in table 1.1. The emphasis on the poorer sections of the community is justified in the the light of the statistics quoted by Vergnani & van den Berg (1986) :

"In 1985 there were 5,5 million children under the age of 6 in the RSA of which 4,5 million were black. In 1984 approximately 1,3 % of the coloureds and 0,6% of the black children between the ages of 0 and 6 were catered for in preschool facilities."

In addition to these figures, further problems identified are the poor teacher/pupil ratios, inequalities of funding, unequal distribution of materials and general lack of facilities (Sebidi, 1986).

While it is therefore self-evident that much work is needed to provide facilities where these facilities are most desperately needed, there is also a place for work in the

Table 1.1 Non-representative sample of current preschool organisations in South Africa.

ORGANISATION	FUNDING	FIELD	GEOGRAPHICAL AREA
FCW (Western Cape Foundation for Community Work)	Renier van Rooyen donation (Pepkor)	Daycare for young children	Western Cape
ELRU (Early Learning Resource Unit)	van Leer Foundation (Holland)	Teacher training; parent awareness; daycare training	Cape based serves S.A. and S.W.A.
ASPECT Association for Preschool Care and Training		Information; unifying func. organisation of events	Cape based National assistance
Grassroots Educare Trust	Sundry Donations	Training Communication Resource centres	Cape based National assistance
Montessori Society, South Africa - outreach and inreach subcommittees	-	Training Communication Resource centre	Johannesburg National outreach
Vumani Preschool Project	HEWSSA (Health, education & Welfare Society of South Africa Trust)	Communication General Assistance	Cape Town & Johannesburg

direction of investigation and evaluation of existent procedures. It is in this direction that the current research is aimed. The present research has as its intention the investigation of the viability of the existent Montessori method of pre-school stimulation from a psychological rather than a professional-educational perspective. As will be seen in Chapter 2, theoretically, Montessorian principles should allow sufficient freedom to accommodate various cultural differences as found in South Africa, based as it is on the principles of human development that are perceived as invariant. This is assumed so for the present and is thus not tested. What is questioned is whether it would be possible to establish a Montessori environment without the expertise and training required by the various Montessori societies. The purpose of this exercise is twofold - to assess from a practical point of view whether it is possible to construct and assemble the apparatus locally (the apparatus is usually imported from Holland), and to assess whether the use of such apparatus within the broad environment advocated by Montessori would be facilitative and more or less in line with the general principles of development. An evaluation of Montessorian procedure per se is therefore not attempted. All assessment is therefore of the experimental environment, and not to be generalized to structured Montessorianism except by implication.

A small, white, middle class sample will be used and the only definite answer sought at this stage is to the question "Can a Montessori environment be established and run without training and experience in a manner similar to that advocated by Montessori?" This would hopefully pave the way for a wider, cross-cultural study along the same lines, but addressing the problem of environmental deprivation rather

than, as in the present case, theoretical justification and operationalization.

An indepth study of the works of Maria Montessori is indicated since the research in part duplicates the procedures origionally followed by Montessori. Links with other theories need to be established, as well as an outline of current developmental thought. A survey of research already conducted in this and related areas will then set the stage for the procedures of the present study.

CHAPTER 2

LITERATURE SURVEY

It is then from within the perspective of this current uniquely South African context that certain questions are asked concerning not only the process or practice of educational procedures but also the aims of these procedures. Always deeply inherent in this is the general effect of such procedures on the maturing organism, and the consequences of these effects on the broader environment. It is this field that is of interest to the developmental psychologist and it is this broad area that is addressed by the rather narrower thrust of the present research.

Concerning the matter of the process of present educational procedures particularly at pre-school level, general trends in terms of stimulation of environmentally deprived individuals has been discussed. State provisions comprise the major portion of educational provision, at least in terms of the period of formal education. Facilities for pre-school children are governed by regulations determined by the National Health Department and administered by local authorities. In the case of the magisterial district of Bloemfontein, the geographical location of the present research, the City of Bloemfontein regulates the running of "creche-cum-nursery schools" defined as :

"any building or premises maintained or used for the custody, care and tuition during the whole or part of the day, on all or only some days of the week, and where a nursery school programme applies, of more than 6 children of pre-school going age...but does not include a private school registered in terms of section 42 of the Education Ordinance" (The City of Bloemfontein, 1976).

The Department of Education, O.F.S., limits itself to intervention in the field of pre-school education by way of subsidies, to the extent of payment of salaries of teachers holding posts at such schools, and a grant of R4 per year per child who attends the school in accordance with the prescribed provisions. In schools run on this basis they must comply with the National Health Department regulations regarding hygiene and minimum requirements for premises. Additionally, attendance and admission records must be submitted on a regular basis to the Department. The only curricular provision is the following :

"The principal of a subsidized pre-primary school shall submit to the Director for approval the program to be followed at the school : Provided that it shall not provide for reading, writing or arithmetic" (O.F.S. Provincial Administration, 1981, pp 1448).

The minimum educational requirements of the proprietor of such a facility are not discussed, apart from the reference

to the requirements for qualification for the above mentioned subsidy.

It is clear therefore that an indepth investigation of state provided pre-school education would be futile. More fruitful perhaps would be to consider the discrete approaches within the field of education. On a national level, apart from those approaches already discussed, all that remains are two virtual sects, or "alternative" approaches to pre-school education.

Rudolf Steiner, born in 1861 on the borders of Austria and Hungary founded the one movement, namely the Waldorf movement. The other was founded by Maria Montessori. Steiner became involved in philosophy after studying the works of Goethe. He also studied Literature, Psychology and Medicine. From an early age he felt a strong spiritual presence in his life and at the turn of the century he began to devote himself to finding new ways of soul-spiritual research based on scientific methods. This put him squarely in the camp of the Theosophical Society and out of the mainstream of educational thought. From this developed the Anthroposophical Movement. "He wrote and produced four Mystery Dramas and created eurhythmy - a new art of movement which aims at expressing in gesture and movement the living quality of the sounds of speech and music" (Carlgren, Grosse, Howard, Klingborg & Rudel, 1976, pp 12).

From these roots and stimulated by an earlier successful experience of educating a retarded child, Steiner formulated the ideas that were put into practice in the Waldorf Schools internationally (Carlgren et.al., 1976; Edmunds, 1979).

Based on his threefold social order and the threefold

organism and the threefold powers of the soul, Steiner felt that in terms of his developmental needs, the individual progresses through three distinct stages of development. From birth to the age of seven, or to the growth of permanent teeth, the development of the will is paramount. From the age of change of teeth to the age of puberty the child is engaged in development of the emotions; and from puberty to adolescence he is concerned with intellectual advancement (Harwood, 1958; 1979). Based on this, general educational principles and procedures evolved. In terms of pre-school children, Steiner felt that the child dwells in the realm of fantasy, and therefore the best way to facilitate the development of the will is to provide an environment of peace and tranquillity with much room for artistic and creative manipulation of media of expression (music, paint, clay, drama, dance, etc.). The etherial aspect of the child is catered for by much pretend play and fantasy. Steiner categorically states in fact that all materials that are remotely "educational in the modern sense should be withheld from the child until he reaches the age of seven since this can interfere with the normal development of his will"(Harwood, 1979). Some support for this exclusive importance of fantasy is provided by Bettelheim (1975) who feels that it is only by means of not only the acting out and consequent cathartic effects of fantasy that the young child builds up psychic coping mechanisms, but also the transformational opportunities provided by the classic folk or fairy tale. It is this property of fantasy very often utilized in Waldorf pre-schools.

Without attempting to evaluate the Waldorf approach summarily, it is obvious that this pre-school experience offers an entirely unique approach to pre-school stimulation. The change in emphasis from the traditionally

accepted achievement of school readiness skills to that tranquil development of the will, while not necessarily inappropriate, would not seem to lend itself to accomodation within the general school system. Thus the child in a Waldorf pre-school could conceivably experience difficulties entering a conventional sub A or grade 1. It is perhaps for this reason that Waldorf pre-schools seem to act as feeders to Waldorf primary and elementary schools at this stage and are not found outside the geographical location of these large Waldorf environments. Any evaluation of the Waldorf system would therefore need to be made from within the system, more especially since observation and evaluation is actively discouraged within these environments.

The other sect, which according to all statistical indications (Montessori Society, South Africa, 1987) seems to be commanding increasing support, is the Montessori method of pre-school education. The viability of this approach as a unit independent of later similar schooling is testified by the presence of many such facilities in areas where primary schools do not exist. The emphasis on a hands on method of sensory stimulation, progression at personal rates according to individual needs and general respect for the needs of the child (Crowe, 1984), makes much sense in the light of the present needs in this country which were discussed earlier and also the analysis of local needs and trends as put forward by Short (1987) and Cloete (1987).

Against this backdrop, a desirable objective would be to assess this "Montessori Approach" in terms of previous literature and local conditions, as well as from a developmental perspective in order to determine whether it has a place in the complexity of the South African situation, or whether it deserves to remain an elitist group, caught up in the net of jealously guarded secrets.

2.1. MONTESSORI - HISTORICAL PERSPECTIVE

By way of brief introduction to the topic to be investigated, a minor digression into the roots and origins of Montessorianism may provide a clearer perspective from which to approach a critical evaluation.

Maria Montessori was born in 1870 in Chiaravalle, Ancona province, Italy. She gained entrance to the University of Rome and became the first female to enrol for the medical course. She graduated and was the first woman to register as a practising physician. Her work with retarded children sparked off an interest in the educational possibilities of these children. "During the 1897 - 98 university term she attended the courses in pedagogy....and read all of the major works on educational theory of the past two hundred years. Little by little many of the ideas she found in these works came together in her mind in a theory of her own" (Kramer, 1976, pp 61).

A brief look at the themes traceable through the major theories would thus facilitate an understanding of the Montessorian theory. As can be seen from Table 2.1, the concept of sensory training, utilized extensively by Montessori goes back as far as Pereira (1715 - 1785), albeit in a primitive form. Rousseau (1712 - 1778) was the first to advocate multisensory training, but it was only Seguin (1812 - 1880) taking over the idea of graded stimuli from Itard (1775 - 1838), who actually devised a method of sensory training.

Seguin also gave Montessori the concept of the "respectworthiness" of the child. The concept of freedom for development goes back all the way to Locke (1632 - 1704)

Table 2.1 Comparative analysis of Philosophical Trends in Education : Locke to Froebel.

	Locke 1632-1704	De Condillac 1715-1780	Pereira 1715-1780	Rousseau 1712-1778	Itard 1775-1838	Seguin 1812-1880	Pestalozzi 1746-1821	Froebel 1782-1852
EDUCATION OF SENSES	No training necessary	No training necessary	Trained sense of touch only	Multisense training	Train by gradations of stimuli	All senses trained by gradations contrasts		Toys used to see relation- ships
ORIGIN OF DEVELOP- MENT	Sensory experience causes thought	Occurs naturally		Evolution of innate powers			Thinking begins with obser- -vation	Invariant innate law of developm.
ROLE OF EDUCATOR						Respect and assist child		Directs and intervenes
PROCESS OF LEARNING	Occurs spontane- ously				Broken into parts		Direct experience sequential	Active partici- pation
FREEDOM	Vital for learning			Freedoms facilitate developm.			Not important	Not important

and is again brought forward by Rousseau. Neither Itard nor Seguin dealt with this, since they worked with the deviant needs of retarded children.

Interestingly enough, Montessori followed the more contemporary Pestalozzi (1746 - 1821) and Froebel (1782 - 1852) only in terms of their concept of the process of learning. It is thus clear that while Montessorian theory was and is unique, it never claimed to be original, but rather the culmination in practice of previous thought patterns. The theory can thus be seen as very much part of the evolutionary development of knowledge, and not merely as the result of the thoughts of one innovative individual. Of further use in understanding the nature of Montessorian theory, a closer look at her theory beside that of Seguin would be interesting.

As can be seen in table 2.2, the main difference between Montessori and Seguin is that Montessori eventually adapted the method by which Seguin's retarded children were taught to teach normal children, while Seguin himself remained with retarded children. Thus Montessori adapted and refined the principles of Seguin which included the idea of respect for the individuality of the child; used the sensory apparatus used by Seguin; broke down learning into component parts, etc. One is thus lead to understand why Montessori saw herself, in the early days at any rate, as a follower of Seguin.

A final point of interest in viewing the factors that gave rise to Montessorian theory are two more or less chance events in the personal life of Maria Montessori. Without the first there may well never have been a Montessori Method at all, and without the second the method would probably not

Table 2.2 Comparison of the thought development of Seguin and Montessori

SEGUIN	MONTESSORI
Adapted ideal methods of ordinary education for the mentally deficient	Adapted Seguin's method for the mentally deficient for use with normal children
Respect for individuality by teacher held as important	Advocated a total respect for the child as a being in the process of becoming
Method divided into stages for different modalities from physical movement to intellectual development	Adopted stage sequence verbatim
Graduated exercises in motor education, using tools of everyday life	Refined this idea to form the concept of Practical Life Exercises
Devised equipment for sensory stimulation	Adopted sensory apparatus with very little modification
Taught drawing of lines before writing of letters and writing before reading	Endorsed the idea of skills broken into component parts Taught writing before reading
Continued to work with retarded children - no further development of theory	Became involved with normal children and by observation ascertained developmental needs. Devised a theory for development which included the concept of freedom and discipline, sensitive periods, etc

have come to be a trend so far removed from the mainstream of education, but rather counted among those ideas which gave rise to common educational practice.

While still working with the retarded or 'idiot' children at the Orthophrenic School, Montessori suddenly resigned at the height of her success in educating these hitherto ineducable children (Berger, 1986). The reason she later gave for this surprising move was that she had decided to leave medical practice and devote herself to the education of normal children. Kramer (1976) however points out that she left due to personal complications which arose after the birth of her illegitimate child by the co-director of the school, Dr Montesano. Unable to continue working beside this man after his subsequent marriage to someone else, Montessori was compelled to leave and pursue another field of interest. She turned to the education of normal children and developed what is known today as the Montessori Method.

Later, having achieved phenomenal success in the "Casa dei Bambini" or "Children's Houses", which was the name given to the facilities run by her for the development of normal pre-school children, "at the age of forty, Montessori took another of those steps which would shape the rest of her life. She made the decision to give up all other work in order to devote her full time and energies to the schools and societies of what was becoming the Montessori Movement" (Kramer, 1976, pp 155). The implication of this decision was that she no longer had an independent income and had to rely on training courses, sale of books and sale of didactic equipment for an income. She consequently developed a possessive attitude towards her work which resulted in schisms within the ranks of Montessorians as well as "keeping Montessori out of the intellectual mainstream of

education" (Hainstock, 1978, pp 24).

However, maintaining both a historical perspective and a mind open to empirical evidence, it must be remembered that "a decade after her death.....Montessori was rediscovered as the pendulum of school reform swung back to her view of the nature and aims of the educational process. With the perspective of time her genius becomes clearer. She remains one of the true originals of educational theory and practice" (Kramer, 1976, pp 16).

2.2. MONTESSORI - THE THEORY

According to Montessorian theory, education should be help to life, since taken at its root, educate comes from the Latin word "educare" which denotes "leading happily, with pleasure". Life includes intelligence, will and personality, with their instrument of expression - the body (Petrutis, 1969, pp 3). Montessori held this view of education. The method is based on the needs of children as manifest at different phases of growth (Montessori, 1980). She contends that an effort to understand her method merely as a method of education would exclude much of importance. She insists that "the method is the consequence of having assisted the development of the psychological phenomena which had remained unobserved and unknown....The problem is therefore not pedagogic but psychologic" (Montessori, 1966, pp 326). It is based upon this very assumption that the present research was undertaken.

From this perspective we shall consider the three elements of the Montessori approach as classified by Hayes (1986): the child, the prepared environment and the teacher or pre-school facilitator.

2.2.1. The child

In modern terms Montessorian theory is an interactionist theory (Bruce, 1984). "She stressed that the organism and the mind form a structured whole, and that mental development is the product of the interaction between the structure of the organism and the structure of the environment" (Miezitis, 1973, pp 124).

Although originally borrowed from Wordsworth (Bloom & Trilling, 1973) a now famous Montessorianism is : "The child is the father of the man" (Montessori, 1961, pp 12). This is simply because the man comes from the child that he was. The Montessorian view and treatment of the child flow from this basic premise, and are governed by the following principles for development :

Blueprint for development - within each child is the blueprint for the development of psychic organs (Montessori, 1986), which given sympathetic conditions, will enable the child to become totally self-actualizing.

Work of the child - all activities the child engages in of his own accord are thus directed to this end - the making of the man (Montessori, 1966).

Drive toward functional independence - this drive is the motivation for activity in the early years. It originated from the basic life - force of the unfolding individual, which Montessori called the horne (from the Greek, meaning force or stimulus). This horne then provides the urges or needs of which the educator must be aware during the different stages of development (Hayes, 1986).

Self didactic - following the promptings of this hormone, children become "capable of learning important concepts from (their) own spontaneous activities" (Elkind, 1983, pp 4). The child thus constructs himself through his own work.

Exercise of own responsibility - it is only possible to proceed with this work of self-construction if the child is free to exercise his own responsibility in the choice of his activities. Only when given this responsibility is the danger of "placing upon the adult the responsibility for his (the child's) doings" avoided (Montessori, 1966, pp 108).

Since the child is totally unconscious of these internal needs, adults cannot assume to know what the needs of children are, without careful study and observation (Montessori, 1966). The assumption of prior knowledge of the needs of the child very often results in misconceptions and inappropriate expectations being imposed upon the child. This causes distortion of the true nature of the child. Exposure to an environment that will encourage participation and interaction by the child results in the process referred to as normalization - "the process of de-programming the adult mask" (Berryman, 1980, pp 296). Futrell (1970) identifies the three circumstances necessary for normalization, namely the cooperation between school and home, an understanding of how to cater for the child's needs and the elapse of a period of time. Given these and exposure to the prepared environment, according to Montessori the normalized child will emerge exhibiting certain characteristics. The normalized child would thus have :

Love of order as indicated by respect for

materials and consideration for companions.

Love of silence and working alone.

Mutual aid and co-operation stemming from lack of a competitive environment.

Profound spontaneous concentration developed by activities that focus on reality and encourage a lengthened cycle of work (specifically practical life exercises).

Obedience displayed by being eagerly responsive to adult authority.

Independence and initiative resulting from adult non-interference, the control of error inherent in the apparatus and the child sized accessibility of the apparatus.

Spontaneous self - discipline which is an active phenomenon growing from spontaneous activity of the child.

Attachment to reality which comes from ordering of a real environment.

Sublimating possessive instinct resulting from the need to wait a turn and share the apparatus.

Joy since learning is a happy experience, harnessing the child's delight in discovery (Futrell, 1970).

In order to facilitate development, the child is endowed with what Montessori terms sensitive periods. During these periods of sensitivity "the mind (is) as soft as wax, susceptible at this stage to impressions which could not be taken (with as much ease) at a later stage" (Montessori, 1946, pp 6). A child in a sensitive period is characterized by a great enthusiasm for a particular activity. When the sensitivity passes there remains only indifference to that particular source of stimulation (Montessori, 1966).

Sensitive periods are of varying length for various stimuli. Hainstock (1978) clearly states the onset and duration of the various periods of sensitivity. This is found in table 2.3. Figure 2.1 provides an alternative arrangement of this information. It can be seen that areas of sensitivity overlap, so that each child is simultaneously sensitive to various inputs. From birth to 3 years the child is characterised by what Montessori called the absorbent mind. By this is meant that the child literally absorbs all that surrounds him in order to facilitate later adaptation. Thus language, down to the detail of dialectic variation is internalized in this period, as well as cultural views, racial prejudices, ethical values, etc. (Montessori, 1967). The adult thus influences the child only indirectly at this stage. Conversely, the period 3 - 6 years is the period in which the child is susceptible to adult influence. During this stage the child emulates and imitates the significant adults in his life, adopting behaviour patterns and modes of being.

The general muscle development for movement and refinement of this movement takes place between 6 months and 4 years. Sensory refinement overlaps this, being from 2 - 6 years, the period of exposure to the pre-school environment. The pre-academic sensitivity to reading and writing also occurs during this period.

This list of periods of sensitivity is not comprehensive. The later evaluation of the research is nevertheless based on this division identified by Hainstock (1978). These sensitive periods must be seen within the context of the greater periods of development.

TABLE 2.3 - Sensitive periods for the first period of life

AGE	AREA OF SENSITIVITY
0 - 3 yrs	absorbent mind
1 ¹ / ₂ - 3 yrs	language development
1 ¹ / ₂ - 4 yrs	co-ordination and muscle development
	interest in small objects
2 - 4 yrs	refinement of movement
	concern with truth and reality
	awareness of order sequence in time and space
2 ¹ / ₂ - 6 yrs	sensory refinement
3 - 6 yrs	susceptibility to adult influence
3 ¹ / ₂ - 4 ¹ / ₂	writing
4 - 4 ¹ / ₂	tactile sense
4 ¹ / ₂ - 5 ¹ / ₂	reading

Period 1 : 0 - 6 yrs : period of transformation
 Period 2 : 6 - 12yrs : period of tranquil growth
 Period 3 : 12- 18yrs : 2nd period of transformation, physical and psychic

The sensitive periods enable those involved with young children to discern certain needs of the child. Futrell (1970) outlines the basic needs of the child in the first period of life :

Movement - he requires freedom to explore and manipulate.

Language - he needs to hear the spoken word and also to absorb his culture.

Independence - freedom to interact with the environment and acquire independence.

Love and security - constant reassurance of being loved.

Discipline - few rules, consistently observed

Order - comes to internal order through external order. Internal order is a prerequisite to intellectual expansion.

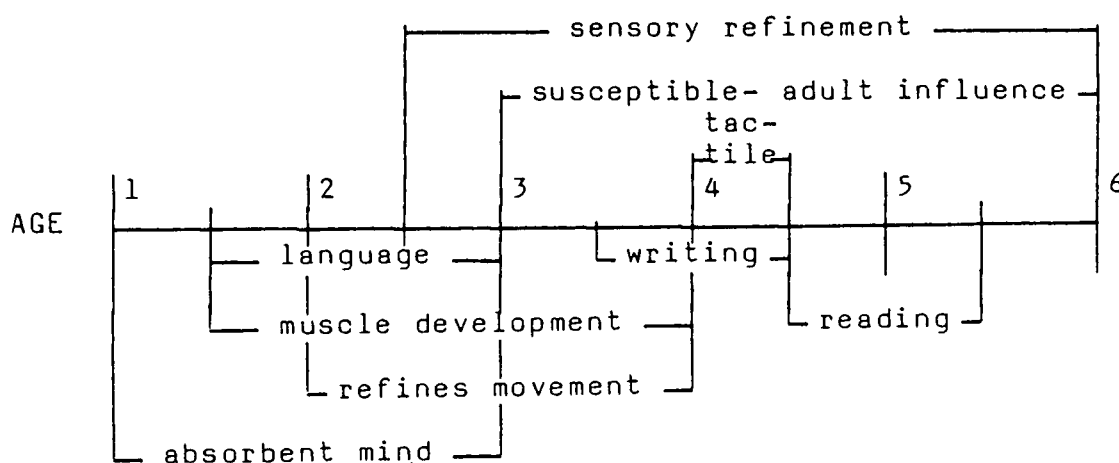


Figure 2.1 Graphical representation of sensitive periods according to Hainstock (1978, pp 58).

The interactionist nature of Montessorian theory can be understood by consideration of the environmental needs of the child. Without an appropriate environment in which to unfold, the normalized child will never appear. It is therefore necessary to consider the nature of the environment in greater detail.

2.2.2. The prepared environment

The role of the Montessori environment is basically twofold. In the first instance it needs to be of such a nature that it calls the child to activity. The young child should be so stimulated that he can't wait to act upon it (Hayes, 1986). Secondly, the environment, by its nature and preparation becomes in effect an inanimate teacher to the child. By its composition it provides those activities that correspond to the needs of the child. It is

thus not a teaching aid to be used the better to understand a point or lesson, but is in itself in part a teacher (Montessori, 1966).

The optimum environment would be one that matched completely the development needs of the child (Hannon, 1986; Karnes, 1979). The Montessori environments are classified as one for the 3 - 6 year olds; one for the 6 - 9 year olds and one for the 9 - 12 year olds. In discussing the requirements for the children in the 3 - 6 year group, the environment for optimum development has the following characteristics :

Control of error - in specific materials as well as in the larger environment.

Aesthetically pleasing - since the child internalizes the environment, it needs to contain that which it is desirable for a child to absorb. "The environment for the very small child is home-like. It is beautiful" (Montessori, 1986).

