Verbal Versus Active Play Learning: Their Effectiveness on Symbol Recall in Three and Four-Year-Old Children

Mark R. Dorman

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Verbal Versus Active Play Learning: Their Effectiveness on Symbol Recall in Three and Four-Year-Old Children

A Thesis
Presented to the
Department of Physical Education and Sport
State University of New York
College at Brockport
Brockport, New York

In Partial Fulfillment
of the Requirements for the Degree
Master of Science of Education
(Physical Education)

by
Mark R. Dorman
December 1992
Title of Thesis: VERBAL VERSUS ACTIVE PLAY LEARNING: THEIR EFFECTIVENESS ON SYMBOL RECALL IN THREE AND FOUR-YEAR-OLD CHILDREN

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Chairperson, Department of Physical Education and Sport
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This study investigated the contribution of the motor activity learning medium (MALM) to the development of symbol recall in three and four-year-old children. Eighteen pre-schoolers from Gananda Day Care, in Macedon, New York, were used in this study. They were assigned to either a verbal learning group or an active learning group using a stratified random sampling technique. The children were pre-tested for prior knowledge of the symbols; pi, sigma, theta, and omega of the Greek alphabet. These symbols were taught to children in the verbal learning and active learning groups for thirty minutes for two consecutive days with verbal and active learning teaching methods respectively. A post-test was performed after the second day of instruction and the results were recorded. A retention follow-up test was performed ten days later and the results were recorded.

The data were statistically analyzed with the Wilcoxon Signed Rank Test of Differences. While a post-test and a ten-day follow-up test indicated a non-significant difference between the verbal learning and the active learning groups in performance, both groups showed gains on test scores. Although the results failed to show statistically significant differences in symbol recall between the two teaching methods, the mean scores for the active play group were higher for both the post-test and follow-up measures. The results showed a positive trend in favor of the active play method.
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In the words of the child;

I hear and I forget
I see and I remember
I do and I understand

Chinese Proverb
[Author Unknown]
CHAPTER I

INTRODUCTION

Throughout the ages, children have been the fiber that is spun into the thread that is later woven into the fabric of society. How this fiber is developed determines the strength of the thread which in turn determines the quality of the fabric. The way societies have raised their children has been one of the most important goals in human cultural behavior (LaBarre, 1949). There has always been concern among people about the needs of children. Today this concern is growing. Research reports have emphasized the significance of development in the early years (Read, 1971). Special attention needs to be paid to children's early educational experiences, if they are to grow into healthy adults. Play and movement time is one area that is critical to growth and development of children in the early years. During the first five years of a child's life, the foundations for all later development are constructed physically, intellectually, socially, and emotionally.

Physical motor development should be the central focus of the needs and interests of young children; it should play a central role in planning preschool curriculum (Gordon & Browne, 1989). Evidence shows that a majority of parents are sending their children to some form of preschool. Indeed, it has been estimated that some fifty percent of parents want the out-of-home program for their
preschoolers to be educational (Elkind, 1990). With a majority of young children being sent to some form of preschool, parents and educators need to be concerned with how and what these children are taught. In an attempt to increase our society's academic standing, many young children are being taught by teaching methods that are inappropriate to their age group (Kantrowitz & Wingert, 1989).

With the intent on increasing children's academic achievement and raising scores on standardized tests, early childhood curriculum has been replaced with sterile mastery of skills (Hatch & Freeman, 1988). Monighan-Nourot (1990) has observed that many teachers of young children have adapted traditional practices without questioning their origin or meaning in the lives of the children they teach. Elkind (1990) has pointed out that "The conviction that earlier is better-aided and abetted by contemporary family styles and international economic competition has led to the early formal instruction of infants and young children" (p. 4). In today's technological society where high levels of competition and production are valued, the education of children has been influenced greatly. The prevailing theory is to do it harder, do it more, do it faster, and there will be twice the benefits for children, families, and society. Elkind (1990) has indicated that the concept of "Earlier is better, has become an entrenched conviction among many contemporary parents and educators. According to this premise, it is never too early to start children on reading or mathematics, swimming, violin lessons, cooking, or karate" (p. 3). Many parents with the 'earlier is better' mentality are sending their children to preschools.
expecting them to be reading by the second semester of kindergarten (Kantrowitz & Wingert, 1989).