Lends itself to activity - in addition to the invitation to work due to the beauty of the environment, it needs to be structured in such a way that it is accessible in a practical way to the small child.

Constant - the materials must always be arranged in the same place and in the same order so that the child can locate what he requires and function independently (Hayes, 1986).

Complete - materials must not be broken or missing as this necessitates adult intervention (Hayes, 1986).

Limited quantity - Montessori (1966) cautions that excessive quantity of materials results in overstimulation, which inhibits the process of

ordering the chaos during this stage of development.

The materials in the environment are based on two invariant principles, namely that they correspond to the needs of the child and that the material is arranged in graduated sequences from easy to difficult. This implies that the facilitator - parent, teacher or general caregiver should be alert to the needs either expressed or implied by the child. Tasks should also be broken into component parts, to ensure mastery. Thus, for instance, before pouring tea for guests, the child will master the pouring of seeds from one small jug to another.

When the child enters the environment he begins with the **exercises in practical life**. The function of this material is to help the child order reality (reality based play) (Kahn, 1980) and also to extend concentration through lengthened cycles of activity (Montessori, 1966).

Sensorial exercises - with structured materials so designed to deal with a single attribute at a time, facilitates improved perception, thus providing a wider basis for intellectual development. Sensorial exercises also help to order impressions by refining ordinary sensorial perceptions. In addition, exposure to the sensorial material often assists in the early detection of physiological defects (Hannon, 1986).

From this stage visual and auditory discriminations develop into reading; the demonstration of relationships result in relational concepts which lead to the understanding of both mathematical and physical concepts. Perceptions gleaned from the sensory-motor activities facilitate the formation

of abstract ideas (Hannon, 1986).

By contrast to this, when Montessori discusses the needs of children in the age group 6 - 12 years, she says that "the principles that can be applied usefully to the first period are not the same as those that must be applied to the second" (Montessori, 1973, pp 4). Thus the child in the 6 - 12 year period requires a wider environment in which to function than the pre-schooler. He requires among other things, to understand what money should represent and how to use it. He needs to establish social relationships in a larger society (Montessori, 1973). The child in this second stage of development is moving from sensorial to abstract thinking - he turns toward the intellectual and moral sides of life at this stage. In fact, Montessori indentifies a sensitive period for moral development for the 6 - 12 year group. But essentially, at this stage "the role of education is to interest the child profoundly in an external activity to which he will give all his potential" (Montessori, 1973, pp 24).

Having a basic understanding of the environmental needs of the preschool child, upon which this study focuses, the role of the pre-school facilitator needs clarification.

2.2.3. The Preschool Facilitator

Essentially the facilitator has a function similar to that of the environment, namely to facilitate the development of the child. As facilitator, Montessori (1986) identifies three basic functions of the teacher, or directress, to use Montessorian terminology, namely to:

Present the material at the correct time which corresponds with the child's expressed need. The

purpose of presentation is so that the children understand the function of the apparatus.

Observe children in order to determine needs (for 1 above) and stages of development.

Prepare the environment.

In order to present the material in a way that will facilitate development and not hinder it, the directress needs to be well acquainted with the material. She must acquire exact knowledge of technique and presentation of the apparatus and also know how to treat a child in order to provide only guidance (Montessori, 1966). It is necessary for the facilitator or directress to have certain attributes or attitudes in order to assume the position of subservience required in a Montessori environment. Miezitis (1973) highlights both the facilitative and the disruptive teacher attributes.

Positive attributes include an inclination to experiment, astute powers of observation, a creative imagination and a basic faith in the inherent goodness of children.

Negative attributes include a tendency to moralize, lack of respect for children's work shown by constant interruption, a tendency to rush the child's work and the arbitrary imposition of verbal rules.

Montessori (1966) places the matter on a level more concerned with personality attributes :

"not for words, energy and severity, but wisdom, keen-eyed in observing, in serving, in approaching and in withdrawing, in speaking and in keeping silent, in accordance with the occasion

and needs. She must acquire a moral alertness, a mingling of calm, patience, love and humility. Virtues and not words form her main qualification" (Montessori, 1966, pp 160).

The teacher or facilitator possessing negative teacher attributes is potentially an obstacle to the development of the child. Notwithstanding this danger, Montessori (1966) contends that the training of teachers in the Montessori Method is much simplified as compared with that of ordinary teachers.

The role of the directress as aid to the development of self-discipline in the child as well as maintaining overall discipline in the environment is pointed out (Lillard, 1973). The teacher needs to safeguard the right of the child to undisturbed work, even if this means bodily removal of the offender. The teacher as aid to the development of self-discipline in the child will be discussed in the following section.

The fact that the Montessori Method is separated methodologically speaking from the mainstream of educational thought implies that there will be much criticism both in principle and practice. Three areas where such criticism abounds will be dealt with in relative detail.

2.3. MONTESSORI CRITICIZED

While limited scope and relevance preclude a comprehensive treatment of all areas viewed as contentious within Montessorian theory, the most significant deserve some attention. These are the freedom-discipline balance, fantasy and creativity.

2.3.1. Freedom - Discipline Balance

The Montessori environment is neither characterized by total chaos resulting from freedom from authority nor total immobility due to strictly imposed discipline. These two extremes are the ultimate evils according to Montessori (1966).

"Discipline in its true sense means the art of completing conditions favourable for cooperation" (Peller, 1979, pp 1). He indicates the flexible balance between no control and overcontrol that simultaneously draws out the self-conscious child and calms the unruly child. This role of disciplinarian, which the teacher must assume is a temporary state, necessary only until the child is able to achieve his own self-discipline.

Self-discipline can only appear in the presence of sufficient freedom.

"We give children freedom, yes, but freedom within limits. We give them...in the classroom the freedom of movement...We give the freedom of choice. We give the freedom of time...We give the freedom of being alone or with another child...We give these freedoms, but within limits" (Waltuch, 1979, pp 15).

Montessori (1966) believed the sole limit to freedom should be the collective interest of the community.

Given these liberties, Lillard (1973) traces the development of self-discipline in the child as going through the following stages:

Repetition of activity polarizes attention;
achieves concentration, independence and power
over own movements

Begins to choose self-discipline as a way of life

Achieves power to obey

The free child, given the definite limits of collective interest, is able to follow the promptings of his life-force or horne, and develop to his full potential (Hager, 1971). Applied practically, this principle would mean that the child in the Montessori environment would be free to move about; to choose his own activity, or to choose not to work. He would be free to work where he pleased - inside or out, at a table or on the floor. But the limit of the collective interest means that by availing himself of these freedoms, the child would not be permitted to impinge on the freedom of others. He could therefore not run around the schoolroom shouting; nor could he knock down, remove or in any other way interfere with the work of any other child. The second limit to freedom in the collective interest means that the child would not be allowed to damage or destroy any portion of the environment or hurt any other child in any way. A child attempting to ignore these limits meets with peer disapproval in the first instance and if he persists, is physically restrained by the directress.

2.3.2. Fantasy

While normal development during the early years is seen by Montessori to exclude fantasy as a need (Montessori, 1966) a sensitive period for the development of imagination and one for the enthusiastic acquisition of all seeds of culture are recognised by Montessorians in the period 6 - 12 years (Hayes, 1986).

There remains however much dispute concerning whether fantasy is to be catered for in the Montessori environment or not. Boyd (1914) has Montessori on record as saying that the omission of fantasy was due to the fact that "her system was still in its infancy and that in the course of time would all be brought in" (Boyd, 1914, pp 245).

Berryman (1980) explains the general discouragement of fantasy as being due to Montessori's interpretation of the doctrine of the Catholic Church (of which she was a member) of *creatio ex nihilo* to the effect that humankind could only create with sense matter. "Reality lay straight ahead in the world out there known by the senses and ordered by natural law embedded in its structure....Montessori was (thus) concerned about children disengaging from the sensing world" (Berryman, pp 300).

Montessori did believe that the child in the 0 - 6 year period needs to sort his impressions, "to learn what is true and what is not true" (Futrell, 1970, pp 11). She classified imagination into two aspects - true imagination - based on true images and ideas - an important part of intelligence, and false imagination - based on fancies and fantasies, and resulting in disorderly movements of the mind (Montessori, 1961). Her latter view is apparently supported by Holt (1967) who feels that children use fantasy to get out of, not into the real world.

Be that as it may, this apparent dichotomy in Montessorian thinking can perhaps be explained by the view posited by Boyd (1914) and Elkind (1980) that the omission of fantasy from the Montessori environment comes as a result of a lack of aesthetic appreciation in the nature of Montessori the woman. Elkind sees her as essentially productive and achievement orientated, which limits her tolerance of

an alternative perspective in others.

The view of contemporary developmental psychologists is in general not unsupportive of the Montessorian view. There is however very little differentiation made between the use of fantasy and imagination and general play as such. Hurlock (1959; 1970) for instance, deals extensively with the functional attributes of play - mentioning only that children sometimes like to engage in dramatic play where the child substitutes one object for another. Fong & Resnick (1980) discuss fantasy in terms of the link it constitutes between the internal and external world of the child. They do not consider fantasy of any other significance. Helms & Turner (1981, pp 446) take the matter further - they feel that "imagination in play usually results as a reflection of the inner needs and desires of the child, which in turn originate from real experiences. By transforming these inner impulses into make-believe forms of play, the child presumably can resolve inner conflicts and begin to develop a better understanding of people and events."

Perry & Bussey (1984) actively support the Montessorian contention that pre-schoolers have a greater need for functional and constructive play than pretend play. They do however admit that the few pre-schoolers attracted by fantasy play have a developmental advantage over their peers by being more popular, patient and cooperative, friendlier and more empathic than their peers. They assert that pretend play is conducive to prosocial behaviour.

Mussen, Conger, Kagan & Huston (1984) are cautious in their evaluation of the importance of fantasy. They feel that fantasy play has an adaptive function, helping children to cope with later adult roles, but do not at any stage mention

the age at which fantasy play is most likely to occur.

The only authors consulted expressing a totally unambiguous and definitive view on the subject were Yussen & Santrock (1978). They felt that pretend play was a fundamental need of the preschool period, beginning at about 18 months, peaking between 5 and 6 and being replaced by an interest in games in the early elementary school years. This view is totally different to that of Montessori.

It is obvious that the fantasy-reality controversy continues. The question is not whether developing children need fantasy or not, but rather at what age they need it. Further research is needed, but it seems unlikely that an answer acceptable to all will be found in the near future.

2.3.3. Creativity

Traditionally closely aligned to fantasy in terms of artistic, musical or literary creativity, creativity occupied a far vaster and deeper relevance for Montessori. She saw creativity in the context of the work of the child in creating the man (Kahn, 1980).

The movement from one stage of development to the other involves a creative flow in order to know and develop the self within each stage (Kahn, 1980). All creative energies are thus tied up in the cycle of discovery and mastery, both of self and of environment in each successive stage of development. This process of awakening awareness and response to internal needs by means of active and creative use of both the self and the environment are the building blocks used by the child in the making of the man.

The aspects of artistic, musical or literary creativity would thus be incorporated into the wider concept of creating the man. These would however be means and not ends in the process.

The confusion between Montessorians and non-Montessorians on this subject stems from the fact that Montessori felt that discovery and mastery of the self necessarily preceded mastery of the environment (Montessori, 1966). Thus the child would need to develop the musculature sufficient to manipulate a pen or brush before being expected to use these to create artistically.

As can be seen, Montessorian theory is a complex arrangement of components that certainly have not received adequate treatment here. An understanding of the gist of the legacy which Montessori has left the child is sufficient to make clear that certain areas have already been proved relevant, while others have been actively disproved. It may be useful at this point to attempt to establish some points of similarity between Montessorian theory and general trends in developmental psychology the better to determine the value of the Montessori environment for the pre-school child.

2.4. MONTESSORI FROM THE PERSPECTIVE OF DEVELOPMENTAL PSYCHOLOGY

The developmental psychologist thinks in terms of specific developmental tasks rather than epistemologically, since various theorists have divergent views on the origins of development. Thus Freud, Erikson, Skinner and Piaget would each offer a different explanation for an observed phenomenon. Being a theorist, Montessori has her own,

unique view, as already discussed. A comparison of theories is useful and will be done in the following section. For evaluation of the theory from a developmental psychologist's point of view it is necessary to discover to what extent opportunity for mastery of developmental tasks is given within the Montessori environment.

The question of whether early stimulation is desirable is not a purely Montessori question, but it has relevance here. Hetherington & Parke (1979) quote animal studies in which it was found that an enriched early environment causes increased brain size, a change in brain chemistry by way of increased enzyme activity and increased complexity of neurons. This is true to such an extent that "an animal reared in an environment that is low in sensory and perceptual stimulation and does not allow opportunities for interaction with other members of its species during some period of its early life will be socially, emotionally and perhaps intellectually inadequate" (Hetherington & Parke, 1979, pp 153). The validity of generalizing this to human children can perhaps be questioned, but the growing interest in pre-school enrichment indicates an acceptance of this at a relatively deep level.

An issue central to Montessori is the existence of sensitive periods. While Montessori goes into the most specific details concerning not only the areas of sensitivity, but the exact ages at which this sensitivity occurs, developmental theorists limit themselves to the admission that an innate sensitivity does exist in certain areas. Thus Yussen & Santrock (1978) recognise the special sensitivity of the human brain to the structure and rules of language.

As regards the Montessori Method of presentation of and

practice on apparatus Hurlock (1959; 1970) identifies an innate desire in the child to repeat a skill until mastery is achieved. Hurlock also documents the types of activities preferred by children of pre-school age saying that the most enjoyable activities for these children are those found about the house - helping mother so that "through constant practice, a child can improve his skills. Meanwhile, he will be learning to control his muscles so that in time finer and more useful skills can be learned" (Hurlock, 1970, pp 184). This corresponds both in form and intent with the Montessorian practical life exercises.

Hurlock also indicates the desirability of exact demonstration of the correct way to perform various actions. "This can be done by showing the child how to use the different muscle teams for a particular activity...(since)...well learned fundamental skills will do much to pave the way for good body control later on" (Hurlock, 1970, pp 185). This echos the underlying rationale of presentation of apparatus in the Montessori environment.

Havighurst (1972) gives the most comprehensive analysis of specific developmental tasks of early childhood. Of these the following does not apply to the period the child spends in the pre-school environment, but are completed by the time the child enters pre-school :

Learning to take solid foods,
Learning to control the elimination of body wastes and
Achieving physiological stability.

The remaining tasks (similarly identified by Hurlock, 1959; 1980; Yussen & Santrock, 1978; Fong & Resnick, 1980 and Helms & Turner, 1981) indicated in table 2.4, where they

appear in relation to the facilities for development provided by the Montessori environment, are as follows :

Learning to walk - including all gross motor components.

Learning to talk - language development.

Learning sex differences and sexual modesty - grouped under socialization skills by others.

Forming simple concepts of social and physical reality - as it corresponds with the idea of cognitive development.

Learning to relate oneself emotionally to parents, siblings, and other people - socialization skills.

Table 2.4 Provision of activities within the Montessori environment compatible with developmental tasks as recognised by developmental psychologists.

DEVELOPMENTAL TASK	FACILITIES WITHIN THE MONTESSORI ENVIRONMENT
Learning to walk - motor development	Practical life exercises; fine and gross motor coordination activities
Learning to talk	Sensory discrimination, practical life exercises, pre-academic activities and the general freedom to move and socialize
Learning sex differences and sexual modesty	Freedom to interact socially provides environmental cues about self and others
Forming simple concepts of social and physical reality	Freedom to interact, sensory discrimination, pre-academic activities and practical life exercises
Learning to relate oneself emotionally to parents, siblings and other people	Freedom to interact provides social experiences and provides feedback about position in society
Learning to distinguish right and wrong and developing a conscience	Respect for others and for property is emphasised as a rule of the environment
Learning a sense of autonomy and initiative	Practical life exercises provide positive reinforcement, freedom of choice of activities

Learning to distinguish right and wrong and developing a conscience - general personality skills.

Based on this and the data in table 2.4, it is clear that the Montessori method is in no way contrary to the trends observed by developmental psychologists.

All that remains is an evaluation of the theory from the perspective of scientific research. The relative exclusivity of Montessori and its presence as a movement rather than as a trend in educational thought has limited the amount of research conducted specifically on Montessori per se. It may therefore be useful to draw parallels between this theory and that of Piaget the better to evaluate the contributions to developmental theory and facilitative practice of these principles by Montessori.

2.5. COMMON GROUND BETWEEN MONTESSORI AND PIAGET

"Piaget was born in 1896, the same year that Montessori became a doctor of medicine and a year after the publication of Freud's "Studies in Hysteria". Piaget was thus of a different generation than these two investigators, although he was much influenced by them (Elkind, 1980, pp 285).

One would not expect to find concordance between Montessori and Piaget given that Montessori's theory developed from educational principles from observation of educational practice. Piaget proposed education possibilities following observation in experimental settings (Mckay, 1983; Elkind, 1979).

The experimental methods of Piaget were dedicated to epistemological purposes, namely to explain the relationship between the child and the nature of his knowledge. Or - to explain "how the child adapts to and interprets objects and events in the world around him" (Hetherington, 1979, pp 308). Conversely, the focus of Montessori's attention was to establish the specific needs of the child through his successive stages of development. Thus - HOW he learns (Piaget) as opposed to WHAT HE NEEDS in order to learn (Montessori).

In some cases, points emphasized by one theorist, while not rejected by the other, are more or less tacitly accepted. For instance, for Piaget development depends on neurological maturation; physical experience; social experience and motivational equilibration (Evans, 1971). Kamii (1973) adds a fifth point namely cultural and educational transmission. For Montessori, neurological maturation is tacitly accepted as a requirement, while physical and social experience would together form the single component - the environment. Motivational equilibration would in terms of Montessori be a product of the genetically determined blueprint for development.

Both theorists favour a stage model for development, and both agree that the stages of development are invariant in terms of order, but variable in terms of rate for the individual child (Evans, 1971).

Another important principle agreed by both theorists concerns the nature of the child compared to the nature of the adult. Both agree that "there are qualitative as well as quantitative differences" in their mode of thought (Craig, 1976, pp 32).

For Montessori development is a spontaneous process which is facilitated by sensitive periods. These are determined by an unfolding genetic plan inherent in the child. A similar idea expressed by Piaget is a process of spontaneous development also according to a genetic plan, which requires continual nourishment from the environment (Craig, 1976; Phillips, 1981).

A pervasive theme within Piagetian theory is the concept of learning through activity upon the environment. Piaget actually credits Montessori, Froebel, Pestalozzi and Rousseau as being originators of this idea (Boyle, 1983, pp 74, Chattin-McNichols, 1979).

Piaget focuses his attention on the change in mental structure that is effected when the child moves from one phase to the next (Hetherington, 1979).

Vast differences can be expected to exist due to the fact that the purpose of the theories differ. The cognitive theory of Piaget can however be modified to express educational principles that would underlie a method following Piagetian guidelines. This has been done by Evans (1971) who identifies 7 principles of application to education. These are compared to Montessorian tenets as discussed under 2.2. Montessori - the theory. The comparison is found in table 2.5.

From this table it is clear that Montessori and Piaget agree on certain important principles. Freedom to interact with the environment (Montessori) automatically assures self discovery (Piaget). The progression of apparatus from simple to complex assures sufficient challenge to stimulate development. Both theorists feel sensory enrichment to be

Table 2.5. Comparison of the educational principles of Piaget and those of Montessori.

PIAGET	MONTESSORI
Active, self discovery; child acts on materials in the environment to produce own learning	Freedom to interact with environment according to inherent needs
Arrangement of moderately novel experiences which facilitate stage relevant thinking operations, simultaneously accomodating present intellectual style	Apparatus arranged in sequence from easy to difficult, providing points of familiarity as well as novel situations
a variety of patterned and enriched concrete sensory experiences	structured sensorial apparatus designed to provide a wide range of sensory experiences
symbolization of manipulative play and aesthetic experiences	little or no symbolization but adaptive and manipulative play provided by practical life exercises
provision of variety of models for imitative learning	models provided by directress and older children
high rate of interpersonal interaction among children	total freedom for social interaction in class of mixed age group
use of clinical method to study children's progress	careful observation and detailed record keeping to study children's progress

essential. The importance of imitative models, a high rate of social interaction, the need for manipulative activities and the need for careful observation of the children are further points of similarity. The only area not covered by Montessori is Piaget's idea of the importance of symbolization in play.

A final point of interest would be a comparison of the stage model proposed by Montessori (Montessori, 1980) and the

Table 2.6 Comparison of the stage models of Montessori and Piaget

PIAGET	MONTESSORI
<p>0 - 18 months -sensorimotor cognitive growth based on sensory-motor actions.</p> <p>18 months - 6 yrs - preoperational stage - manipulation of symbols; play and imagination</p>	<p>0 - 6 years - child both in home (0 - 3) and in school (3 - 6). Needs love, freedom and to be spontaneously active</p>
<p>7 - 12 yrs - concrete operations - ability to engage in mental operations that are flexible and fully reversible - understands logical rules; conserves; seriates; relates; classifies</p>	<p>7 - 12 yrs - different psychic attitude, quest for knowledge, ethical values needs to function in wider environment; acquisition of culture</p>
<p>12 upwards - formal operations - limitations of concrete operations overcome</p>	<p>12 upwards - social awareness - needs to investigate and experience; create and orientate self; somewhere in adulthood - self actualization can occur</p>

stage model of Piaget (Piaget, 1929; Mussen et. al., 1984). This comparison is found in table 2.6. The most striking thing about this comparison is that, although the elements observed in each period differ drastically, due no doubt to the differing perspectives of the two researchers, the division of the periods as regards the approximate onset of each period shows little variation.

The concept of play holds vastly different implications for Montessori and Piaget. Montessori acknowledges the importance of play and identifies three characteristics of play (Montessori, 1961, pp 85). Play, according to her is not ordered or commanded by an adult (ie it is spontaneously chosen by the child); play has as its aim the activity

itself and nothing beyond and it is repetitious by nature - the child repeats this activity over and over in response to some covert need. "In our houses of children we respond to the child's natural love of play but we bring the play activities of the child close to reality" (Montessori, 1961, pp 86). The reason for the play being kept close to reality is explained by Elkind (1980) as being that the aim and purpose of the Montessori school is to be the best means for children to become good citizens of high character. Its purpose is therefore social adaptation. Kramer (1976, pp 142) takes this a step further and contends that Montessori never meant to ignore or banish play and fantasy from the life of the child, merely to remove it from the school, where "as she has defined the function to the school, it has no business."

Piaget, by contrast, distinguishes between work and play - work being that which promotes accommodation to social reality (cf the Montessorian concept of work), and play as being pure assimilation. It is assimilation in that through it, the child is able to realize his personal abilities and transform the world to adapt it to his needs (Elkind, 1983) This accords with Vygotsky's (1967) view of play as being chiefly by way of unconscious wish-fulfillment. This is a need which Montessori does not recognise at preschool level. Piaget distinguishes between 3 types of play (Elkind, 1980) :

Practice play - which is short lived and generally appears after mastery of one or other type of sensory-motor co-ordination task (cf repetitious activity of Montessori).

Symbolic or adaptive play - consisting of representational activities. Children from

approximately 2 to 4 or 5 yrs characteristically engage in this type of play. Representational activities move in two directions - one is toward conventional representations, concepts, verbal signs and the socialization of experience (cf Montessori's work). The other moves towards distorted representations, symbols and the expression of personal feelings, conflicts, etc (ie fantasy).

Games with rules - employed by children in the operational stage.

Piaget concludes that "In the broad sense, then, play is indeed a preparation for adult life, if adult life is seen as including self-expression and self-realization as well as social adaptation" (Elkind, 1983, pp 5). The issue of play and fantasy in this context needs further scientific investigation.

This brief comparison is sufficient to indicate that there are vast areas of common ground as well as striking differences between Montessorian and Piagetian theory. These parallels may therefore make it possible to reach a conclusion affecting Montessorian theory from research done on specifically Piagetian constructs.

2.6. RESEARCH EVALUATION

A fair amount of research has been conducted on various aspects of Montessorian theory and practice. Unfortunately however there has been little duplication of subject, procedure or results. Thus the various questions raised remain largely unanswered, or answered in a fashion that is inconclusive.

Banta (Miezitis, 1973) first raised the question of whether Montessori could be seen as a generic term or whether Montessori actually existed at all as a definite, recognizable approach to education in 1966. He investigated the period of time during which various groups were employed with the characteristic Montessori didactic materials, since it is interaction with these materials that is purported to produce changes in cognitive functioning. It was found that degree of structure inherent in the classroom was more significant than theoretical orientation per se. Children from a structured Montessori environment were engaged with the apparatus between 1% and 21% of the time, while those from an unstructured environment used the apparatus 1% - 7% of the time. From this it was concluded that Montessori as a distinctive approach could not be said to exist. Conversely Rubin & Hansen (1976) using a between groups comparison of teacher attitudes and behaviours in terms of educational strategies confronted the same question. Based on these measures, they found significant between groups correlations. This led to the conclusion that a Montessori system does exist, in terms of shared curriculum beliefs.

Miezitis (1973) conducted a comprehensive overview of relevant research done to evaluate Montessori in general terms. All the designs were between groups, with hypotheses that indicate an expected increased functioning in one sphere or the other over children from other, usually more traditional kindergarten environments. In terms of middle class children, Miezitis (1973) reviewed the research of Bereiter; McMorro; Miezitis; and Dreyer & Rigler. In an overview of findings the following emerged :

Significant differences in favour of Montessori groups on task persistence, reflective cognitive

tempo and self reliance.

Nonsignificant differences in respect of creativity, field independence, situational test of independence and moral judgement.

These unprepossessing findings elicit the suggestion that "one possibility is that similarities in the home environment may be more influential than differences in pre-school training" (Miezitis, 1973, pp 135).

From a lower class study conducted by Karnes, Miezitis (1973) concludes that Montessori may be beneficial for those with an initial limited potential, since those individuals seem to maintain increases in level of cognitive functioning even over a long period follow up study. The limited potential theme is reflected by Berger (1970) who found significant gains by Montessori children particularly when the initial status was low. Also using a between groups comparison design, Gross, Green & Clapp in an unpublished manuscript (University of Cincinnati) reviewed by Reuter & Yunik (1973) report their research in which IQ and motivational outcome variables were used. The Montessori pre-school experience was found to yield outcomes superior to that of other approaches.

Berk (1976) used naturalistic observation in order to assess the activity patterns of children as compared with teacher expectations and goals. A high level of congruence was found between teacher ideals and actual practice. This was attributed to the well defined philosophy and clear curricular rationales of Montessori, which were not found in the other programmes.

In a small study conducted by Coe (1969) based on parent evaluation of child behaviour, 36 out of 39 parents felt

that they could see changes in their child's behaviour after 3 months. These children were alleged to be more independent, curious about their environment and verbally more competent than before.

Lillard (1973) reports on further research done under the auspices of the University of Cincinnati by the Cincinnati Montessori Research Project. All results reported show Montessori to be superior in several respects to the traditional control groups.

The only long term evaluation available for review was the one conducted by Miller & Bizzell (1984). The project involved a follow-up study of an achievement test and IQ on low income black youths, who had been in the Bereiter - Engelman programme, DARCEE and a Montessori prekindergarten. The Bereiter Engelman programme and the DARCEE are alternative preschool approaches in the U.S.A. Bereiter Engelman is characterized by a high level of structure and teacher directiveness (Hallahan & Kauffman, 1982), while DARCEE is based on a high level of verbal input. The study was done at 9th and 10th grade levels. It was found that at that stage the group who had been in a Montessori programme at preschool level showed superiority on alphabet and numbers over the other groups. When tested at the end of the prekindergarten year the Montessori group had been superior on inventiveness and divergent thinking. The 10th grade Montessori males were the only group with an IQ not lower than at the end of prekindergarten. Females from DARCEE fared the best of all females. This points to the long-term benefits of Montessori over other approaches for boys - a more physical approach, while the more verbal approach of DARCEE seemed to have lasting benefits for females.

An answer to the puzzling question of why results seeking to evaluate Montessori as a method are so confusing and contradicting, can perhaps be traced back to Montessorian theory. The Montessori environments, as has been seen have two basic purposes - to facilitate the cognitive development of the child and to promote his social adaptation. Both of these have as a prerequisite that development should occur within the child. Development is a continuous process characterized by various discrete periods of sensitivity according to individual time schedules. Development in Montessorian terms is therefore a process and can therefore not be evaluated as one would evaluate a product. In Montessori there would never be a product, merely a continuing process. Between groups comparisons by their nature evaluate in terms of a product - what the child (group) is at a particular time, compared to what another child (group) is at the same time. Results would therefore vary according to innumerable extraneous variables, not the least of which is the nature and definability of the group in question. More useful would perhaps be a study of the process - the how of development - using techniques similar to those employed by Montessori and Piaget - namely scientific observation.

Specific directions of thought deserve mention at this stage. Champagne & Tausky (1976) state that behaviour is externally motivated, even in environments which claim to facilitate intrinsic motivation, since these environments contain stimuli that provide external motivation for behaviour. Hannon (1986) disputes this, pointing out that perceived success, apart from providing feelings of positive self worth, is intrinsically motivating. Success is inevitable in the Montessori environment given the nature of the environment. Croll & Smith (1984) confronted this

question of intrinsic or extrinsic motivation of behaviour and found that when promised rewards, the children's intrinsic motivation to perform a task decreased regardless of whether the promise preceded or followed the children's commitment to perform the task. They concluded that frustration probably played a role in mediating the rewards of intrinsic motivation. This seems to support Montessori's view of the intrinsic nature of motivation to work.

On the subject of social interaction, Lillard (1973) reports the Sand School project report claiming that research at the institute indicated that Montessori children were more extroverted, verbal and personable than the other groups of children evaluated. Reuter & Yunik (1973) base their support of this claim on a measure of the proportion of time Montessori children spent in peer and adult interaction. They found :

Montessori children spent significantly more time interacting with peers (25%)

Montessori children spent the least time interacting with adults (6%)

Montessori children had the longest mean interaction time (28,7 seconds)

They concluded that "the Montessori children in this study when compared to the children in the other two nursery schools across age showed more advanced social interaction patterns" (Reuter & Yunik, 1973, pp 322) - this despite the Montessori concentration on developing perceptual, practical and cognitive skills.

White, Yussen & Docherty (1976) performed an evaluation of Montessori from a Piagetian perspective. Hypothesising that the Montessori curriculum would accelerate the acquisition of certain concrete operational skills, it was found that

while this was confirmed on tasks of seriation and classification, the same was not true for conservation. The authors contend that this is because conservation is probably an ability of a higher order than seriation and classification. They conclude therefore that a Montessori environment can facilitate the development of concrete operational thinking. Zammarelli & Bolton (1977) found that physical manipulation of materials which embody certain concepts facilitates the formation of those and related concepts. This bears out the idea of White et.al.(1976) that exposure to an environment such as the Montessori environment could hasten the acquisition of operational thinking.

Finally, in a survey of play preferences, Rubin & Maioni (1975) found that there is a higher incidence of functional and constructive play in the 3 - 5 year group than the incidence of more mature forms of play (dramatic play, rules). This was borne out in a later study by Rubin (1978), in which it was found that not only are the preferred play categories different across age as indicated, but that the levels of play within the categories differ. Thus for instance, with age solitary play becomes cognitively more mature. Harper & Huie (1985) concurred on this point. They found that playing alone is an alternative to playing with others - a choice made by the child, based on immediacy factors, as well as past experience of peer interaction. This supports the Montessorian idea of functional play - either solitary or in a group having a place in the preschool environment. Russell & Russnaik (1981) could find no relationship between language development and symbolic play, which further supports the Montessorian notion that the young child, while needing functional play, does not require fantasy play for optimum development.

In conclusion - the hodge podge of results indicates that significant errors are creeping in somewhere - probably in methodology. New ways of evaluating preschool programmes so that the process and not the product is emphasized, need to be formulated so that research procedures can become accurately replicable, and findings come to support one another. Only then can the chaff of Montessorian theory be separated from the hay, so that the new generation can find itself in an environment that truly facilitates development and self actualization.

CHAPTER 3

RESEARCH QUESTIONS

The inconclusive results in the area of Montessorianism justifies questions concerning the theoretical claims of Montessori, and lack of research locally justifies investigation under local conditions. Given the two areas of interest of this research, namely that investigation at this level should concentrate on **process** rather than merely on product in order to gain a clear idea of the effectiveness of this method, and the concern with **local conditions**, it becomes clear that the scope is too vast for comprehensive treatment of either area at this stage. This work should therefore be considered as a type of pilot study to determine whether work in this direction is potentially profitable or not, given the current situation and trends.

The basic questions would then be whether effects of Montessorianism observed elsewhere can be generalized to South Africa; and also whether given the lack of resources, this method is viable as an approach under local conditions.

3.1. STATISTICALLY TESTABLE HYPOTHESES

Based on the model of sensitivity discussed by

Hainstock (1978, pp 58) (Fig 2.1 and Table 2.3), periods of sensitivity could, according to the rules of logic, be confirmed or even suggested by analysis of observational data. The following hypotheses are indicated :

HYPOTHESIS 1

Children in the 2 - 4 year group spend a greater proportion of their time engaged in motor activities than children in the 4 - 6 year group.

Rationale : According to Montessori, children in a sensitive period are characterized by frenzied activity in that area. Emergence from a sensitive period is characterized by peacefulness and a lack of interest in that area. It is logical to assume that a child in a sensitive period would be involved with activities that fulfil his inner need to a greater extent than a child not in that sensitivity.

HYPOTHESIS 2

Children in the sensitive periods for reading and writing will spend more time in pre-academic activities than children not in this sensitive period.

Rationale : While not possible to determine whether a specific sensitivity to reading and writing exists based on the observational data reflecting the proportion time engaged in "pre-academic activities", an indication of such a tendency will be reflected by careful analysis of the data.

HYPOTHESIS 3

Given freedom of choice, pre-school children will engage in more adaptive play than in fantasy play.

Rationale : If it can be assumed that the Piagetian concept

of adaptive play is parallel to the Montessorian idea of practical life exercises (as it appears so from literature), one can ask whether pre-school children spend more time in adaptive play (practical life exercises) or fantasy play.

HYPOTHESIS 4

Exposure to the environment described in chapter 4 will be facilitative, and accelerated development will result.

Rationale : An evaluation is necessary in order to challenge the AMI (Association Montessori Internationale) contention that it is not possible to establish and run a Montessori environment without AMI training. Since the stated objective of a Montessori school is to promote the intellectual and social development of the child, a test re-test procedure on the child is indicated.

3.2. INFERRED TRENDS

In addition to the formal hypotheses, the following questions may be answered from graphical analysis of data :

QUESTION 1

Is there a period of sensitivity for sensory refinement from 2½ - 6 years, as suggested by Hainstock (1978, pp 58)?

QUESTION 2

Are 6 year old children moving towards a sensitive period for imagination as indicated by Montessori (1966). ?

QUESTION 3

Is naturalistic observation sufficient to isolate developmental tendencies across time, and can such observation identify a facilitative environment ?

CHAPTER 4

METHOD

This chapter can be divided into two discrete sections. In the first place a Montessori environment had to be established. This was central to the main theme of the research, as the main objective was to determine whether this could be done without formal training. Premises were obtained, apparatus constructed and volunteer children and adult facilitators were recruited and established within the environment before observation or evaluation could begin. The initial establishment of the research environment took 10 months to complete. Techniques of naturalistic observation were then employed to establish patterns of activity preferences in the children. Finally testing procedures were initiated in order to assess the degree of facilitiveness of the environment.

4.1. ESTABLISHMENT OF A RESEARCH ENVIRONMENT

4.1.1. Apparatus

Specific to the Montessori method of education is the use of certain didactic materials or apparatus. This was deemed an appropriate point of departure in the

establishment of the research environment. A visit to Montessori schools in the Cape Province and in the Transvaal made it clear that NIENHUIS MONTESSORI¹ in Holland is the chief supplier of this didactic material. LEMELLA ENTERPRISES² also manufacture certain materials of good quality, but the price is no less than that of Nienhuis. There were (at the time of writing) no manufacturers or suppliers of the materials in the RSA. The cost of equipping an environment was estimated to be in excess of R10 000-00, even for only the most basic materials.

Manufacture of the apparatus was thus undertaken. The Montessori philosophy and method was studied extensively for this purpose. It became clear that while apparatus was of specific dimensions and character, the function of the material was its most important feature. The function of each piece of apparatus was as a response to the developmental needs of the child as observed by Montessori. Thus the child entering the environment at age 2,½ to 3 is deemed to have an overriding need for the development of independence. "Practical Life Exercises" (PLE) are the response to that need, and are thus the point of departure both for the child and in the preparation of the environment. These exercises consist of material adapted to the size of the child, visually pleasing, which attracts the child and encourages handling and use. This is supposed to stimulate the child to develop skills which will free him from dependence on others. The activities catered for in this research project classified under PLE are found in table 4.1 and discussed at length in chapter 8 - appendix 1. Basically the exercises provided by this apparatus are those which develop skills leading to independent care of the self and independence within the wider environment.

1 & 2 : See notes pp 140

Table 4.1 : Practical Life Exercises.

CARE OF PERSON	CARE OF ENVIRONMENT	FOOD PREPARATION
hand/face washing brushing hair dress /undress go to toilet	wash/dry dishes wash clothes hang clothes on washline iron clothes polish silver polish shoes dusting sweeping scrub tables wash floor clean spills water garden gardening	butter bread peel vegetables cut vegetables serve food to others set tables

While still engaged in gaining mastery of the Practical Life Exercises, children are introduced to exercises of Sensory Discrimination (SD). Under this classification are all activities the doing of which could potentially enhance sensory discrimination to some extent. Within the Montessori environment the senses are divided as follows : auditory; tactile; olfactory; visual and taste. Taste as a separate sense worthy of recognition is recognised, but due to the extreme difficulty in testing and selective stimulation it was omitted from the research environment. The specific apparatus which was either made or obtained in this category are found in table 4.2 and discussed at great length in Appendix 1.

Certain other areas of sensory discrimination usually presented in an authentic Montessori environment were not included due to difficulty in apparatus construction. These were : baric tablet (wooden tablets of similar appearance but differing weight), thermal tablets (tablets made of various substances, each of a different resting temperature - eg wood, metal, wool, etc.).

Table 4.2 : Exercises in Sensory Discrimination.

VISUAL DISCRIMINATION	TACTILE DISCRIMINATION	AUDITORY DISCRIMINATION	OLFACTORY DISC.
cylinder block long red stair broad stair tower colour tablets colour dominoes	sandpaper boards sandpaper tablets fabric basket	sound boxes sound bottles cassette tapes	smelling bottles

Other areas classified by Montessori under sensory discrimination activities were the various geometric shapes, both plastic and wood. In the research environment these activities were represented to a limited extent, but classified under pre-academic activities for observation purposes. The reason for this was that the ability to perform these activities is closely allied to pre-writing, pre-reading and sequencing skills looked for in school readiness. For example, the geometric insets, while sometimes used as inset puzzles, are actually designed so that the child grasps the knob to lift the inset out with the fingers that will grasp the pencil. The shape is then traced both around the inset and in the space vacated by the inset with the finger, and later with a pencil onto paper - using the inset as a stencil. All these movements develop musculature that will be used specifically in writing. The recognition of geometric shapes also paves the way for later letter recognition. The Logi-blocks described in Appendix 1 require the child to reproduce a sequence of shapes from a card - which requires the same sequencing ability as that required for reading.

Pre-academic skills are thus the skills that could potentially be developed from the proper use of the apparatus listed under table 4.3 and discussed in

Appendix 1. While most of these activities could advance the level of development to beyond that required for school readiness, the treatment of this apparatus in the environment was always such that it was only those children who had an intrinsic motivation towards this area who engaged in these activities. No child was compelled either explicitly or implicitly to make use of any of the apparatus. Pre-academic apparatus was divided into 4 categories : pre-reading/writing; pre-arithmetic; general sequencing and cultural subjects.

Table 4.3. : Pre-Academic Exercises.

PRE-READING	PRE-ARITHMETIC	SEQUENCING	CULTURAL
sandpaper letters moveable alphabet picture and object boxes phonogram cards	red and blue rods spindle box button box sandpaper numbers	logi- blocks brainy blocks my calculator geometric insets	circuitry board magnets magnifying glass

Additionally, in order to provide an environment of balance, non-Montessorian activities were provided. Activities involving fantasy were thus included. The term fantasy could however be a misnomer given the type of activities provided in the research environment. A detailed list of this apparatus is found in table 4.4, with a detailed description of what each set of apparatus consisted of to be found in Appendix 1. More appropriate in the present case perhaps is the idea of "abstractions". Fantasy is basically an unobservable construct. Therefore all activities chiefly involving the internal processes of the child were considered fantasy for purposes of this research. Because of the confusion in classification of the term fantasy for purposes of observation, clear parameters had to be established. Whenever the child engaged in activities non-representable by 3 dimensional

objects in the environment, the child was interpreted as using abstractions. Since all other fields of activity in the environment were made visible 3 dimensionally, such non-representable activities were classified as fantasy.

Table 4.4. : Apparatus to stimulate fantasy

books - both fairy tale and other story illustrations on the wall; small dolls and animals used in illustrating fairy stories; blocks - when used for fantasy construction.

Another potentially ambiguous classification is that headed "motor activities" - both fine and gross. The reason is that within the Montessori Environment virtually ALL activities include motor involvement to a greater or lesser extent, by way of fulfilling the developmental needs of the 3 - 6 year age group. Thus items of sensory discrimination require the physical fetching of the apparatus from the shelf and the motor manipulation of the said apparatus. Thus by process of elimination the only activities to be classified as purely "motor" activities are those which fulfill no other obvious function. The nature of Montessori apparatus itself is essentially structured, because it allows only the intended application. Thus purely motor activities are essentially unstructured or open-ended, since their application varies with the intention of the performer. Thus a block can be used for construction; as a stand-in for another object presently absent; as a missile to be hurled; as a step to reach a distant object and in many other ways, depending on intent. Activities not classified under the previous categories which none the less involve movement are provided for under the classification of motor activities, both gross and fine. A list of this apparatus

is found in table 4.5 and a detailed description of what this implies if found in Appendix 1.

Table 4.5. : Motor Activities

FINE MOTOR ACTIVITIES	GROSS MOTOR ACTIVITIES
clay sand blocks painting drawing threading beads peg board nesting egg puzzles dropper tweezers nuts and bolts pouring pasting/collage wire and loop scissors	sand blocks climbing running walking tyres balancing planks

Having obtained, constructed and assembled all the apparatus necessary for the establishment of the research environment, physical premises of sufficient size to accommodate the volunteer group was sought.

4.1.2. Physical Environment

Permission was granted to use a derelict house situated on church grounds. The house was duly repaired and painted. Once repaired, the physical environment consisted of the following :

The main room was approximately 6 m x 3,5 m. This room was used for all of the structured activities, being equipped with tables, chairs and shelves for the apparatus. The second room, approximately 3,5 m² was carpeted and equipped with the fantasy materials as well as with the blocks.

The kitchen, 3,5 m x 2,75 m in size was equipped with low working surfaces, hooks for the hanging of brooms, dust pans, dusters, tea towels and the like. The bowls serving as wash basins for clothes and dishes were also found here. Two large buckets, one containing fresh water and the other for the disposal of dirty water were also in the kitchen.

In the bathroom area were the low jacket hooks, approximately 1,2 m from the ground. The floor was raised, making the toilet low enough for toddlers to use with ease. A suitable surface was used for the hand washbasins. A small dressing table with mirror completed the bathroom.

The outside environment consisted of a verandah which was used in fine weather for painting and chalk-board drawing, as well as block building. The garden was a totally enclosed space approximately 20 m x 10 m. The lawn space was bordered by flower beds utilized by the children for cultivating small personal gardens. Two large sandpits, climbing apparatus approximately 1 m high and a number of discarded motor car tyres completed the outdoor environment.

The physical environment was deemed to have all the resources required for the establishment of the projected research environment. Sample selection was begun.

4.1.3. Sample Selection

Because of the nature of the research, random selection of subjects was impossible. The research environment had to be established from scratch. Subjects were thus provided on a volunteer basis. This automatically caused certain bias of selection. In addition, it was necessary for the group to adapt to the environment and to

normalize within it to a degree before observation could begin. Once the observations began the sample remained constant for the duration of the observation period.

Table 4.6 : Composition of sample.

MALES		FEMALES	
Age	Total observation time	Age	Total observation time
2 yrs 1 mnth	31 hrs 14 min	2 yrs 5 mnths	27 hrs 38 min
2 yrs 8 mnths	28 hrs 36 min	2 yrs 10mnths	28 hrs 36 min
2 yrs 9 mnths	34 hrs 26 min	3 yrs	25 hrs 34 min
3 yrs	29 hrs 36 min	3 yrs 5 mnths	24 hrs 38 min
3 yrs 2 mnths	27 hrs 8 min	3 yrs 5 mnths	28 hrs 36 min
3 yrs 3 mnths	17 hrs 14 min	4 yrs	21 hrs 44 min
3 yrs 4 mnths	28 hrs 36 min	4 yrs 1 mnth	24 hrs 34 min
3 yrs 5 mnths	29 hrs 56 min	4 yrs 1 mnth	25 hrs 6 min
3 yrs 8 mnths	15 hrs 58 min	4 yrs 1 mnth	16 hrs 2 min
5 yrs 3 mnths	28 hrs 22 min	4 yrs 2 mnths	28 hrs 36 min
5 yrs 3 mnths	24 hrs 14 min	4 yrs 5 mnths	33 hrs
5 yrs 10 mnths	8 hrs	4 yrs 7 mnths	14 hrs 54 min
		4 yrs 9 mnths	28 hrs 30 min
		5 yrs	28 hrs 8 min
		5 yrs 8 mnths	12 hrs 38 min

The initial sample was too small for statistical purposes. After completion of the period of observation, another sample was therefore obtained, and given exactly the same treatment. In this way a final sample of 27 children was observed for a mean period of 24,8 non-continuous hours. The sample was of higher than average socio-economic status, residing for the most part in the more affluent suburbs. Only two of the mothers worked in a full-time capacity, the others being able to remain at home. The range in age of the sample was 2 years 1 month to 5 years 10 months. The ratio of boys to girls was 12 : 15.

4.1.4. Facilitators

Within both conventional pre-school environments and properly functioning Montessori environments, extensive teacher training is imperative. Given the cost of such training, it was hypothesized that if it were possible to provide an enriching environment for a child without such teacher training, exciting possibilities might arise especially in view of the vast problems in terms of the environmental deprivation in South Africa. While a conclusion in this regard is beyond the scope of this research, it was nevertheless decided that instead of trained people, or persons experienced in the field of child care, relative novices would be chosen and given brief instruction as to the nature of the environment.

In fact facilitators were obtained on a voluntary basis. Two elderly ladies volunteered to assist in the environment. These were two ladies who, apart from raising their own children, had had no experience in child care. To both the concept of a child-dominated environment was foreign and the greatest difficulty lay in making it clear that their role was as assistant and facilitator to the children, not teachers or superiors in any way. To clarify this point, both were given Chapter 20 from **The Discovery of the Child** (Montessori, 1948, pp 160 - 164) to read. In this it is shown that:

"The objects and not the teaching given by the mistress form the principal agent and as it is the child who uses them, it is he, the child, who is the active being and not the teacher.....There is no need for her words, her energy, her

severity, but what is needed is wisdom, keen eyed observing, in serving, in approaching and in withdrawing, in speaking and in keeping silent, in accordance with the occasions and needs. She must acquire a moral alertness which has not been demanded by any other method, a mingling of calm, patience, love and humility. Virtues and not words form her main qualification. Summing up her principle duty in school practice, one may state it thus - the mistress must explain the use of the material " (Montessori, 1984, pp 161).

Persons of grandmother status were thus deemed ideal. The only other guidance by way of training was in the form of instructions which were given concerning the presentation and use of apparatus. The period of settling in for the children was considered sufficient initiation for the facilitators as well.

The present researcher maintained an objective distance throughout, acting chiefly as arbitrator, advisor and final authority in matters of running the school. Liason with parents was also undertaken, leaving the facilitators free to devote all their attention to the children.

4.1.5 Establishment of a Stable Environment

A protracted period of time prior to the observation period was indicated in order to :

Phase children in gradually.

Allow children to become accustomed to **physical environment.**

Allow children to establish their level of functioning in terms of apparatus use, relationship with facilitators and general social relationships.

Allow a period for normalization .

Allow facilitators time to familiarize with functions and possibilities of apparatus.

Allow facilitators time to become accustomed to their role in the child dominated environment.

Permit children to resolve problems of maternal attachment.

A period of 6 months was allowed for this. During this time the group began to function as an ordinary pre-school group. In general, the children settled down well, and soon adopted a level of functioning more or less in line with that considered stable. Whether the normalization mentioned under the third point ever materialized is however questionable, especially given the following description :

"normalized children have a love of order, love of work, profound spontaneous concentration, they are attached to reality, they have a love of silence and working alone, they have sublimated the possessive instinct, they are cheerfully obedient and possess independence and initiative. They are co-operative and mutually helpful. They possess self-discipline and joy"
(Futrell, 1970, pp 12).

Normalization occurs only when the environment, both home and school, provides all the components as described above for

the normal development of the child. Given the fact that due to health and municipal regulations, the children were in the research environment only 3 hours daily, 3 days per week - it is doubtful that normalization could have occurred to any significant degree.

However, the population of preschool children is not normalized according to these criteria. Thus the research group was deemed to have achieved normalization to an extent sufficient for the purpose of this research once the majority of the children showed themselves capable of exercising the self-reliance which enabled the selection and carrying out of an activity with the minimum adult intervention. By the end of six months this was accomplished to a significant degree in all the subjects.

4.1.6. Presentation of Apparatus

While one of the aspects deemed most relevant in this research design was the fact that facilitators began as totally untrained in childcare procedures, knowledge of the apparatus was essential. Thus notes were attached to the wall in places as close as possible to the relevant apparatus. These notes detailed the procedures to be followed in presenting the apparatus to the children. Facilitators were encouraged to avail themselves of this information at frequent intervals. In addition, each piece of apparatus was presented to each facilitator once, prior to the commencement of the project.

Each set of apparatus of more structured function - as opposed to the unstructured apparatus - had one basic function - thus there was only one appropriate application. It was essential that the facilitators understood this

function. Each set of apparatus thus had a unique presentation procedure in line with its function. There were however certain aspects common to all apparatus - techniques common to the Montessori Method. Facilitators were given the following instructions which held good for all categories of apparatus:

Limited verbal instruction - all exercises have to be demonstrated slowly and deliberately, using as few words as possible.

The only words to be used in fact were certain "key" words which bore a certain relation to the apparatus being presented. The main purpose of this was for expansion of vocabulary. For example - in demonstrating the colour tablets the word to emphasise would be that of the relevant colour. Totally excluded were lengthy verbal instructions to the children. Montessori felt that these had a deadening effect on the faculty of auditory discrimination since the child seldom took any notice of such instructions (Montessori, 1961).

Appropriate use of the apparatus - the apparatus is to be used in the manner in which it is presented.

This does not necessarily mean that innovative uses of the apparatus is to be discouraged. It merely implies that inappropriate uses of the apparatus are to be discouraged. For example, in using the cylinder blocks, the children are supposed to fit the cylinders into the vacant sockets, and not roll them across the floor to each other. The facilitators were made to understand that their discretion was to be used in this and all matters.

Non-interference of children at work - once the apparatus has been demonstrated the child is to be left to work alone, unless he or she expressly requests assistance or invites another child to join him.

In practice this meant that if the child was seen to be messing, or making obvious mistakes in the use of the apparatus, the facilitator was to refrain from correction at that point. This is because of the assumption that the child was at that stage incapable of more appropriate behaviour. The facilitator would then need to resolve to repeat the presentation of that particular apparatus at a later stage.

Respect for work and property - the only time the facilitator is to intervene in the environment without the prior request of a child is if a child disturbs the work of another, tries to hurt another child, or damages or destroys any part of the environment in any way.

In this case the facilitator was to remove the child from the offensive situation, bodily if necessary. Such a child could then either be encouraged to find alternative employment, or be isolated for a period, depending on the seriousness of the offence. In practice it was seldom necessary to isolate a child.

In presentation of the apparatus, a method or technique was employed, the basics of which were common to all apparatus types. Differences in specifics were detailed in the instruction paper attached to the walls. (Explanation of these notes are found in Appendix 2). The method of presentation was the **Three Period Lesson** first used by Seguin and later adopted by Montessori :

Lesson 1 - the apparatus is shown to the child and the key word is introduced. For example - point to the largest block of the tower and say "This is big." Pointing to the smallest block say "This is small."

Lesson 2 - using the same apparatus, the child is requested to show or pass the apparatus associated

with the key word from lesson 1. For example, using the tower, say "Give me the big block." or "Give me the small block." If the child does not succeed at this stage, no negative comment is to be given. The apparatus is then replaced. On another occasion however, lesson 1 is repeated. If lesson 2 is successfully completed, lesson 3 is presented.

Lesson 3 - using the same apparatus, the child is required to say the key word associated with the apparatus. For example the facilitator, pointing to the biggest block asks "What is this ?"

These three lessons are presented on three separate occasions, possibly on separate days, but also possibly on the same day. The facilitator had to be led by the interest of the child in this (Montessori, 1961).

Detailed treatment of presentation of specific apparatus is found in Appendix 2.

4.2. COLLECTION OF DATA

Once the environment was established and the children had settled in sufficiently, the second phase of the research procedure was initiated. In line with the expressed need (chapter 2, point 2.6) concerning the need to evaluate process rather than product, the research design was based chiefly on naturalistic observation techniques. Since evaluative testing was necessary in order to assess the effectiveness of the environment, two levels of information became available.

In the first place it became possible to assess a habitual

mode or level of functioning of children in the research environment. This could be done by techniques of unobtrusive observation. By the administration of selected tests or test batteries the second source of information could be tapped - namely the ability level or upper limit of the individual at the time of the test. The main criterion of assessment was observation. Testing procedures were originally initiated from an ethical point of view - in order to be sure that the research environment was a facilitative experience for the volunteer children.

4.2.1. Observational Data

In a Montessori environment as described previously, each set of apparatus has a specific, structured function. In the physical arrangement of the environment, apparatus of similar function are grouped together according to degree of difficulty. Thus there will be a sensory corner, a practical life corner, a crafts section and so on. Given this and the fact that there are various different types of apparatus for each function, it was decided to record activity choice by broad category rather than by specific function, as the latter course would result in data of such volume that meaningful interpretation would be difficult. Since the purpose of the study, as indicated in chapter 1 is to determine whether it is possible to establish and run a Montessori environment without training, and also secondary to this, to determine whether the environment so established is both truly Montessorian and simultaneously facilitative from a developmental point of view, the loss of data due to this process of summarization was considered to be unimportant.

Categories were in line with the Montessorian divisions,

apart from the inclusion of a category for fantasy activities, as well as a category included for practical purposes were the child was classified if otherwise unoccupied. The classification categories were thus as follows :

- Practical life exercises (PLE)
- Sensory discrimination (SD)
- Pre-academic skills (PA)
- Fantasy (Fant)
- Fine Motor Co-ordination (FM)
- Gross Motor Co-ordination (GM)
- Non-specific activities (N/S)

From the point of view of observer training, classification according to observation categories was easy due to the structured nature of Montessori apparatus. By way of further simplification, after observers were given an explanation of the basic nature of each set of apparatus, the following directives were supplied (verbatim):

Practical Life Exercises - all activities that pertain to the care of the individual or the environment, including dressing, cleaning, gardening, etc.

Sensory Discrimination - all activities which make use chiefly of the senses, the doing of which could potentially enhance sensory discrimination to some extent. While most of these activities involve some aspect of motor manipulation, they are classified here because their main feature is the involvement of the sense modalities.

Pre-academic Skills - obviously includes all activities directly related to writing/reading and numeration, but also all activities involved with

picture building or sequencing activities. Cultural subjects which extend into the school subjects of science, biology, geography, history etc. are also included.

Fantasy - since not externally observable, all activities chiefly involving the internal processes of the child will be considered fantasy for the purposes of this research. This would include all activities not externally represented by two of three dimensional objects. Not included would be pure construction with blocks. Thus if the child builds a structure for the sake of building, this would be classified under the following section - motor activities. If the apparatus is used as part of a story sequence, this would be considered fantasy. For instance, if the child builds a house for the little pig, and the wolf comes along and blows it down, this is fantasy. If however the child just builds a house, this is not fantasy.

Motor Co-ordination - both fine and gross - includes those essentially open-ended activities that defy classification. The distinction between fine and gross is relatively arbitrary - gross referring to the need to involve the entire body in the activity and fine to the need to involve only certain parts of the body. Running would thus be a gross motor activity, while building with blocks would be a fine motor activity, even if the child needs to stand up to fetch a block some distance away. The getting up and walking would be subservient to the building which is the activity recorded for that unit.

Non-specific Activities - this category is to be

avoided as far as possible. It is to be reserved only for the child who wanders around aimlessly or who has been caught between activities. It is also for the child who is apparently 'watching' the activities of other children. While necessary in certain cases, it is to be used only if there is no alternative classification.

A comprehensive description, both of purpose and composition of each set of apparatus was supplied for each observation category. The description given is found in Appendix 1.

Time sampling was chosen as method of observation. Observation units were set at 2-minute intervals - as indicated useful in a trial run. The 3-hour day was divided into 90 2-minute observation periods. Observers were given observation sheets divided into the relevant observation categories. Children were identified by their names, which were entered into the relevant spaces on the observation sheets. The proportion time spent by each child in each observation category was thus calculated on a daily basis, and stored on larger score sheets for later analysis.

4.2.2. Inter-rater Reliability

Due to the sensitive nature of the balance of autonomy and orderly behaviour in the children and the period of time required for observation, it was decided to use only individuals familiar to the group as observers. One chief, full-time observer was decided upon. A volunteer parent was recruited as second observer, who came in on an irregular basis for periods of one hour in order to assess the reliability of observational techniques. Based on the results from this procedure detailed by Medinnus (1976) and

Vasta (1979), a reliability coefficient of 0,855 was delivered.

4.2.3. Test Data

A suitable test for children of preschool age proved difficult to find. A comprehensive scale was preferred in order to assess the general benefits or disadvantages of the research environment. The Griffiths Mental Developmental Scales were favoured (Griffiths, 1970). An individual who had undergone the training period prescribed by the Test Agency agreed to administer the scales.

Further investigation of the nature and scope of the Griffiths Mental Developmental Scales consolidated the choice of this test battery in the present research for the following reasons :

The **wide range of skills** covered by the scales was more likely to illuminate problems areas in the environment than a more limited scale.

The scales were **similar to the observation categories** already being used in the research environment. (An indication of the relationship between the Griffiths test categories and the observation categories used in this research is found in table 4.7.)

Although **standardization procedures** of the Griffiths scale were not carried out under local conditions, but on children in the UK, cultural variants were not considered a problem as all the children involved in the project were from white, English-speaking western type backgrounds.

Furthermore the extensive validation and standardization procedures undertaken on the 2260 children assessed during the period of formulation of the scales provided satisfactory evidence of the suitability of the scales for the present purposes. One of the procedures, in which the totals of scales A to F were considered, delivered an average GQ (General Quotient) = 100,18 for N = 2260, with SD (Standard Deviation) = 12,76. In terms of construct validity, a correlation between each individual scale and the GQ was undertaken. The mean correlation coefficient of all the scales was $r = 0,72235$. They conclude :

"Scales C,D,E, and F all show quite high correlations with the total scale, presumably with 'G' or general intelligence. This helps to confirm us in a belief in a common general factor which is this work we have called GQ"
(Griffiths, 1970, pp 74).

By way of reliability, both the test -retest and the parallel test method of determining reliability were used. The test re-test correlation coefficient for N = 270 was $r = 0,774748$. The parallel form used was the Terman-Merrill test. A separate correlation coefficient for each year, 3 to 6 inclusive was calculated. The mean coefficient delivered by this method was $r = 0,80185$ for N = 524 (Griffiths, 1970).

The tests were administered soon after commencement of the programme, and again after the period of observation. This meant that the re-test took place 6 months after the original test.

Table 4.7 - Relationship between Griffiths Developmental Scales and observation categories.

GRIFFITHS DEVELOPMENTAL SCALES		CORRESPONDING OBSERVATION CATEGORIES
Scale A	Locomotor Scale	Gross motor co-ordination
Scale B	Personal Social Scale	Practical Life Exercises
Scale C	Hearing and Speech Scale	Sensory discrimination
Scale D	Hand-eye co-ordination	Fine Motor Co-ordination
Scale E	Performance Scale	No similar observation category
Scale F	Practical Reasoning	No similar observation category

Data obtained from observations were summarized by 6-month age groupings. This data, found in table 5.1, was then graphically depicted in order to assess trends of behaviour (found in tables 5.1 - 5.7). Furthermore, raw data was used for the comparisons required by hypotheses 1, 2 and 3. The Mann Whitney U test was performed in the two former cases, while the parametric t-test was performed in the latter case.

Test data was analysed using the sign test, in order to fulfil the requirements of hypothesis 4.

CHAPTER 5

RESULTS

The first phase of the research procedure, namely the establishment of a research environment resulted in - as was hoped - an environment in which data collection was possible. At the time of data collection the children were happy and well adapted to both the physical environment and the significant adults therein. Thus, in the absence of an existing Montessori environment, one based on Montessori principles was created, it is believed, in such a way that most of the undesirable extraneous influences were eliminated. The data thus collected was deemed to be truly representative of the circumstances at the time of the research.

5.1. OBSERVATIONAL DATA

Observations were made at two-minute intervals. At the end of each day of observations the total number of observation units per activity category was entered onto a record sheet for that child. Due to days of absenteeism, late arrival and early departure, a different number of observation units was obtained for each child by the end of the observation period. These totals were therefore

rendered into a mean proportion total time spent by each relevant child in each activity category.

Thus in a full day of observation one child may spend 16 units (i.e. 32 minutes in total) engaged in Practical Life Exercises, 0 units in Sensory Discrimination Exercises, 0 units in Fantasy related activities, 42 units in Fine Motor Activities, 10 units in Gross Motor Activities and 16 units in Non-specific activities. This delivers a total of 90 observation units.

By way of summarization of data, for purposes of trend analysis, a six-month age grouping was decided upon, and the data obtained for the various children was classified accordingly. A mean proportion time per activity category was thus obtained for each age group. Data thus obtained is detailed in table 5.1. Graphical representation of this data is found in figures 5.1 - 5.7 - being a graphical indication of the proportion time spent by each age group in the respective activity categories.

Table 5.1 : Mean proportion time spent in various activity categories by different age groups.

AGES	NO PER GROUP	PLE	S D	PA	FANT	FINE MOTOR	GROSS MOTOR	NON SPEC.
2y1m-2y6m	2	27,49	7,99	4,56	11,25	34,22	4,6	9,87
2y7m-3y	5	29,99	7,33	4,93	5,14	26,23	8,48	17,91
3y1m-3y6m	6	26,42	8	6,99	8,84	27,19	9,31	13,24
3y7m-4y	2	26,47	8,18	7,90	6,56	22,62	11,6	16,68
4y1m-4y6m	5	28,85	7,02	10,25	3,52	27,97	9,85	12,54
4y7m-5y	3	32,47	5,53	12,91	2,91	26,57	9,32	10,29
5y1m-5y6m	2	26,71	5,36	19,35	8,15	20,09	9,20	11,14
5y7m-6y	2	14,83	4,23	25,37	13,55	21,28	10,09	10,65

The raw scores were used in statistical procedures of

hypothesis testing. The following statistical hypotheses were formulated as indicated from the research hypotheses discussed in chapter 3 :

HYPOTHESIS 1

Null Hypothesis : H_0 : There is no difference in the proportion of time spent by children in the 2 - 4 year group and children in the 4 - 6 year group on motor activities.

Alternative Hypothesis : H_1 : The proportion of time spent by the 2 - 4 year group on motor activities is stochastically larger than the proportion of time spent by the 4 - 6 year group on that activity. Put differently - the children from the 2 - 4 year group spend more time engaged in motor activities than children of the 4 - 6 year group.

Statistical Analysis : The Mann-Whitney U test (Siegel, 1956) was conducted first using the proportion of time represented by a combination of Fine Motor and Gross Motor observation units, and also by using only the Fine Motor observation category. In both cases the observed $U = 87$ (combined categories) and $U = 70$ (FM category only) for $n_1 = 12$ and $n_2 = 15$ was not less than the tabled value of $U = 55$. This was not significant (at the $\alpha = 0,1$ level of significance). The Null hypothesis for hypothesis 1 is therefore retained.

HYPOTHESIS 2

Null Hypothesis : H_0 : There is no difference in the proportion time spent by the $3\frac{1}{2}$ - $4\frac{1}{2}$ year group and the 2 - $3\frac{1}{2}$ year group on pre-academic activities.

Alternative Hypothesis : H_1 : Children in the $3\frac{1}{2}$ - $5\frac{1}{2}$ year group spend a greater proportion time in

pre-academic activities than children in the 2 - 3½ year group.

Statistical Analysis : The Mann-Whitney U test (Siegel, 1956) was once again used, comparing the 3½ - 5½ year group with the 2 - 3½ year group in the observation category entitled "pre-academic" activities. In this case the observed U = 15 for $n_1 = 12$ and $n_2 = 13$ is less than the tabled U of 23 at $\alpha = 0,01$. The Null hypothesis is thus rejected in favour of the alternative hypothesis.

HYPOTHESIS 3

Null Hypothesis : H_0 : children spend as much time in adaptive play as they do in fantasy play.

Alternative Hypothesis : H_1 : children spend more time in adaptive play than they do in fantasy play.

Statistical Analysis : The parametric between groups t-test for the difference between means for dependent groups (Lemke & Wiersma, 1976) was performed on the data from the categories "practical life exercises" and "fantasy" respectively. The parametric test was undertaken because of the larger sample sizes provided by comparison of all 27 subjects on two different measures. Each group thus had $n = 27$. Since the test statistic $t_d = 9,9424$ was larger than the tabled $t = 2,779$ with 26 df, which is significant at the $\alpha = 0,01$ level of significance, the null hypothesis is rejected in favour of the alternative hypothesis.

5.2. TEST RESULTS

Five children were available for a re-test six months after the original test. The raw scores for this data is found in table 5.2. The difference between test and re-test general quotients is found in table 5.3.

Table 5.2 : Raw score data from test and re-test procedure of Griffiths Mental Development Scales.

AGES	GEN QUOT	LOCO-MOTOR	PERS - SOCIAL	HEAR-SPEECH	EYE-HAND	PERF.	PRAC. REASON
26 m	122,08	123	123	153,8	98,08	103,8	130,8
32 m	129,17	125	118,7	137,5	106,2	131,2	151,3
30 m	101,1	120	93,3	93,3	100	100	100
36 m	166,67	155,6	105,6	116,7	105,6	116,7	127,8
34 m	142,15	158,8	152,9	170,6	111,8	123,5	135,3
40 m	146,6	180	160	165	125	120	130
49 m	92,51	97,7	102,4	93,9	93,9	93,9	73,5
55 m	103,63	105,4	123,6	94,5	120	87,7	90,9
54 m	140,11	140,7	148,1	144,4	137	133,3	137
60 m	146,67	156,7	150	133,3	133,3	140	146,3

HYPOTHESIS 4

Null Hypothesis : H_0 : There will be no change in the overall evaluated ability of the child before and after a period of exposure to a Montessori environment.

Alternative Hypothesis : H_1 : There will be an improvement in the overall evaluated ability of the child before and after a period of exposure to a Montessori environment.

Statistical Analysis : In order to assess the facilitativeness of the environment the data from the Griffiths Developmental scales were assessed. As so few subjects were re-tested, the data is insufficient for the more powerful forms of statistical manipulation. The general quotient difference scores were analysed using the sign test. For $N = 5$, an $x \leq 0$ has a one-tailed probability of occurrence under H_0 of $p = 0,031$ (where x = the number of minus signs). This value is in the region of rejection for $\alpha = 0,5$, thus H_0 is rejected in favour of H_1 .

Table 5.3 : Increase in General Quotient scores considered against the G.Q. score from the first test :

GENERAL QUOTIENT - FIRST TEST	DIFFERENCE SCORE - GENERAL QUOTIENTS
142,15	+ 4,52
140,11	+ 6,55
122,08	+ 7,09
101,1	+ 65,57
92,51	+ 11,12

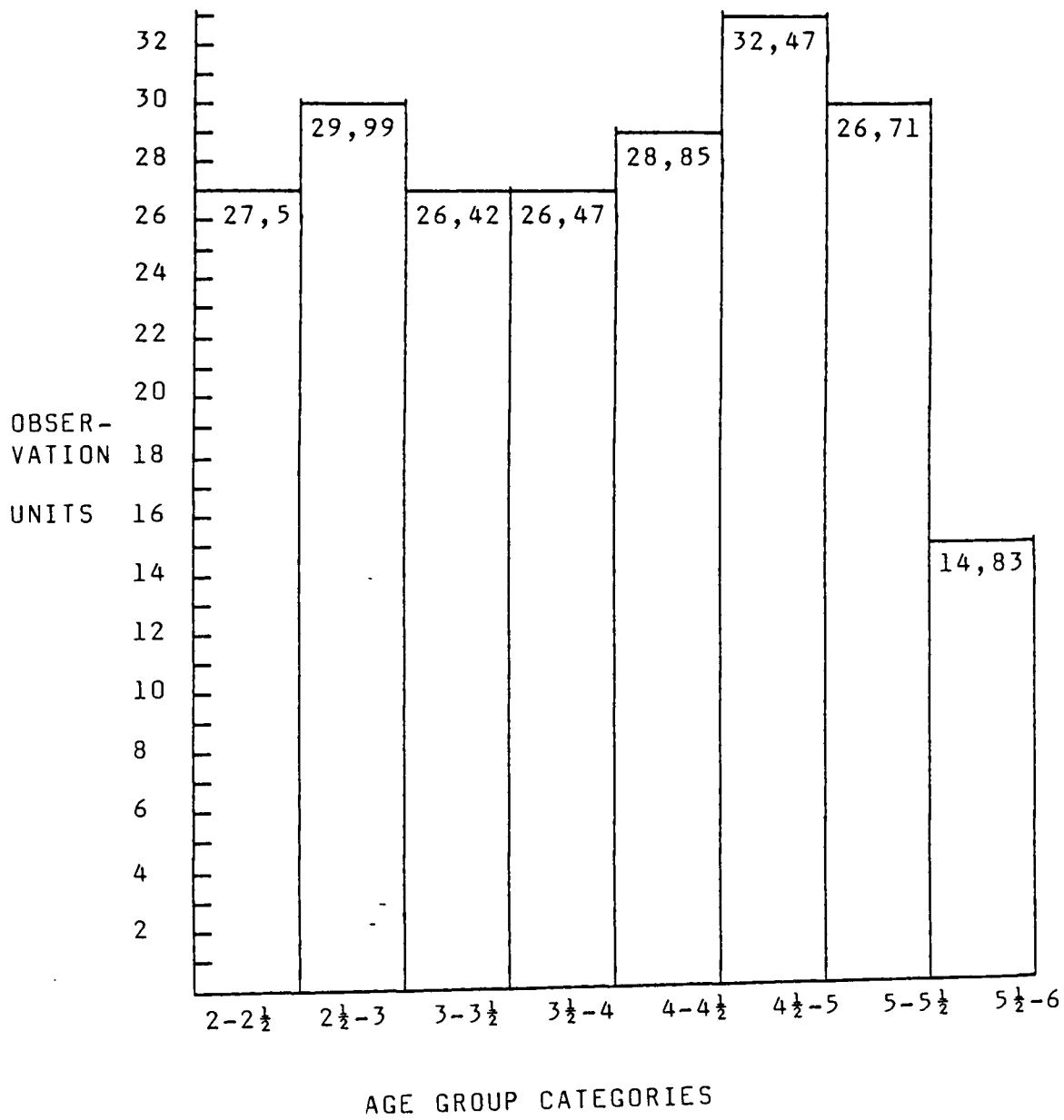


Figure 5.1 : Proportion time spent by various ages in Practical Life Exercises

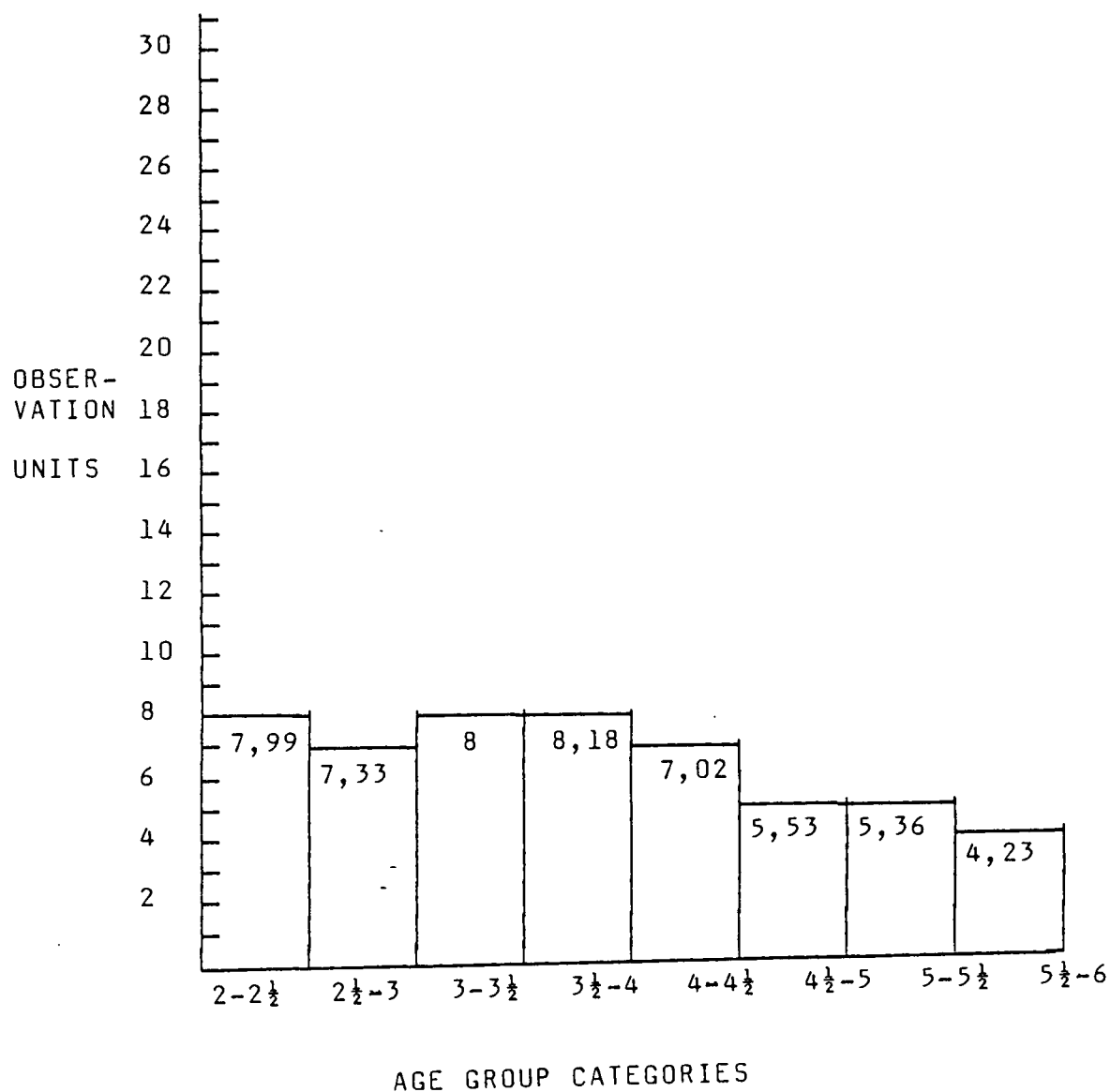


Figure 5.2 : Proportion time spent by various ages in Sensory Discrimination tasks.

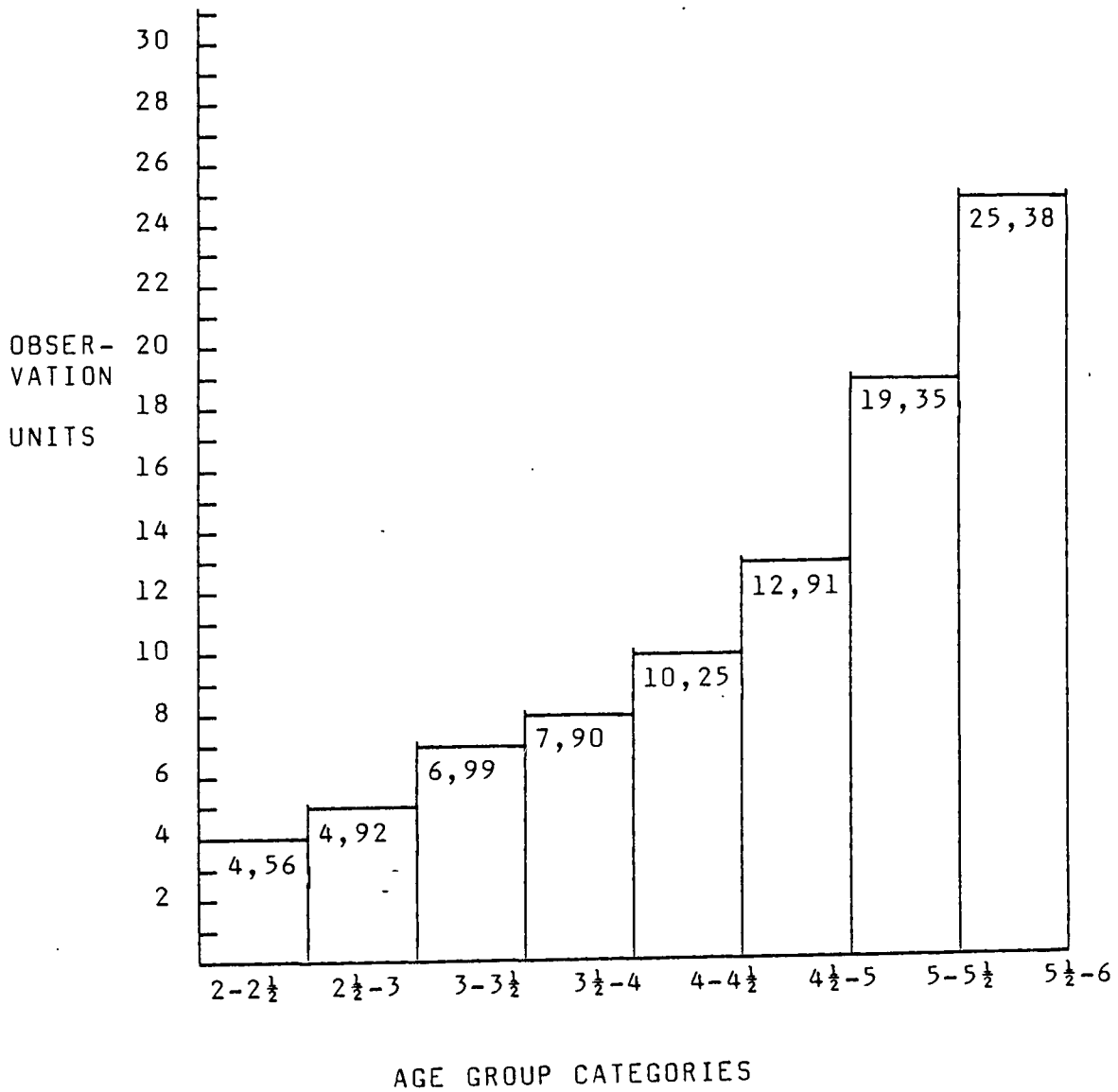


Figure 5.3 : Proportion time spent by different age groups in Pre-Academic activities.

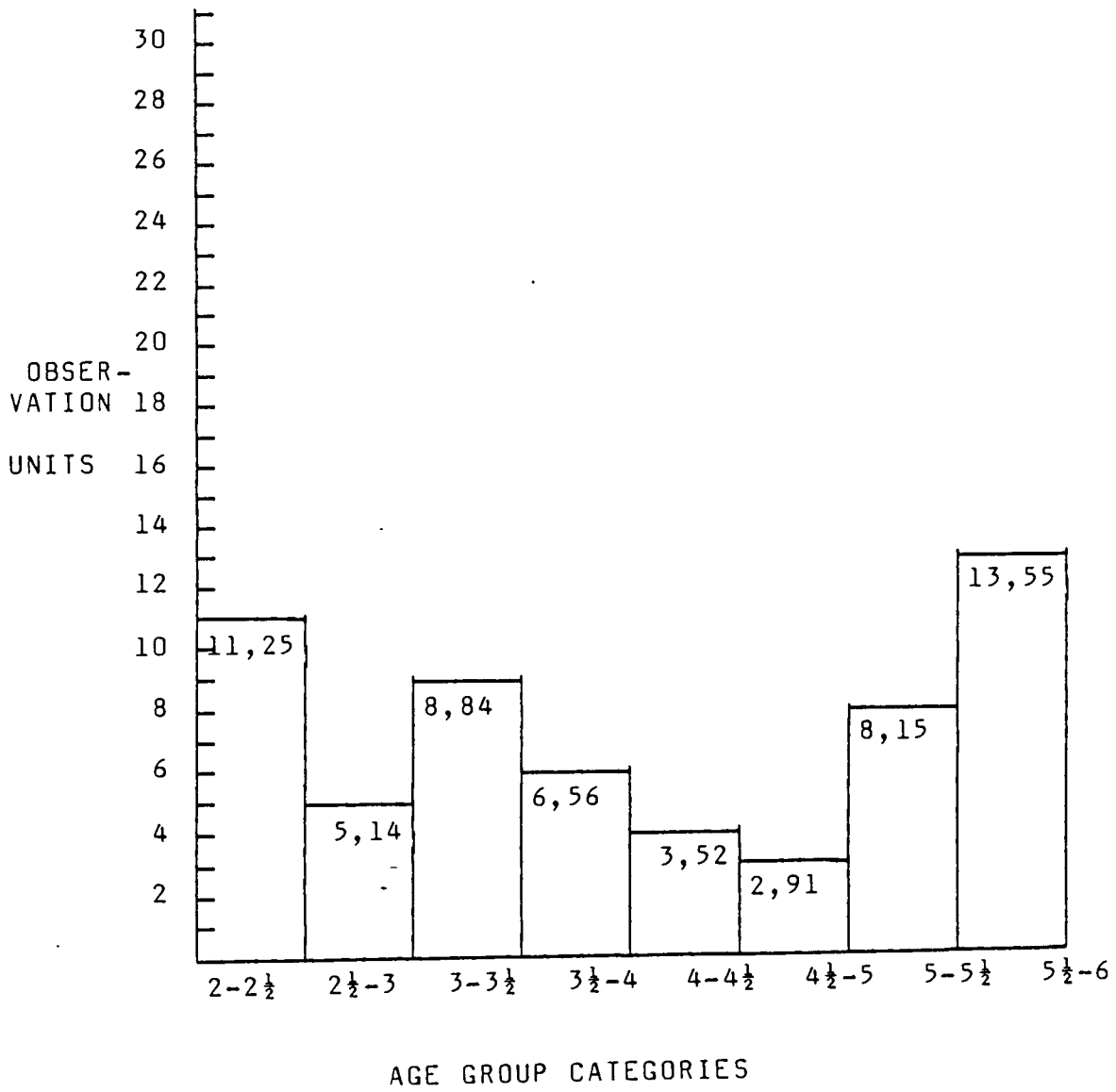


Figure 5.4 : Proportion time spent by different age groups in activities involving Fantasy .

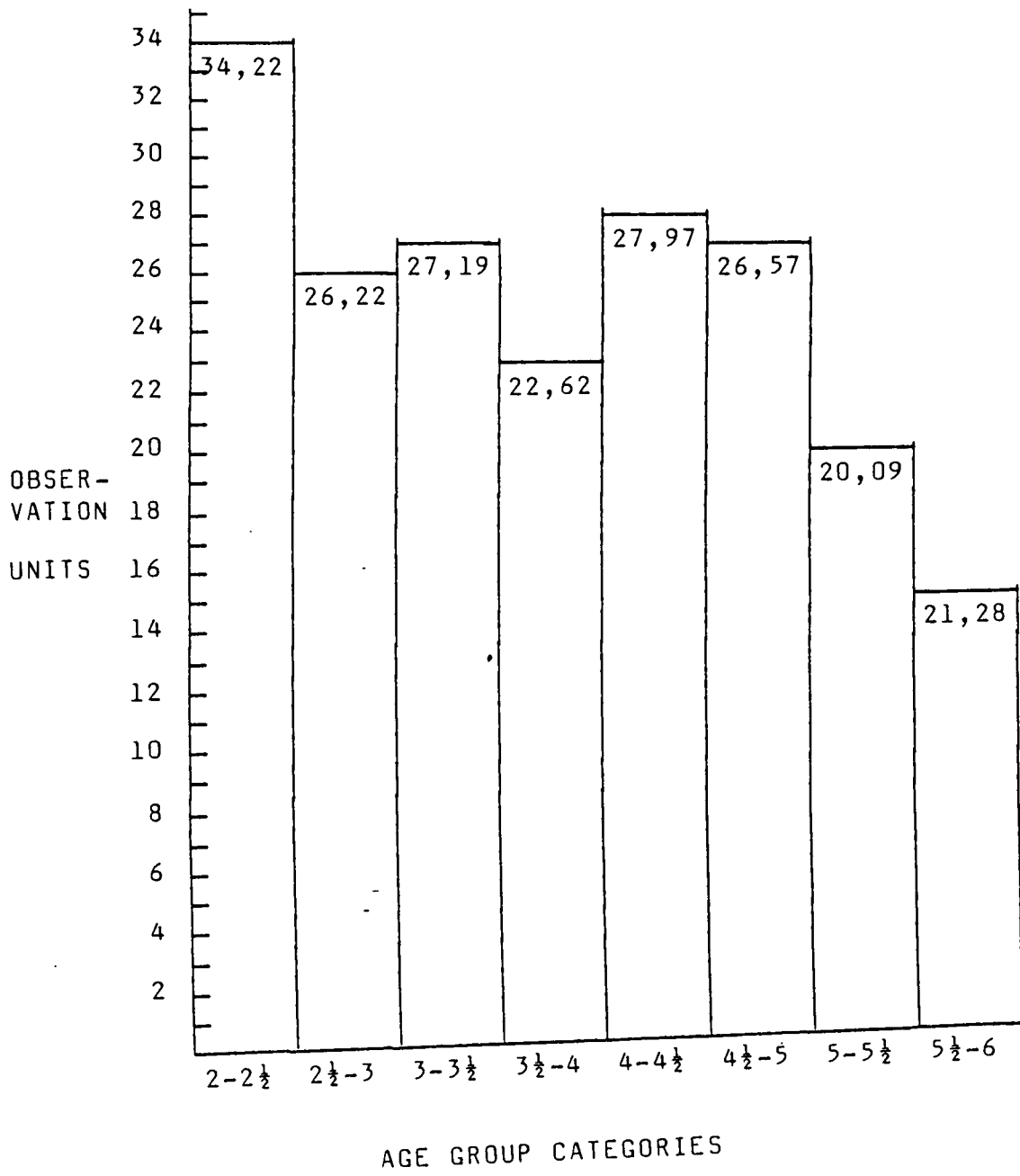


Figure 5.5 : Proportion time spent by different age groups in Fine Motor activities.

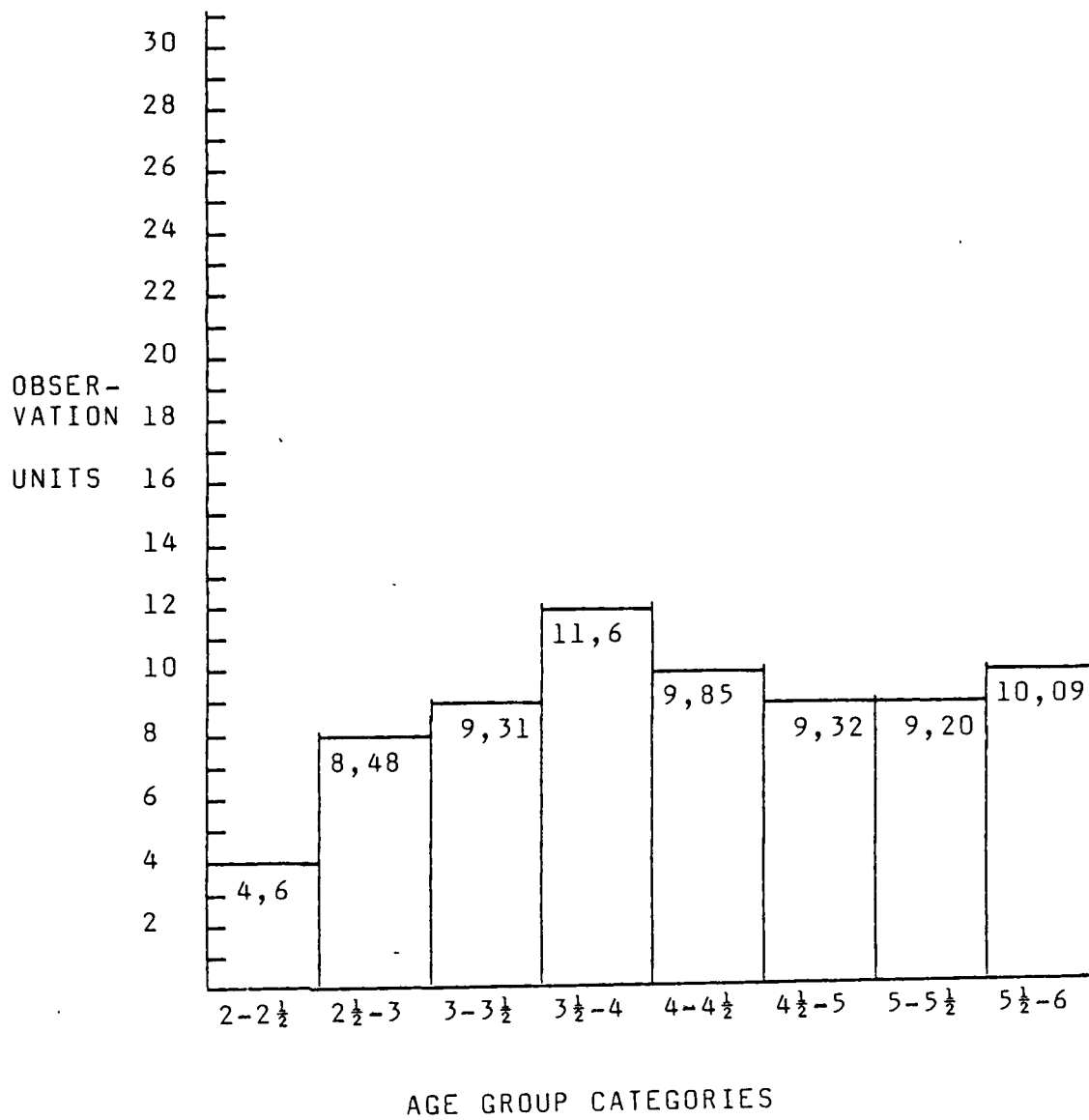


Figure 5.6 : Proportion time spent by different age groups in **Gross Motor** activities.

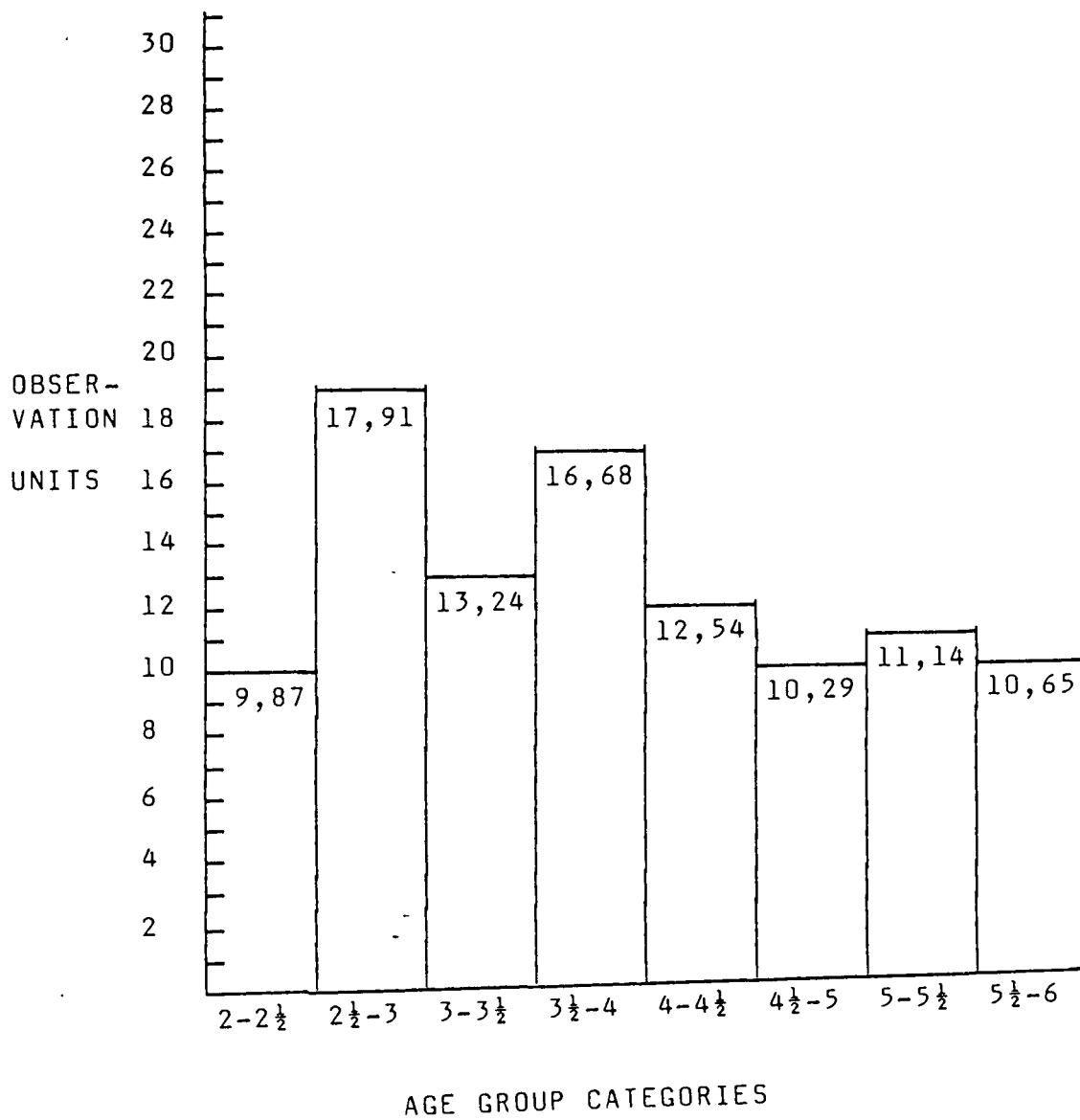


Figure 5.7 : Proportion time spent by different age groups in **Non-specific** activities.

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1. DISCUSSION OF RESULTS

6.1.1. Statistically Testable Hypotheses

HYPOTHESIS 1

The fact that the null hypothesis is accepted, viz. that there is no difference in the proportion of time spent by children in the 2 - 4 year group and children in the 4 - 6 year group on motor activities, indicates either that children do not have a sensitive period for co-ordination and muscle development, or that the observation category for motor activities does not measure this construct identified by Montessori. Either alternative would theoretically be feasible, but the evidence presented by the other hypotheses seems to indicate that sensitive periods may exist. This would imply that the method of observation employed here was not sensitive enough to measure this sensitivity. The reason would be that the motor component features in all activities engaged in by young children. Those activities thus delineated as "motor" may thus not constitute a representative sample of the type of activities preferred by young children in this alleged period of

sensitivity.

HYPOTHESIS 2

Despite the fact that reading and writing forms but a sub-category of the observation category "pre-academic activities", the alternative hypothesis is accepted, namely that the older group ($3\frac{1}{2}$ - $5\frac{1}{2}$) spends more time engaged in pre-academic activities than the younger group ($2-3\frac{1}{2}$). This again provides ambiguous information. It indicates a logical trend by showing that a relationship exists between increasing age and increased complexity of preferred activities. This is some indication of the stimulation needs of children of this age, and as such possesses intrinsic value. This is however insufficient to prove indisputably the "explosion" into reading and writing so often noted by Montessori (1961; 1965; 1966; 1967; etc).

HYPOTHESIS 3

Of more interest perhaps is the rejection of this null hypothesis with a high level of significance. Apart from the relatively small confounding effect which may have crept in as a result of using broad observation categories instead of noting the use of specific sets of apparatus, the finding that children of this age prefer functional play to fantasy play is potentially very important. This especially in view of the fact that it supports the research cited by Rubin & Maioni (1975); Rubin (1978) and Harper & Huie (1985). As this area of Montessorian practice is one that comes in for a vast amount of criticism, it can be stated that the original omission of fantasy from the Montessori curriculum, whether accidental, on purpose, or due to personality factors, has been supported by later empirical

evidence to a significant extent.

HYPOTHESIS 4

Interpretation of the data provided under this hypothesis requires careful treatment. This is not only because of the sensitive nature of the issue raised, but also because of the smallness and non-representativeness of the sample in question. It can be unconditionally accepted that the research environment was facilitative in terms of promoting opportunities which encouraged a slightly accelerated rate of development in those children re-tested. The significance here is that this should be so despite the lack of formal training of the facilitators in the research environment. The purpose of the training given by the Association Montessori Internationale is basically two-fold : "first to understand the theory of the Montessori approach and develop various skills, and secondly, but equally important, to help the student undergo a "spiritual transformation of attitude towards the child" (Lubin, 1983, pp 15). There is furthermore much talk about the development of the teacher as an individual and his/her personal growth the better to facilitate the growth of others. Based on this, there is hesitancy to accept the alternative hypothesis unconditionally. All that can be accepted without reserve is that the research environment was truly facilitative. It can be contended that a Montessori environment was set up and run successfully once, without formal training and that it is worth investigating whether this can be replicated.

6.1.2. Inferred Trends

In order to attempt to answer the questions concerning observable trends in activity preferences, Figures 5.1 to 5.7 will be discussed.

The data contained in fig 5.1 was used for statistical analysis under hypothesis 3. Of further interest is the fact that the children's interest in **Practical Life Exercises** seems to decrease at age $5\frac{1}{2}$ - 6 - at the age when the child prepares to enter the larger school environment. This seems to indicate a readiness for the change to a more challenging environment.

In answer to **question 1** concerning whether a sensitive period for **sensory refinement** exists in the age $2\frac{1}{2}$ - 6 years, fig. 5.2 will be considered. This shows a progressive decrease in the proportion of time spent on sensory discrimination tasks. It also shows a slight peak in the 3 - 4 year section. This may be taken as the peak and the period preceding the end of a sensitive period. A definitive judgement is however impossible as no control group exists.

For an answer to **question 2** - does it seem that children approaching 6 years of age are moving towards a period of sensitivity for **imagination** and **fantasy**, fig. 5.4. presents a rather interesting picture. It appears that both the younger and older children have a preference for fantasy activities when compared with the middle section. The method of observation is once again not sensitive enough to establish the cause of this. A further hypothesis can be posed however - it is possible that the younger children ($2 - 2\frac{1}{2}$) engage in fantasy activities for one of two unrelated

reasons. First it could be by way of imitation of the older group (5¹/₂) or as a result of attraction for purposes of physical manipulation of the attractive toys provided for the fantasy activities (see appendix 1). In either case the younger children would be using the fantasy materials, but not in order to engage in fantasy as such. If this were so, the sharp increase in proportion time spent by the 5¹/₂ - 6 year group could be an indication of entrance into a period of sensitivity.

Answering **question 3** concerning the possibility of **Evaluation by naturalistic techniques** it is pointed out that while observation was advocated for assessment of the development of individual children by Montessori (St Nicholas Manual), this method is also useful in evaluating the facilitativeness of the environment in individual cases. In the case of the present research however, data delivered by observations classified into observation categories is not sufficiently sensitive to allow conclusions on the facilitativeness of the environment in general terms. Data reflecting apparatus choices, utilization of apparatus and length of concentration would be necessary in order to determine whether the research environment was facilitative. In the present case, testing procedures enable a conclusion in this regard.

The data in figures 5.5 and 5.6 were dealt with under hypothesis 1 and that in figure 5.3 under hypothesis 2. Further analysis here would be redundant. Figure 5.7 has as its main significance a control effect.

6.2. CONCLUSIONS

As an evaluation of the research procedure followed in

this project, it can be reiterated at this point that mere assessment of product does not provide a sufficiently clear indication of the benefits of the process. Classification of observations by category of activity as employed here, is also insufficient in that it does not provide sufficient detail concerning the specific apparatus and progress with that apparatus. Having discounted the benefits of product evaluation and proved the shortcomings of the method of classification of activities by categories, this research has its methodological value in that it indicates the direction of similar investigations in the future. It is now necessary to devise a sensitive method of naturalistic observation that gives equal attention to action and intent.

The control effect of the combination of observation and testing was felt to be of some value. This could be an example of the type of control required to solve the problem of insensitive observation techniques.

In terms of evaluation of the content of this research, the original aim needs to be recalled. This was to attempt to discover whether the theory of Montessori is valid in the South African context and also whether given the lack of facilities and resources in South Africa, this method is viable as an approach.

As regards theoretical validation, it can be concluded from the above research that the effectiveness of Montessori has yet to be disproved. The weakness indicated in the research design makes it unwise to suggest generalizations, but the presence of sensitive periods has been sufficiently supported to warrant further research in this regard.

In terms of viability within the South African context,

there is much to recommend Montessori. The educational principles involved have elsewhere (Karnes, 1979; Guyer, 1981) been proved effective both in terms of disabled and environmentally deprived children. This research has shown that this type of environment can be established, and run, without the expense of apparatus and training previously limiting the usefulness of the Montessori Method. This opens vast areas of exciting research possibilities, of which the present study would constitute a pilot study.

APPENDICES

APPENDIX 1 : CONSTRUCTION AND COMPOSITION OF SETS OF APPARATUS

PRACTICAL LIFE EXERCISES

GARDENING

small hand trowels and forks were provided for children to engage in gardening activities. The gardening was co-ordinated by one of the facilitators, who would go and "work in the garden" and be accompanied by one or more of the children. Work consisted mainly of weeding and planting.

WATERING THE GARDEN

toy watering cans obtainable from toy suppliers were used. A large bucket was placed in an accessible spot in the garden and the children filled their watering cans by immersing them in the bucket.

HAND WASHING

two small brown bowls were placed on a flat surface approximately 45 cm from the ground. Water was obtained from a bucket by means of a small jug, poured into the bowl which then served as a handbasin. A small cake of soap and a tiny nailbrush (from cutting a standard nailbrush in half) was also supplied. A small hand towel completed the apparatus. The child had complete access to this apparatus and if capable was permitted to wash hands at any time without adult assistance.

BRUSHING TEETH

each child was supplied with a toothbrush which was hung on one of a row of hooks approx. 1,25 m from the ground. Whenever a child wished to brush his teeth, adult assistance was requested, upon which the child was given his toothbrush with toothpaste on and a glass of fresh water. He had to use the hand wash basin, and could then proceed to brush his teeth.

BRUSHING HAIR

a number of small brushes and combs were provided on the "dressing table" which consisted of a small bedside cupboard with a mirror at an appropriate height behind it on the wall.

DRESS-UNDRESS SELF

in addition to active encouragement to do all items of dressing and undressing without assistance, "busy boards" were provided - the equivalent of Montessori "dressing frames". These were made from pine planks cut to approx. 36,5 cm². Two of these planks were used in the research environment. Strips of fabric approx. 7 cm wide were attached to these boards in pairs by means of furniture tacks on the outer edge. The inner edge was provided with various fastening devices : press-studs; safety pins; a zip; hooks and eyes; buttons; velcro; eyelets with lacing and a buckle.

TOILET

a standard toilet was used and the floor was raised by approximately 10 cm, bringing the toilet to a height comfortable for the infant. Toilet paper was provided in a position comfortable for the child.

WASHING AND DRYING OF DISHES

again a small bowl, red to differentiate from the brown hand washing bowl was provided on a low table. A small squeeze bottle was used for dishwashing liquid. A matching red drying rack placed on a towel served as a draining board. Tea towels cut to approx. 20 cm² served as drying cloths, hung on attractive red hooks above the basins.

WASHING AND HANGING OUT OF CLOTHES

a second red bowl on a low table served as a wash basin for washing clothes. Soap powder in a small bottle was provided. A basket of dirty washing consisting of various items : small pieces of fabric, handkerchiefs and small items of clothing were provided. A small red plastic waste paper basket served as a washing basket for wet clothing. A wash line in the form of nylon rope attached to two low poles was provided. A small bag of standard clothes pegs was attached to 1 pole. The activity consisted of washing and rinsing the clothes as well as hanging them out to dry.

IRONING CLOTHES

a plastic seamstress' steam iron was provided. The iron was prepared each morning with the necessary salt and water, and plugged into a concealed power point. The iron itself had an on-off switch which the child was shown how to operate. The ironing was provided in an ironing basket, chiefly supplied by the washing activity. The apparatus was so prepared that the child was able to initiate the ironing activity without adult intervention.

POLISHING SHOES

two separate bowls of equipment were provided, both identical except for the colour of the polish. Each bowl had two shoe brushes - one for the application of shoe polish and one for brushing excess polish off. There was also one soft cloth for buffing the shoe after polishing. A previously dirtied brown shoe was placed with the brown set, and a dirtied black shoe with the other set. Shoes were replaced with dirty shoes as the children completed the polishing exercise. Both sets of apparatus were placed on a sheet of thick plastic on a low shelf.

POLISHING SILVER

this set of apparatus consisted of a small tray with a tiny bowl of approx. 6 cm diameter into which was poured a small quantity of silvo silver polish. Additionally two soft cloths were provided, one for applying the polish, the other for buffing the silver. Items of tarnished silver - chiefly silver spoons were provided singly for polishing.

DUSTING

ordinary orange dusters and a small feather duster were hung from hooks approximately 1 m from floor level for the purpose of dusting.

SWEEPING

an ordinary lightweight kitchen broom, the handle cut to approx. 60 cm was provided for sweeping. A functional toy hand brush and dust pan was used for hand sweeping of the dirt.

WASHING FLOORS

an ordinary floor mop, the handle cut to approx. 60 cm was kept together with a 5 lt bucket for this purpose.

SCRUBBING TABLES

small buckets containing a small cake of Sunlight soap, a small wooden nail brush, a small square washing cloth and a small tea towel for drying the table made up this set of apparatus.

CLEANING SPILLS

a small bucket with super-absorbent sponge cut into small sections was provided for cleaning up liquid spills.

SENSORY DISCRIMINATION

Visual Discrimination

CYLINDER BLOCKS³

or solid insets - consisted of 4 wooden blocks, each 55 cm long, 5 or 6 cm high and 8 cm wide. Along the length of each cylinder holes of the dimensions listed below were drilled. Each hole was filled with a solid circular inset or cylinder which fitted into the hole perfectly, being the exact dimensions of the hole. Each cylinder was equipped with a knob or other apparatus for grasping which enabled the cylinder to be removed and replaced in the holes.

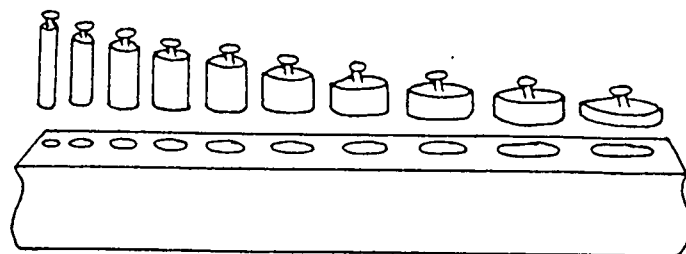
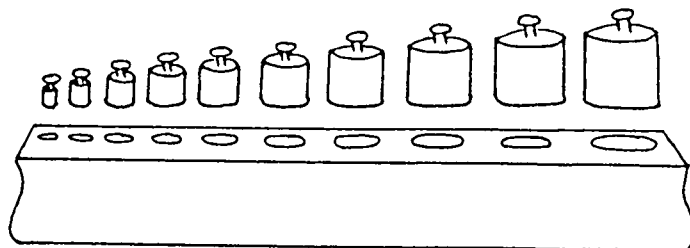
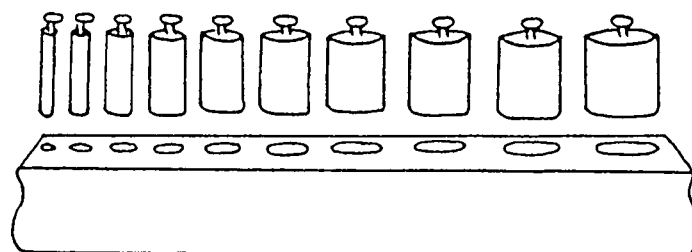
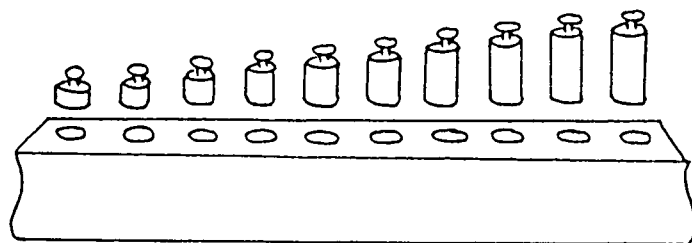
Block 1 : cylinders all of the same diameter (2,5 cm) but ranging in height from 5 cm to 0,5 cm in steps of 0,5 cm gradations.

3 : See Notes pp 140

Block 2 : cylinders all of the same height but diameter increasing by 0,5 cm from 5 cm to 0,5 cm.

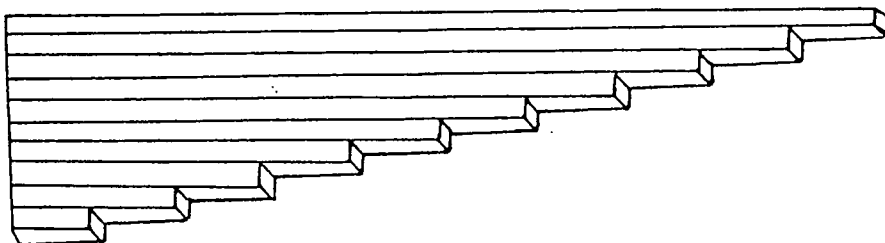
Block 3 : cylinders diminish in both height and diameter from 5 cm high by 5 cm diameter to 0,5 cm height by 0,5 cm diameter.

Block 4 : cylinders decrease in diameter from 5 cm by 0,5 cm while increasing in height from 0,5 cm to 5 cm.



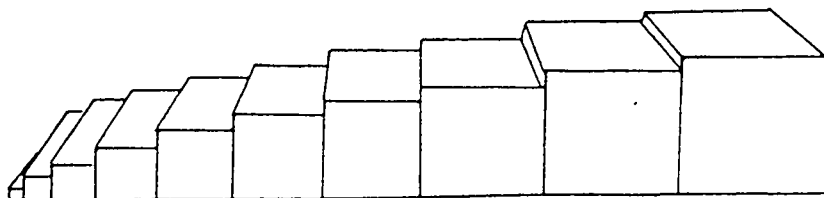
LONG RED STAIR³

consisted of 10 wooden rods, 2 cm² on the square section, painted red. These rods differed from each other by 10 cm, the longest being 1 m and the shortest 10 cm.



BROAD STAIR³

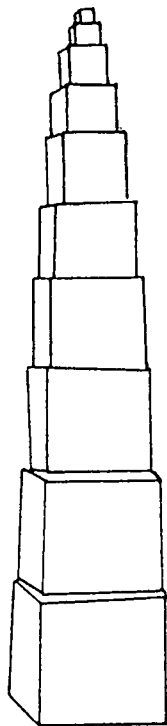
consisted of 10 wooden blocks all of the same length but having different square sections. The largest was 10cm² and they were scaled down by 1 cm through 9cm²; 8 cm²; 7 cm²; 6cm²; 5 cm²; 4 cm²; 3 cm²; 2 cm² to 1 cm².



³ : See Notes pp 140

TOWER ³

a series of 10 cubes decreasing in size from 10 cm³ to 1 cm³.



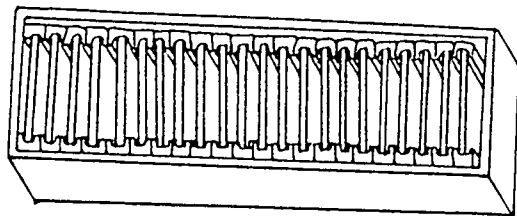
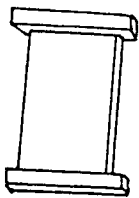
COLOUR TABLETS³

two separate boxes, one which consisted of a box 19 cm by 7,5 cm containing 16 hardboard tablets 5 cm by 3,5 cm. Attached to either short end of each of the tablets were two strips of wood for the purpose of holding the tablets without damaging the central coloured portion of the tablet. Originally the central portion of the tablet was wound with different coloured silk thread, but in this case the hardboard was painted with enamel paint as follows : two tablets were painted with identical shades of red, yellow, blue, green, brown, purple, black and white.

The second box 13,5 cm by 28 cm was divided into 6 compartments each approx. 8 cm by 5,5 cm. Each compartment was equipped with 7 tablets of the same construction as those in box 1. The tablets in box 2

³ : See Notes pp 140

were painted as follows: the tablets in each compartment differed in basic colour from compartment to compartment and in shade from tablet to tablet. Thus one compartment consisted of 7 shades of red from dark wine-red through crimson to light pink. The other compartments differed similarly but in respect of yellow, green, blue, brown and the black-white continuum.



COLOUR DOMINOES

these were hardboard tablets approx. 3 cm by 5 cm painted on the same principle as number dominoes, using colour combinations instead of number combinations.

Tactile Discrimination

SANDPAPER BOARDS

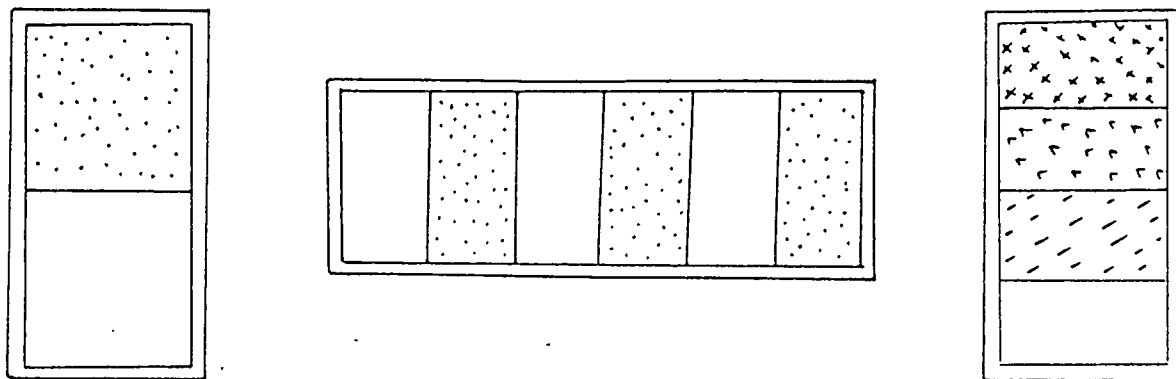
3 pine-wood planks 20 cm x 23 cm.

Board 1 - 1 strip of very coarse sandpaper and 1 strip of the finest possible sandpaper approx. 6 cm x 10 cm each glued onto one surface some distance apart.

Board 2 - 2 strips each approx. 3 cm x 10 cm coarse and fine sandpaper glued onto one surface of the board

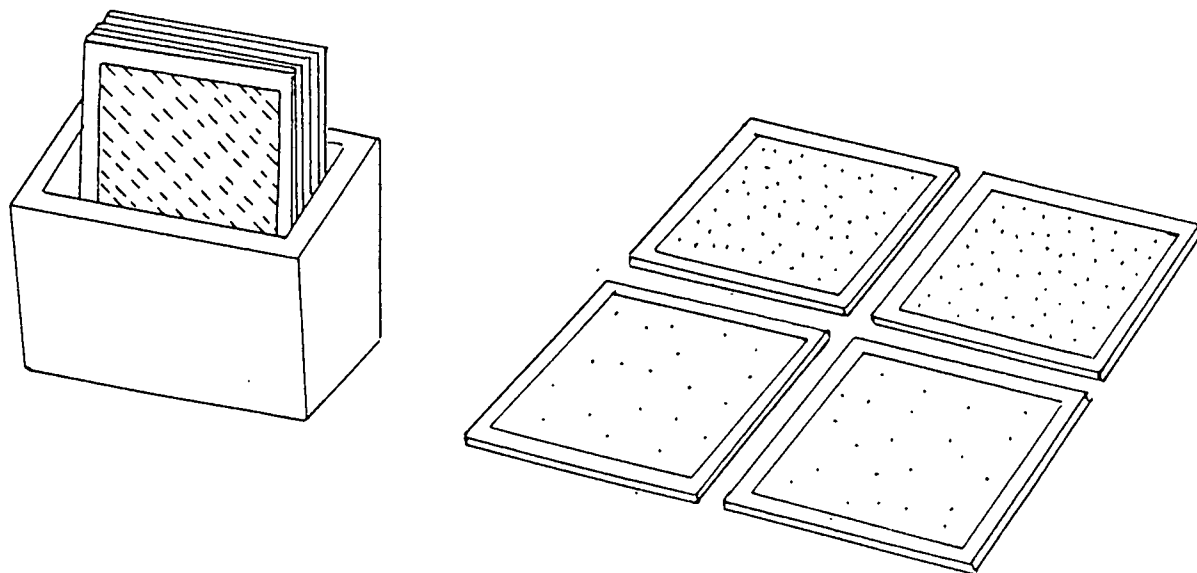
so that the coarse alternates with the smooth sandpaper.

Board 3 - 6 strips of sandpaper 3 cm x 10 cm, each of a different grade of coarseness glued to one surface of the board so that they form a graded sequence from rough (coarse) to smooth (fine).



SANDPAPER TABLETS

8 x 0,5 cm plywood tablets 10 cm^2 covered on one side with pieces of sandpaper approx. 9 cm^2 so that they formed identical pairs. This meant that 4 different grades of similarly coloured sandpaper were used so that 4 pairs of identical sandpaper tablets were formed.



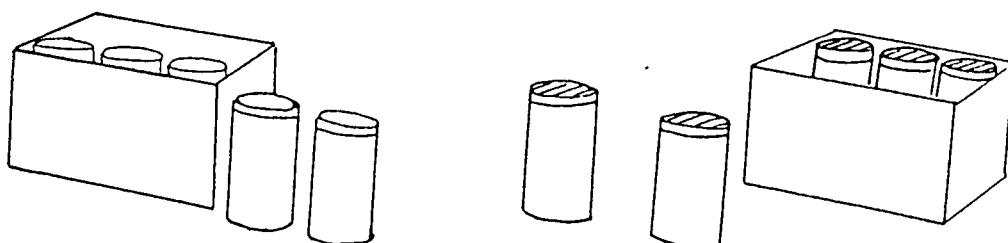
FABRIC BASKET

a container with eight pairs of fabric of varied texture eg: cotton, satin, felt, velvet, georgette, linen weave etc. Also necessary was some form of blindfold of a size to fit a small child.

Auditory Discrimination

SOUND BOXES

using wooden curtain rods of 3,5 cm diameter, 10 lengths of 11 cm each were cut. Using a wood drill of approx. 1,5 cm diameter, each cylinder was drilled to a depth of 10 cm to form 10 hollow receptacles. 10 plastic circles were cut from strong opaque red and blue plastic, five of each. Two hollow cylinders were left empty, and sealed with the plastic circles, 1 red, 1 blue, using strong contact adhesive. A small quantity of maize meal was sealed into two more containers with red and blue lids respectively. The same was done with soya beans, medium sized pebbles and rice. Care was taken so that the weight discrepancy between the cylinders was as small as possible.



SOUND BOTTLES

using 8 identical wine bottles with screw tops, two sets of 4 bottles each were formed. Water was poured into each bottle so that two bottles formed a pair of identical sound, but no two pairs produced the same sound when struck. The bottles were sealed and sprayed with aerosol lacquer spray paint, one set red and the other set white, so that for each red bottle there was an identical-sounding white bottle. The paint was thick enough to ensure that the water level was not visible.

CASSETTE TAPES

an ordinary, simple to operate cassette tape player was provided. Additionally, a varied range of sound experiences was provided - traditional sing-along nursery rhymes, various children's songs by various artists, modern pop-music and a selection of classical pieces from a number of classical composers, as well as a cassette tape on which was recorded a number of diverse sound effects (both mechanical and animal) for the children to listen and identify. A set of headphones was provided so that the listening of music did not disturb the activities of the other children. The tapes were not premanently accessible to the children - a child wishing to listen had to approach the facilitator, who provided the tape requested and if necessary helped the child to place it into the cassette player.

Olfactory Discrimination

SMELLING BOTTLES

ten identical spice bottles were obtained, five with

green tops, five with brown tops. The bottles with green tops were painted a matching green and the bottles with brown tops were painted white (in order to conceal the nature of the contents). Into one bottle from each set was placed the following spices : garlic flakes; cinnamon; cloves; ginger and curry powder. The bottles were sealed with their sealing caps and placed into two wooden boxes, one set per box.

PRE-ACADEMIC SKILLS

Pre-reading

SANDPAPER LETTERS

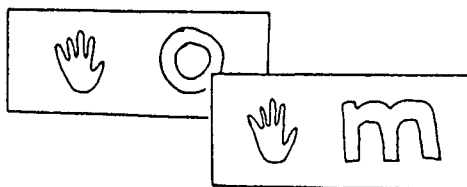
two strong wooden boxes 20cm x 25 cm and 10 cm x 25 cm, each 6 cm high were provided for the purpose of keeping and carrying the sandpaper letters. The basic box contained 25 hardboard tablets 17,5 cm x 14 cm, 3 mm thickness. 20 of these boards were painted a dusty pink colour, while the remaining five were painted a bright blue. On the left half of the board was painted a left hand print of a small child. The purpose of this was should the child wish to use the apparatus unaided, he would be able to place his left hand on the print and trace the letter with his right hand. This would prevent the letter from being traced upside down or sideways. On the pink boards consonants, low case, cut out of the finest grade sandpaper, were pasted. (The q was omitted since it always appears with the u and is a phonogram rather than a single sound) The vowels, cut from the same paper were pasted onto the blue boards.

The second set of boards, painted a darker shade of

pink, were also given the hand print on the left side, while on the right were pasted the "phonograms" or "double letter" to represent those sounds not covered by the letters of the alphabet (Dwyer, 1968). They were as follows :

Phonogram

qu as in quilt
 ai as in aim
 ee as in eel
 ie as in pie
 oa as in oat
 oo as in book
 ue as in blue
 ou as in out
 oy as in oyster
 er as in err
 ar as in ark
 or as in or
 th as in moth
 sh as in push
 ch as in m̄uch



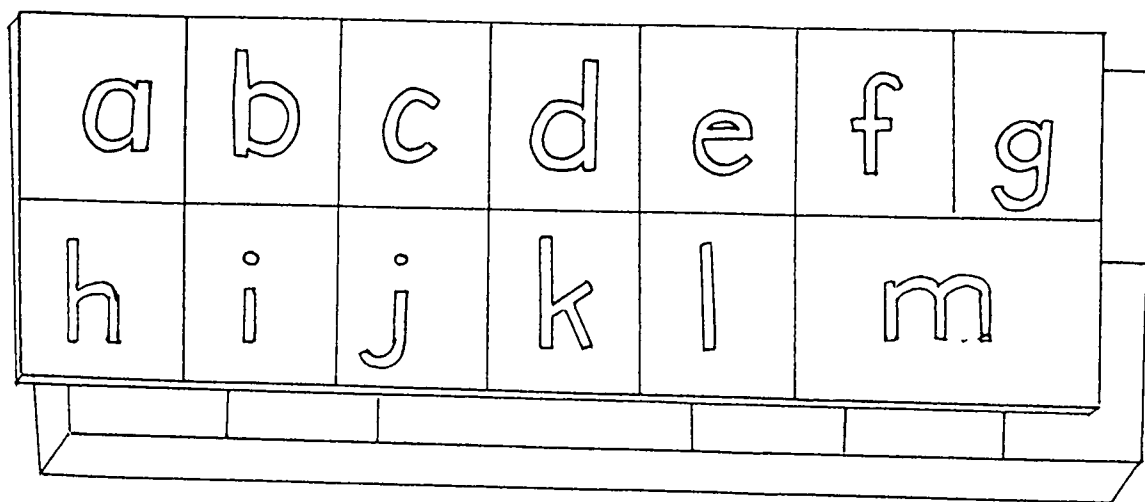
MOVEABLE ALPHABET

this consisted of two nesting trays, the larger 22,5 cm x 49 cm and the smaller 19,5 cm x 4,7 cm. Each tray was divided into 12 small compartments 5,5 cm x 8,5 cm, with one large compartment 11 cm x 12 cm. On the floor of each compartment was painted one letter of the alphabet, in lower case print, red for the consonants and blue for the vowels, approx. 5 cm high. Red and blue plastic letters of identical dimensions, were cut out and placed in these compartments. The final arrangement had :

tray 1 - a - l in small compartments and m in the

large compartment;

tray 2 - n - v in small compartments and w in the large compartment and x,y and z in small compartments.



PICTURE AND OBJECT BOXES

(Manual - St Nicholas Training Centre, pp 146 - 150)
6 small wooden boxes 100 cm² were constructed and painted pink. Small objects with corresponding name cards were placed in 3 of them as follows :

box 1 : pen; lid; top; dog; hat; nut.

box 2 : cup; pip; cat; pin; van; rat.

box 3 : man; hen; peg; pot; bag.

Pictures pasted on pink cards, 6 cm² together with corresponding name cards were in the next 3 pink boxes as follows :

box 4 : gun; mug; bed; ten; net; tap.

box 5 : can; bat; jug; hen; pan; cap.

box 6 : fan; log; mat; pot; box; cup.

3 blue boxes, constructed along the same dimensions were filled as follows :

box 1 : flag; helmet; robin; lamp; frog; crab; slug.

box 2 : belt; kilt; camel; wigwam; stag; drum.

box 3 : milk; hand; lemon; blot; nest; medal.

PHONOGRAM CARDS

this apparatus consisted of 13 large plastic envelopes on which was painted one of the key sounds of the English language that can be written in more than one way. Specifically these were :

ar; er; or; ai; ee; ie; oa; ue; ou; oy; j; s; f; e.

Inside each envelope were white cards, 15 cm x 10 cm, on which were painted alternative ways of writing the sound written on the outside of the envelope. Thus inside each envelope were the following cards :

Symbol of sound on

outside of folder

Cards inside

ar	ar; a
er	er; ur; ir
or	ar; au; aw; ough
ai	ai; ay; ei; a-e
ee	ee; ea; e-e; y; ie
ie	ie; y; i-e; igh
oa	oa; oe; ow; o-e
ue	ue; ew; oo; u-e
ou	ou; ow
oy	oy; oi
j	ge; gi
s	s; ce; ci
f	f; ph
e	e; ea

Attached to the back of each card was another smaller envelope. Inside this envelope, small visiting cards 4,5 cm x 7,5 cm were covered with plastic and joined together to form small booklets. On each card a word was written in black pen, with the "phonogram" contained in the words lifted out in red. The words

in the booklets were as follows :(Dwyer, 1968)

Words for booklets:

(er)

<u>er</u>	<u>ir</u>	<u>ur</u>
fern	bird	curl
herb	girl	burn
winter	first	burnt
sister	sir	surf
helper	skirt	curt
perhaps	dirt	burden
her	twirl	hurt
lantern	swirl	spurt
butter	stir	curd
stern	firm	occur

(or)

<u>or</u>	<u>au</u>	<u>aw</u>	<u>ough</u>
cord	Paul	saw	ought
storm	Maud	lawn	bought
sport	fault	claw	brought
forlorn	default	raw	nought
lord	taut	draw	fought
port	haul	jaw	sought
for	maul	yawn	thought
forget	fraud	hawk	
morning	cauldron	prawn	
pork	nautical		

(ai)

<u>ai</u>	<u>ay</u>	<u>a-e</u>	<u>ei</u>
mail	tray	cake	rein
nail	play	late	feint
pail	clay	date	skein
aim	stay	snake	vein
brain	away	safe	neigh
stain	May	maze	veil
waist	day	flake	beige
laid	pay	blame	weigh
ail	stray	lake	weight
tail	astray	stake	sleigh

(ee)

<u>ee</u>	<u>ea</u>	<u>e-e</u>	<u>y</u>	<u>ie</u>
reed	read	eve	penny	field
seem	sea	even	funny	priest
been	tea	pete	silly	yield
week	eat	mere	sunny	brief
feed	seat	meter	frilly	grief
creep	team	develop	fussy	sieze
steep	stream	breve	Polly	fiend
wee	cream	cede	envy	frieze
peep	heat	here	Henry	chief
weep	meat	delete	putty	shield

(ie)

<u>ie</u>	<u>i-e</u>	<u>igh</u>	<u>y</u>
pie	line	high	fly
tie	pine	sigh	cry
die	time	light	try
lie	kite	tight	my

<u>ie</u>	<u>i-e</u>	<u>ie</u>) (cont.)	
cried	wine	<u>igh</u>	<u>y</u>
dried	twine	right	by
tried	wife	sight	sty
fried	ride	fright	pry
tied	pipe	bright	fry
untied	stripe	right	sty
		blight	fly

		(<u>oa</u>)	
<u>oa</u>	<u>oe</u>	<u>o-e</u>	<u>ow</u>
goat	toe	note	bow
loaf	doe	cone	blow
roam	hoe	dome	low
Joan	toes	home	snow
toast	goes	tone	own
gloom	woe	poke	mow
coast	foe	stroke	flow
coal	oboe	smoke	glow
roast	roe	Rome	row
boast	sloe	pole	sow

		(<u>ue</u>)	
<u>ue</u>	<u>u-e</u>	<u>ew</u>	<u>oo</u>
sue	flute	new	hoof
blue	crude	few	root
flue	rude	stew	roof
glue	prune	mew	droop
true	include	news	stool
untrue	brute	newt	spoon
rue	lute	hew	moon
construe	salute	crew	gloom

	(<u>s</u>)		(<u>j</u>)
<u>ce/ci</u>	<u>s</u>	<u>j</u>	<u>ge/qi</u>
cent	since	job	gem
central	sit	jug	gent
lance	sun	jig	edge
fence	stud	jogged	ledge
pence	stand	jet	bridge
cinder	sing	jam	gin
accident	set	subject	giraffe
recind	scrap	object	engine
cinema	sup		region

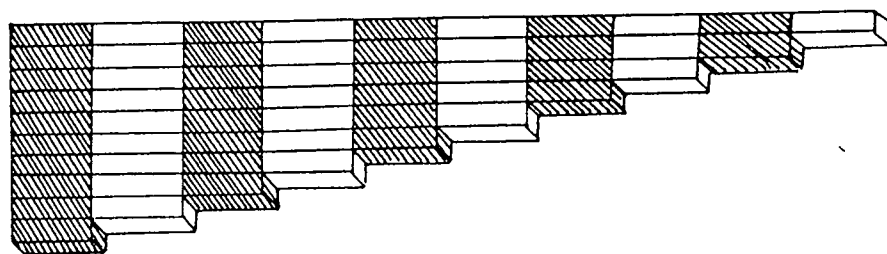
	(<u>ou</u>)		(<u>e</u>)
<u>ou</u>	<u>ow</u>	<u>e</u>	<u>ea</u>
found	cow	pet	head
proud	frown	expect	bread
about	scowl	elect	lead
ground	brown	egg	instead
around	sow	lent	read
amount	allow	spent	dread
stout	gown	tent	spread
account	owl	bend	bedstead
pout	trowel	pedal	tread
sprout	drown	felt	meant

	(oy)		(f)	
<u>oi</u>	<u>oy</u>	<u>f</u>	<u>ph</u>	
oil	joy	fox	graph	
boil	toy	felt	telegraph	
soil	boy	elf	paragraph	
coil	annoy	self	phone	
join	royal	fan	telephone	
point	loyal	fanatic	phonogram	
coin	employ	fun	Philip	
toil	destroy	fin	emphatic	
joint	ahoy	fact	phrase	
spoil	coy	fix		

Pre-Arithmetic

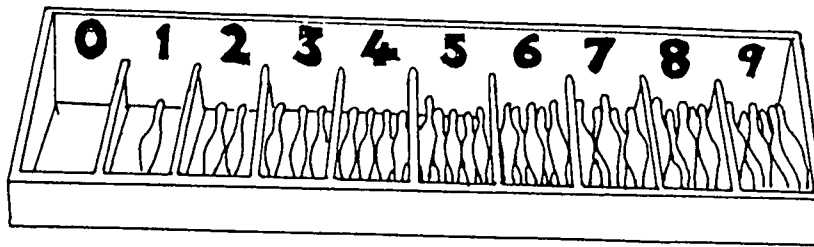
RED AND BLUE RODS

consisted of 10 wooden rods 2 cm² on the square section - identical to the long red stair. The rods differed from each other by 10 cm, the longest being 1 m and the shortest 10 cm long. The smallest block was painted red, the next painted 10 cm red and 10 cm blue. The third was 10 cm red, 10 cm blue, 10 cm red. The rest were painted similarly, always beginning at one end with red, so that each rod was carefully marked in 10 cm sections of red and blue.



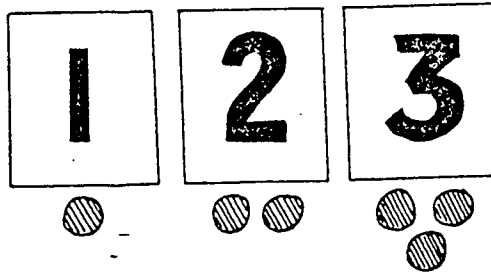
SPINDLE BOX

an ordinary wooden cigar box was divided along the short section into 10 compartments using balsa wood. Each compartment was clearly marked from 0 through to 9. 45 ice-cream sticks were used as counters, the relevant number placed in each compartment.



BUTTON BOX

commercially available self-adhesive numbers, 0 - 9 , in black, 2 cm x 0,5 cm were attached to small cards and varnished for perservation. These were placed loose in a cardboard box, together with 45 identical buttons, approx 1,5 cm diameter.



SANDPAPER NUMBERS

ten pieces of hardboard, 12 cm x 15 cm painted green, on which the numerals 1 to 10, cut out of fine sandpaper were mounted separately, one on each board.

Sequencing

LOGI-BLOCKS and BRAINY BLOCKS⁴

a series of perspex coloured geometric solids - red;

4 : See Notes pp 140

blue; green and yellow - circles; squares; rectangles and triangles. White cards with shape combinations built up to form various pictures completed the apparatus.

MY CALCULATOR ⁵

a plastic box with lid, 18 cm² containing 20 grey 1,2 cm³ blocks; 10 pale blue 1,2 cm x 1,2 cm x 2,5 cm rods; 7 yellow rods, 1,2 cm x 1,2z cm x 3,8 cm; 6v light blue rods 1,2 cm x 1,2 cm x 5 cm; 5 light green rods 1,2 cm x 1,2 cm x 6,3 cm; 3 orange rods 1,2 cm x 1,2 cm x 7,6 cm; 2 white rods, 1,2 cm x 1,2 cm x 8,9 cm; 2 dark blue rods 1,2 cm x 1,2 cm x 10,2 cm; 2 red rods 1,2 cm x 1,2 cm x 11,4 cm and 2 dark green rods 1,2 cm x 1,2 cm x 12,6 cm. These rods and blocks fitted into the box when placed correctly.

GEOMETRIC INSETS AND CARDS

5 wooden trays, 23 cm x 33 cm, with sides 3 cm high. The base of each tray was painted blue. Inside each tray were 6 pieces of plywood each 10 cm². In the centre of each square was a geometric inset, painted the same blue as the base of the tray. The insets were arranged as follows :

Tray 1 - 6 rectangles with sides 1 cm x 6 cm; 2 cm x 6 cm; 3 cm x 6 cm; 4 cm x 6 cm; 5 cm x 6 cm and 6 cm x 6 cm.

Tray 2 - 6 circles with diameters 3 cm; 4 cm; 5 cm; 6 cm; 7 cm and 8 cm.

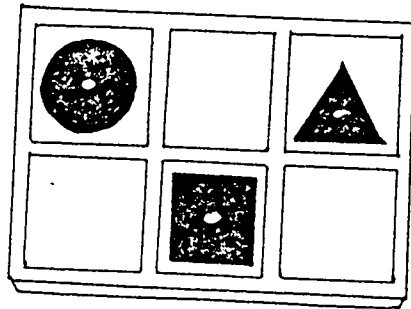
Tray 3 - 6 triangles : 1 equilateral triangle, sides 7 cm each; 1 isoseles triangle, 1 side 3 cm and 2 sides of 6 cm; 1 right angled triangle with sides 4 cm, 7 cm and 8 cm; an acute angle scalene triangle, sides 2,5 cm 5,5 cm and 7 cm; an obtuse angle scalene

5 : See Notes, pp 140

triangle, sides 8,5 cm, 7 cm and 3 cm and a scalene triangle with sides 7,5 cm, 3,5 cm and 5 cm.

Tray 4 - 6 polygons which would inscribe in the circle of 8 cm : a pentagon; a hexagon; a heplagon; an octogon; a nonogon and a decagon.

Tray 5 - to be used as a presentation tray : equipped with 3 plain wooden squares of 10 cm².

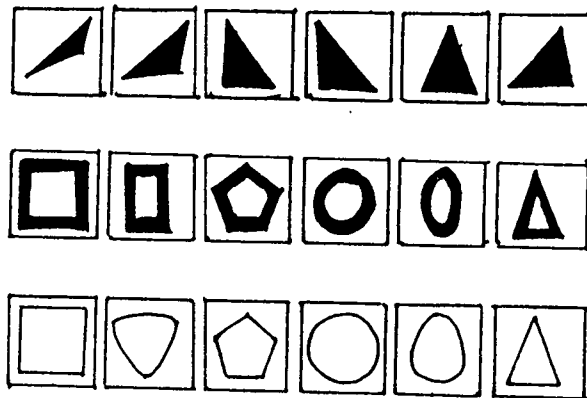


CARDS :

Set 1 - white cards with replicas of the geometrical shapes in blue, cut out of thick cardboard and pasted onto the white cards - 1 for each figure in the cabinet.

Set 2 - white cards with a broad outline of each geometric shape in blue, also cut out and pasted onto the white cards.

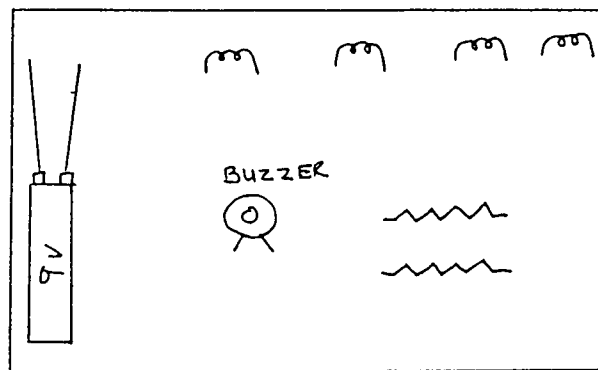
Set 3 - a thin blue outline of each geometric shape, drawn onto the white card.



Cultural

CIRCUITRY BOARD

a large piece of plywood, 30 cm x 45 cm - on which was randomly arranged: 5 small lamps, a buzzer, a number of resistors and a large 9 v battery. 10 pieces of electric wire with small black and red crocodile clips on either end - resulting in 5 "black" wires and 5 "red" wires.



MAGNETS

a random selection of magnets - a circle, a horseshoe magnet, and sundry others; together with a selection of magnetic and non-magnetic objects - kept together on a small tray.

MAGNIFYING GLASS

a 4x magnifier, mounted on a perspex receptacle which

allowed live creatures to be observed without harm - kept on a small tray and used with various items of interest.

FANTASY

STORY CARDS

made from story colouring in books, the pictures were coloured in and pasted on thick cardboard which could then be pasted against the wall by way of illustration of a story. Stories thus illustrated were : Goldilocks and The Three Bears; Red Riding Hood; Cinderella (the Grimms version); Beauty and the Beast.

BOOKS

a variety were obtained on a weekly basis from the local children's library.

ANIMALS AND TOYS

Forest Families⁶ vinyl furry animals were purchased and used to illustrate : The three little pigs; The story of Peter Rabbit (Beatrix Potter) and Goldilocks and The Three Bears.

MOTOR ACTIVITIES

Fine Motor Activities

CLAY

boiled playdough was made out of flour, salt, bicarbonate of soda and creme of tartar on a regular basis. Clay was kept in small sealed plastic bowls and used on squares of hardboard 50 cm², together with

6 : See Notes pp 140

wooden rollers and a variety of plastic buscuit shapes for cutting shapes out of clay.

SAND

two large sandpits, equipped with a number of spades and buckets.

BLOCKS

a large variety of coloured building blocks ranging in size from 11 cm x 6 cm x 4 cm to 12 cm², used for various constructions. These were kept in baskets in the "block corner".

PAINTING

a double sided painting easel approx. 1 m high was equipped at all times with at least 2 different primary colour, each with its own paint brush.

DRAWING

paper was always available in abundance, as well as a variety of drawing media: wax crayons; wax squares; pencils; pencil crayons and koki pens. Stencils cut out of hardboard were also available - various animals; a house; a castle; etc. A blackboard was attached to the wall and supplied with both white and coloured chalk and duster.

THREADING BEADS

a variety of wooden beads, both large and small were available to thread onto coloured shoe laces. Circular noodles were coloured with food colouring and also made available for threading.

PEG BOARD⁵

plastic boards 15 cm² with holes in, together with small coloured pegs that fitted into these holes. It was possible to construct patterns and basic pictures using this apparatus.

NESTING EGG

a series of coloured plastic eggs that opened in the middle and became progressively larger, so that they could nest one inside the other - made by Playskool⁶.

PUZZLES

a variety of inset type wooden puzzles, with small knobs on each piece for gripping.

DROPPER

a small glass, a medicine dropper and a plastic soap stand - of the type equipped with small sucker like cups on either side. The purpose of this was to place one drop of water only from the dropper into each little sucker.

TWEEZERS

a pair of tweezers, a bowl of small glass beads of different colours and as many smaller bowls as there are coloured beads - the purpose being to sort the beads into colour groups using the tweezers.

NUTS AND BOLTS

a selection of different-sized nuts and bolts - one nut for each bolt, kept together in a small basket.

POURING

two small jugs kept together on a small tray, filled

5 : See Notes pp 140

with dry rice. The object was to pour the rice from one jug to the other without messing.

PASTING/COLLAGE

a tray bearing the following: a bowl with a small glue brush for glue (the office type) and a series of containers with different things to paste : small pieces of paper; cloth; flower petals; pencil shavings; glitter; etc.

WIRE AND LOOP

a plank of wood with a twirly wire attached to either end, raised in the middle. A small 5v battery was attached to one end of the wire and also attached to the battery was a buzzer. Attached to the other end of the wire was a piece of flex ending in a wire loop so that when the loop touched the wire, the circuit was closed and the buzzer sounded. The object was to move the loop from one end of the wire to the other end without activating the buzzer.

SCISSORS

small safety scissors and a variety of old magazines.

Gross Motor Activities

CLIMBING

a series of cattle dividers, planted in the ground so that the top pole was no more than 1 m from the ground.

TYRES

old motor car tyres that could be rolled, stacked or used in various other ways.

BALANCING PLANKS

6 wooden planks, 3 narrow (approx. 6 cm wide) and 3 wide (approx. 10 cm) each 1 m long, raised from the ground by means of wooden blocks 10 cm high on either end.

APPENDIX 2 : PRESENTATION OF SPECIFIC APPARATUS

Where not discussed under this section, the function of the apparatus was deemed self explanatory. In such cases the facilitator was not required to "present" the apparatus to the child in any specific way. The child was left free to explore the possibilities of the apparatus. The facilitator was merely to prevent abuse and destruction of the apparatus.

Where specific presentation was required, as discussed below, the procedure was that the child either took the apparatus independently, or requested assistance from the facilitator. In both cases the facilitator then proceeded to "present" the apparatus as outlined below and then the child was left to explore further possibilities on his own, the facilitator merely preventing abuse or destruction of the apparatus.

Individual sheets of paper, one for each set of apparatus, were attached to the wall near the physical position of the relevant apparatus, with the following (verbatim) guidelines for the facilitators :

SENSORY DISCRIMINATION

Visual Discrimination

CYLINDER BLOCKS

Block 1 - same height, differing diameter.

Block 2 - same diameter, differing height.

Block 3 - decreasing both in diameter and height.

Block 4 - increasing height, decreasing diameter.

Present first block 1 only. At another time present

block 1 & 2; later blocks 1,2 & 3, and finally all 4 simultaneously. Place the blocks on the table in front of the child, remove the cylinders, begin to replace them. Invite the child to assist. Withdraw.

LONG RED STAIR

Work on the floor, on a mat. Fetch the blocks individually. Place randomly on the mat. Use 3 period lesson :

Lesson 1 : take the shortest, say "this is short"
take the longest, say " this is long"

END OF LESSON. Allow the child to manipulate at will.

Lesson 2 : can follow immediately on lesson 1 or be sometime later .

place longest and shortest together, away from the rest. Say " give me the short / long one"

IF THE CHILD IS UNABLE TO DO THIS - PACK AWAY. REPEAT LESSON 1 LATER.

Lesson 3 : take shortest / longest and ask the child to name.

IF UNABLE, DO NOT CORRECT - PACK AWAY. Return to last point successfully mastered, and repeat at next lesson.

Following the three period lesson : Games :

- * taking short(est) / long(est) say " give me one just a tiny bit longer (shorter) than this" - repeat and proceed to build stair.
- * once able to build from either direction, demonstrate similarity with red and blue rods, matching them one for one.

BROAD STAIR

Work on the floor or on the table. Use 3 period

lesson :

Lesson 1 : " this is thick; this is thin"

Lesson 2 : "give me the thick one; give me the thin one."

Lesson 3 : "what is this?"

Games :

- * give me one a little thicker/ thinner than this
- * build stair both up and down

TOWER

Have the child carry blocks individually to position on carpet.

Build the tower yourself - in silence.

Break it down (lifting off individual blocks)

Invite the child to do the same.

Language - use 3 period lesson :

Lesson 1 : smallest block " this is small"
largest block " this is big"

Lesson 2 : "give me the small / big block

Lesson 3 : ask "what is this?"

COLOUR TABLETS (using the small box)

Use 3 period lesson :

Lesson 1 : use red and blue only (or 2 primary colours) - say "this is red / blue"

Lesson 2 : "give me red, give me blue"

Lesson 3 : "what colour is this"

For each addition of a new colour, return to lesson 1 - eg : either add only 1 new colour, return all 3 to lesson; or use 2 new colour (eg yellow and green) only.

Games :

- * place colours on the table - one tablet of each.
Ask the child to find the other colour the same

(eg the other red disc) from a mixed up pile on the table. The child must then match all the colours.

- * Keep 1 of each of the colours - place the other of each on a table in another room. Ask the child to look at the one in your hand and fetch the identical one from the other room without having the matching one with him.

COLOUR TABLETS : (Large box)

The child will know the basic colours by name. Use 3 period lesson :

- Lesson 1 : select the extremes of 2 colours - eg -
"this is light blue, this is dark blue"
- Lesson 2 : "give me the light / dark blue one"
- Lesson 3 : "what colour is this?"

Games :

- * build the colour progressions by asking the child to give the one that is a little lighter or darker than the one in your hand.
- * Place all the colours in another room, keeping only one shade of each with you. Ask the child to fetch one a little lighter or darker than the one in your hand.

COLOUR DOMINOES

Can be played by individual child or a group.

Turn dominoes face down on the floor / table. Select a number (depending on the number of players). The double colour gets put down face up in the middle of the playing area. Build on either end by means of colour matching.

Tactile Discrimination

SANDPAPER BOARDS

The child must wash hands in warm water before using this apparatus. Use 3 period lesson :

Lesson 1 : Supporting the palm of the child's hand on your forefinger, allow him to stroke first the one then the other strip of sandpaper, saying "This is rough, this is smooth."

Lesson 2 : "show me the rough / smooth strip"

Lesson 3 : "feel this - what do we call it?"

SANDPAPER TABLETS

The child must wash his hands in warm water before beginning this exercise. He will have the concepts relating to rough and smooth.

- * take one set of the boards, give the child the other
- * try to encourage the child to close his eyes, or use the blindfold
- * present one tablet from your store and ask the child to find another the same from his store.

FABRIC BASKET

Exactly same function and procedure as for sandpaper boards . The child must wash hands in warm water before commencing the exercise.

Auditory Discrimination

SOUND BOXES

Use 3 period lesson :

Lesson 1 : take the empty cylinder and the noisiest

one. Shake and say : "this is loud, this is soft"

Lesson 2 : "give me the loud one / soft one"

Lesson 3 : "what kind of sound does this one make?"

Games :

- * Pairing - ask the child to give you one that sounds the same as the one you have.
- * Progression - ask the child to find one that is a little louder / softer than the one you have.
- * Sound memory - take 1 set and place the other a distance away. Ask the child to fetch the one that sounds like the one you have.

SOUND BOTTLES

The bottles are hit with a small stick having a wooden bead attached to the end. The procedure is identical to that followed for sound boxes.

Olfactory Discrimination

SMELLING BOTTLES

Use **3 period lesson** only if child shows real interest.

Lesson 1 : (use only 1 set) - name the spices in the spice bottles - "this is garlic; this is ginger" etc. Allow the child to smell it.

Lesson 2 : Ask the child to identify the smell - "give me the garlic"

Lesson 3 : Require the child to name the smell.

Games :

More fun, therefore more often employed.

- * select 1 set, or ask the child to select.
- * take one of your bottles, allow child to smell it.
- * ask him to find one in his box that smells the

same.

- * try to avoid saying "no" or "wrong" in your responses. Rather say "Are you sure " Smell again" - or finally "I think it is this one" Name the spice"
- * Give uses or functions - so that the child can identify it as a real smell in his own world.

PRE-ACADEMIC ACTIVITIES

Pre-reading

SANDPAPER LETTERS

Child to wash hands in warm water before beginning.

Use 3 period lesson :

Lesson 1 : Select a maximum of 4 letters of the more common or interesting ones - eg a; e; i and the first letter of the child's name. Trace the form of the letter with the child's fore and index finger. Say the name of the letter phonetically and a word that starts with that letter - " a for apple". Use clues and hints to fix the letter in the child's memory - eg "i is for indian - look he is tall and thin with a feather in his cap" etc.

Lesson 2 : "give me....." ask for each of the letter in turn.

Lesson 3 : "what is this?"

It is a good idea, after a few days, to give the child the ones he knows, asking him to name them, and then placing them on the table (lesson 3). Then present 1 or 2 new ones (lesson 1) and calling out "give me

the...." for all of them again (lesson 2). At first the children see the letter for the word - eg : taking the a, they say "this is apple". Therefore stress the sound ie say "Yes - this is a - say a."

MOVEABLE ALPHABET

First the child can empty the box and replace the letters in the correct compartment - identification of form.

Using the object box, select an object.

Use the alphabet to create the word represented - it will be necessary to assist the child in sounding out the word sound for sound, enabling him to separate the word into its component sounds.

PICTURE AND OBJECT BOXES

- used together with moveable alphabet.

Order of use : pink object boxes; pink picture boxes; blue picture boxes. The object / picture is placed on the table and the word represented is built using the moveable alphabet. Control of error is provided by the corresponding word written on the pink or blue card.

PHONOGRAM CARDS

The child will know the sounds represented by the phonograms on the envelope (from the sandpaper alphabet, box 2). Using 3 period lesson the child is introduced to the equivalent sounds on the cards on the inside of the envelope - then allowed to read the booklets. The envelope is selected at random, or through some expressed interest by the child. One envelope is read through before proceeding to the next.

Pre-arithmetic

LONG STAIRS

Used for identification of number. First establish that one is smaller/ bigger than the other by comparison with the red stair - ie - once the child has mastered the long / short, place the coloured rod beside the identical red rod - "Look - these are the same."

Ask the child to give you no 1 (smallest).

Ask for no 2 - count the segments with the child.

Continue with all rods.

Identify with numerals of sandpaper numbers - once the child has mastered these.

Begin basic addition and subtraction - take rod 1, place at the end of rod 9 - compare with rod ten - "Look , they are the same."

SANDPAPER NUMBERS

Child to wash hands in warm water before beginning.

Use 3 period lesson :

take nos 1 to 3. Trace the number in the way that it is written with the child's fore- and index fingers. Say the number. Place on the table.

Lesson 2 : ask the child to give you each number in turn. If the child makes a mistake, go back to lesson 1.

Lesson 3 : Ask the child to name the number.

It is not necessary at this stage that the child should have much of a concept of number. He learns basically to associate form with sound. Further associations will come later.

SPINDLE BOX

The child must know numbers 1 to 9 (from sandpaper numbers). Empty box on table. Begin at 1 - demonstrate how to count appropriate number of sticks into relevant compartments. Point out that there are 0 sticks left, therefore 0 means nothing. Invite the child to repeat the exercise.

BUTTON BOX

The child must recognise numbers 1 to 9 (sandpaper numbers). Arrange the number counters in order. Count the relevant number of buttons and place below each number.

Sequencing

GEOMETRIC INSETS

Prepare the presentation tray as follows :

- * the largest circle
- * the largest square
- * the equilateral triangle
- * 3 blank squares

Use the **3 period lesson** :

Lesson 1 : Remove each inset and allow the child to trace the outline of the shape in his hand and the open shape left in the tray. Say - this is a square / circle / triangle.

Lesson 2 : "give me the square / triangle" etc

Lesson 3 : "what do we call this?"

Games :

- * add other shapes - repeating the procedure
- * use as puzzles - fill tray with all the shapes - take all insets out and require the child to replace them

GEOMETRIC INSETS - CARDS

Give the child card set 1, then 2 then 3, together with the relevant inset tray. The shapes are removed from the tray and fitted exactly over the shapes on the cards.

It will be noted that activity categories form sequences from simple to complex. The child could therefore not select a more advanced activity before having mastered the more elementary activity. If the child therefore selected an inappropriate activity the facilitators were instructed to remove the apparatus gently with words to the effect that the child would do that "just now" - after having been shown this - and a more appropriate activity was substituted.

SUMMARY

The initial purpose of the study was twofold : to assess the possibility of establishing a Montessori environment without formal training, and to determine the extent to which this was successful.

The literature study undertaken investigated Montessori from a historical perspective, before detailing the elements of the theory necessary for establishment of a research environment. The positive value of Montessorianism was shown indisputably by an indepth investigation of the opportunities for fulfilling developmental tasks offered by the Montessori environment. The relationship between the theories of Montessori and Piaget was investigated. Extensive agreement as well as areas of disagreement were discovered, the latter mainly due to Piaget's epistemological approach as opposed to Montessori's concern with the needs for development.

The research evaluation showed general positive effects of exposure to a Montessori environment. Results were however difficult to interpret due to differences and weaknesses in methodology. In the context of the nature of Montessorianism, an evaluation of process (the HOW of development as addressed by Montessori) is suggested in preference to the normal product evaluation provided by purely testing procedures.

A Montessori environment was established after careful consideration of the works of Maria Montessori. Construction of apparatus was undertaken. Children and facilitators were recruited on a voluntary basis. A total

of 27 children were obtained. Two mature facilitators oversaw the running of the group. After a period of 6 months, allowed for settling in, naturalistic observation was begun.

Observation was done by classification of the use of specific apparatus into broad activity categories. The proportion time each child engaged in a particular activity category was recorded. This data was summarized and analysed in order to investigate trends in development. The raw data was used for hypothesis testing.

Four hypotheses were tested : a sensitive period for motor refinement was not confirmed using the Mann-Whitney U test; a sensitivity for pre-academic activities was confirmed, also using the Mann-Whitney U test; and a preference for functional play over fantasy play in the pre-school period was confirmed, using the parametric t-test. The fourth hypothesis, based on test data delivered by the Griffiths Developmental Scales affirmed the general facilitative effects of the research environment. The sign test was used.

The presence of sensitive periods was taken as a sufficient indication that the research environment was "Montessorian", established and run without formal training. The test results proved the facilitativeness of the experience, further supporting the possibility of running a Montessori school without the expense of training.

By way of conclusion it was suggested that further research be undertaken to establish the viability of Montessori in the broader South African context, given the proof that the elitism engendered by expensive training and administration

procedures of this approach is not warranted. Given also its benefits, proven elsewhere, the present study is considered a pilot study to further research on this subject in the wider cultural and ethnic conditions.

NOTES

The goods indicated were obtained from the following manufacturers and suppliers :

1. Nienhuis Montessori
Manufacturer of and AMI approved centre for Montessori Apparatus :
Industriepark 14
P.O. Box 16
Zelhem (Gld) - Holland.

2. Lamella Enterprises - distributed by :
Aloe Book Agency
Educational Division
P.O. Box 4349
Johannesburg 2000

3. Made to order by
G.A. Ezendam: Cabinet Makers
P.O. Box 2055
Bloemfontein 9300

4. Smile Education Centre
Cnr Jan Smuts and Gordon Avenues
Blairgowrie
Randburg 2194

5. Idem - Educational Toys
Johannesburg

6. Central New Agency
Maitland St.
Bloemfontein 9301.

BIBLIOGRAPHY

- Berger, B. (1968). Researching Dottoressa Montessori. **The American Montessori Society Bulletin** , 6 (1), 1 - 8.
- Berger, B.A. 1970). Comparative investigation of Montessori and Traditional Prekindergarten Practices. **The American Montessori Society Bulletin** , 8 (2), 1 - 10.
- Berk, L.E. (1976). How well do classroom practices reflect teacher goals ? **The American Montessori Society Bulletin** , 14 (4), 1 - 18.
- Berryman, J. (1980). Montessori and Religious Education. **Religious Education** , 75 (3), 294 - 307.
- Bettleheim, B.(1975). **The Uses of Enchantment**. Harmondsworth : Penguin.
- Bloom,H. & Trilling, L. (1973) **Romantic Poetry and Prose**. Oxford : University Press.
- Boyd, W. (1914). **From Locke to Montessori**. London : Harrap & Co.
- Boyle, D. (1983). The myth of Piaget's contribution to education. In Modgil, S., Modgil, C. and Brown, G. (eds) **Jean Piaget: An Interdisciplinary Critique**. London : Rautledge & Kegan Paul.
- Bronson, M.B., Pierson, D.E. & Tivnan, T.(1984). The effects of Early Education on Children's Competence in Elementary School. **Evaluation Review** , 8 (5),615 - 629.
- Bruce, T. (1984). A Froebelian looks at Montessori's Work. **Early Child Development and Care** , 14 , 75 - 84.
- Carlgren, F., Grosse, R., Howard, A., Klingborg, A., Rudel, J.& S. **Education Towards Freedom**. Peredur : Lanthorn Press.
- Champagne, P and Tausky, C. (1976). Alternative Perspectives in Education : The radical school or reinforcement theory? **Behaviourism** , 4 (2), 231 - 243.

- Chattin-McNichols, J. (1979). Piaget in the Montessori classroom. **The American Montessori Society Bulletin** , 17 (2), 13 - 20.
- Cloete, M.(1987). The role of pre-school care and its interrelatedness to women's projects in comprehensive development aimed at improving quality of life, with special reference to the RSA population development programme. In van den Breg, O. & Vergnani, T. (eds) **Door to the future : The Preschool Child in South Africa : A book of readings**. Bellville : University of the Western Cape.
- Coe, J.D. (1969). The Bloomington - Normal Montessori School **The American Montessori Society Bulletin** , 7 (3),3-11.
- Craig, G.J. (1976). **Human Development**. New Jersey : Prentice Hall.
- Croll, W.L. & Smith, R.M. (1984). The effects of extrinsic reward timing on intrinsic motivation. **Bulletin of Psychonomic Society** , 22 (5), 415 - 417.
- Crowe, B. (1984). Through the eyes of a child. **Transcripts of the lectures given at the 7th annual weekend conference** , Theobalds Park College, Herts : AMI (UK).
- Dwyer, M.J. (1968). **Reading Scheme for English**. Zelhem - Holland : Nienhuis.
- Edmunds, F. (1979). **Rudolf Steiner Education : The Waldorf Schools**. London : Rudolf Steiner Press.
- Elkind, D. (1979) Piaget and Montessori in the Classroom. **The American Montessori Society Bulletin** , 17 (1),1-13.
- Elkind, D. (1980). The role of play in religious education. **Religious Education** , 75 (3),282 - 293.
- Elkind, D.(1983). Montessori education: abiding contributions and contemporary challenges. **Young Children** , 38 (2), 3 - 10.
- Evans, E.D. (1976). **Contemporary Influences in Early Childhood Education**. New York : Holt, Rinehart & Winston.

- Finch, J. (1984). A First-class Environment ? Working-class playgroup as pre-school experience. **British Educational Research Journal** , 10 (1), 3 - 17.
- Fong, B.C. & Resnick, M.R. (1980) **The Child : Development Through Adolescence**. Menlo Park : Benjamin/Cummings.
- Futrell, K.H. (1970). **The Normalized Child**. Holland : Aquinas Montessori School.
- Griffiths, R. (1970). **The Abilities of Young Children**. London : Child Development Research Centre.
- Guyer, B.P. (1981). The Montessori Approach for the Elementary-Age L.D. Child. **Academic Therapy** , 10 (2), 187 - 192.
- Hager, H. (1971). The Concept of Liberty and the delineation of Authority as found in the Writings of Dr. Maria Montessori. **The American Montessori Society Bulletin** , 9 (1), 1- 14.
- Hallahan, D.P. & Kauffman, J.M. (1982) **Exceptional Children** .(2nd ed) New York : Englewood Cliffs.
- Hainstock, E.G. (1978). **The Essential Montessori**. New York: Plume.
- Hannon, A. (1986). The Montessori Approach from a Learning Theorist's point of view. Unpublished paper read at "To Educate the Human Potential" conference, Johannesburg College of Education, 3 - 5 July.
- Harper, L.V. & Huie, K.S. (1981). The Effects of Prior Group Experience, Age and Familiarity on the Quality and Organization of Preschoolers' Social Relationships. **Child Development** , 56 , 704 - 717.
- Harwood, A.C. (1958). **The Recovery of Man in Childhood**. New York : Anthroposophic Press.
- Harwood, A.C. (1979). **The Way of A Child**. London : Rudolf Steiner Press.
- Havighurst, R. (1972). **Developmental Tasks and Education** (3rd ed). New York : David McKay.

- Hayes, M. (1986). Changing Needs - Changing Environment. Unpublished paper read at "To Educate the Human Potential" conference, Johannesburg College of Education, 3 - 5 July.
- Helms, D.B. & Turner, J.S. (1981). **Exploring Child Behaviour** (2nd ed) New York : Holt, Rinehart & Winston.
- Hetherington, E.M. & Parke, R.D. (1979). **Child Psychology : A Contemporary Viewpoint**. (2nd ed), New York : McGraw - Hill.
- Holt, J. (1964). **How Children Fail**. Harmondsworth : Penguin.
- Human Sciences Research Council. (1981). **Innovational Strategies in Education**. Pretoria : Authors.
- Hurlock, E.B. (1970). **Developmental Psychology**. (4th ed) New York : McGraw - Hill.
- Kahn, D. (1980). Creativity, self and environment. **Montessori Talks to Parents** , 3 (2), 1 - 2.
- Kamii, C. (1973). A sketch of the Piaget - derived preschool curriculum developed by the Ypsilanti early education program. In Frost, J.L. (ed) **Revisiting Early Childhood Education**. New York : Holt, Rinehart & Winston.
- Karnes, M.B. (1979). Components of an exemplary program for young handicapped children. **The American Montessori Society Bulletin** , 17 (2), 1 - 12.
- Kramer, R. (1976). **Maria Montessori : A Biography**. Oxford : Basil Blackwell.
- Lane, M. (1987). Teacher's responsibility for children learning. Unpublished paper read at "Free to be" conference, Cape Town, UCT, July 1987.
- Laubin, C. (1984). Conclusion, **Transcripts of the lectures given at the 7th annual weekend conference** , Theobalt Park College, Herts : AMI (UK).

- Lawton, J.T. & Hooper, F.H. (1978). Piagetian Theory and Early Childhood Education : A critical analysis. In Siegel, L.S. & Brainerd, C.J. (eds) **Alternatives to Piaget Critical Essays on the Theory**. New York : Academic Press.
- Lemke, E. & Wiersma, W. (1976). **Principles of Psychological Measurement** . Boston : Houghton Mifflin.
- Lillard, P.P. (1973). **Montessori, A modern Approach**. New York : Schocken.
- Mackay, C.K. (1983). Piaget and Education : a positive comment. In Modgil, S., Modgil, C. & Brown, G. (eds) **Jean Piaget : An Interdisciplinary Critique**. London : Routledge & Kegan Paul.
- Medinnus, G.R. (1976) **Child Study and Observation Guide** . New York : Wiley.
- Miezitis, S. (1973). The Montessori Method : some recent research. In Frost, J.L. (ed) **Revisiting Early Childhood Education**. New York : Holt, Rinehart & Winston.
- Miller, L.B. & Bizzell, R.P. (1984). Long term effects of four preschool programs : Ninth & tenth grade results. **Child Development** , 55 ,1570 - 1587.
- Montessori, M. (1966). **Discovery of the Child**. Madras : Kalakshetra.
- Montessori, M. (1967). **The Absorbent Mind**. New York:Delta.
- Montessori, M.(1980). The four planes of education. **Montessori speaks to Parents** , 3 (2), 3 - 5.
- Montessori, M. (1973) **From Childhood to Adolescence** New York : Schocken.
- Montessori, R. (1986). Look to the Child. Unpublished paper read at "To Educate the human Potential" conference, Johannesburg College of Education, 3 - 5 July.
- Montessori Society, South Africa. (1987). Display at "Free to be" conference, Cape Town : UCT.

- Mussen, P.H., Conger, J.J., Kagan, J. & Huston, A.C.(1984).
Child Development and Personality . (6th ed) New York :
 Harper & Row.
- Orange Free State (1981). **Extraordinary Official Gazette** ,
 Administrators Notice No 310 of 1981.
- Peller, L.E. (1979). The roots of discipline. **Montessori
 Talks to Parents** , 2 (1), 1 - 4.
- Perry, D.G. & Bussey, K. (1984) **Social Development**. New
 Jersey : Prentice Hall.
- Petrutis, D. (1969). More than Sandpaper Letters :
 Montessori in the home. **Child and Family** , 8 (1), 2-16.
- Phillips, J.L. (1981). **Piaget's Thoery : A Primer**. San
 Francisco : Freeman.
- Piaget, J. (1929) **The child's conception of the world**.
 London : Kegan Paul, Trench, Truber & Co.
- Reuter, J. & Yunik, G.(1973). Social interaction in nursery
 schools. **Developmental Psychology** , 9 (3), 319 - 325.
- Rubin, K. H. (1978). Play behaviours of young children.
The American Montessori Society Bulletin , 16 (2),1-9.
- Rubin, K.H & Hansen, R.(1976). Teaching attitudes and
 behaviour of -preschool personnel : Curriculum
 Variations. **The Alberta Journal of Educational Research**
 22 , 261 - 269.
- Rubin, K.H. & Maioni, T.L. (1975). Play preference and its
 relationship to egocentrism, popularity and
 classification skills in preschoolers. **Merrill Palmer
 Quarterly** , 21 (3), 171 - 179.
- Russell, C. & Russnaik, R.N. (1981). Language and Symbolic
 Play in Infancy : Independent or related abilities ?
Canadian Journal of Behavioural Science , 13 ,95 - 104.
- Sants, J.(1983). Piaget's attitudes to education. In
 Modgil, s, Modgil C. & Brown, G. (eds) **Jean Piaget : An
 interdisciplinary critique**. London : Routledge & Kegan
 Paul.

- Sebidi, L. (1986). Where do we go from here ? *The Child* , summer issue, 5 - 7.
- Short, A. (1987). A critical Appraisal of Cognitive Programmes for Pre-school children. In van de Berg, O. & Vergnani, T. (eds). *Door to the Future : The Preschool Child in South Africa : A book of readings.* Belville : University of the Western Cape.
- Siegel, S.(1956). *Nonparametric Statistics for the Behavioural Sciences.* New York : Mc Graw - Hill.
- St Nicholas Training Centre for the Montessori Method of Education, *Manual - External Diploma Course, Tutor Guided,* London.
- The City of Bloemfontein. (1976). Health regulations for creches and creches-cum-nursery schools. (Promulgated by A.N. 97 of 1976).
- Vasta, R. (1979) *An Introduction to Research Methods : Studying Children.* San Fransisco : Freeman.
- Vergnani, T., & van den Berg, O. (1986). Preschool care and education in South Africa : Problems and priorities. Paper read at "To Educate the Human Potential" conference, Johannesburg College of Education, July, 1986.
- Vygotsky, L.S. (1976). Play and its role in Mental Development. *Soviet Psychology* , 5 ,6 - 18.
- Waltuch, M. (1980). Mistakes and their correction. *Montessori talks to Parents* , 2 (1),7 - 9.
- White, J.M.,Yussen, S.R. & Docherty, E.M. (1976).Performance of Montessori and Traditionally schooled nursery children on tasks of seriation, classification and conservation. *Contemporary Educational Psychology*, 1, 356 - 368.
- Wikramarantne, L. (1979).The child in the world of nature. *Montessori talks to Parents* , 2 (2),2 - 5.

Yussen, S.R. & Santrock, J.W. (1978) **Child Development**
(2nd ed) Dubuque : Wm.C. Brown.

Zammarelli, J. & Bolton, N. (1977). The Effects of Play on
Mathematical Concept Formation. **British Journal of
Educational Psychology** , 47 , 155 - 161.