According to Martha Denckla, a professor of neurology and pediatrics at The Johns Hopkins University, more is not better (Kantrowitz & Wingert, 1989). Denckla also goes on to say that:

Just because a child goes to day care at age three doesn't mean the human brain mutates into an older brain. A five-year-old brain is a five-year-old brain. People are confusing the number of years children have been in school with brain development. Each stage of brain development requires something different for potential to be maximized (Kantrowitz & Wingert, 1989, p. 53).

Further, Humphrey and Humphrey (1980) have pointed out that much of what educators know about child development has been violated by the push into preschools. In fact, some scientists have felt that the traditional procedures for learning currently being imposed upon young children, may possibly decrease their potential for learning at a later time.

Clearly, a paradox exists: on the one hand parents and society are demanding measureable results from academically focused educational institutions. On the other, researchers suggest that too much, too soon, can possibly decrease a child's potential for learning, and that a more play-focused curriculum may be better for this age group. Elkind (1990) has pointed out that:
Schools are often caught in the middle. Although they may not wish to push academics down to the kindergarten and prekindergarten levels, they often believe that this is the only way to get funding. School boards will not fund publicly supported child care. But they will fund educational programs touted as giving children a head start and ensuring academic excellence (p. 4).

One possible solution for the concern over the focus of a preschool curriculum could be the use of the MALM (motor activity learning medium) developed by James H. Humphrey of the University of Maryland (cited in Winnick, 1979). Although using physical education activities or the motor activity learning medium (MALM) is not new, development and refinement of the approach began to accelerate in the mid 1960's. Humphrey (1975) stated that the MALM is concerned specifically with children learning basic skills and concepts in the various subject areas in the elementary school curriculum through the medium of motor activity. He held that children's learning will be enhanced through pleasurable physical activity. He further emphasized that the MALM would enable a child to develop the total person as well as incorporate the total personality which, when heightened, influenced the mind and body interaction. Humphrey, Cratty, Pragrer, Werner, Link, Crist, and Ross have conducted numerous research studies on the effectiveness of MALM (Winnick, 1979). It was found that it was successful in developing academic abilities of elementary school children. However, the age groups studied did not include children below age five.
In retrospect to the concern over academic versus play orientated curricula, it might be a worthwhile compromise to incorporate the MALM into the preschool curriculum. According to Spitzer (1977), recognition is the most basic process of memory. In order for children to benefit from past experiences, mastery of symbols needs to be the focus of preschool age children's learning (Biehler & Snowman, 1982). Since the MALM has shown equal or greater results in a child's ability to recall symbols in elementary school children, serious consideration should be given to its inclusion in the children's preschool curriculum. Humphrey (1966a, 1966b, 1962, 1967b, and 1972), Pragrer (1968, 1974), Ross (1970), Cratty and Martin (1970), Werner (1971), and Cratty and Szczepanik (1971) found a significant difference between a verbal teaching approach and the MALM, in favor of the MALM. Link (1958), Ison (1961), Crist (1968), and Penman, Christopher, and Wood (1977) found the MALM approach worked equally as well as the verbal learning method. In using the MALM, a child's ability to recognize symbols as well as his/her physical growth and development has been found to be enhanced. The MALM, important as it is for studying the acquisition of content knowledge by children above the age of six, has not been used to study the extent to which it is effective in teaching children below age five. During this study the author failed to find research validating MALM's effectiveness in children below the age of five.

Perhaps the biggest argument in favor of the MALM for preschoolers has been the fact that it has been found to provide a child with the movement necessary for healthy growth and development. As Klein (1990) has pointed out:
An emphasis on physical development has been especially important right now when many children have little access to play areas around their homes or schools, and when many play areas have been completely inappropriate for preschool children. Many young children tend to spend hours watching television. Such sedentary activity has not been conducive to physical development, and it has also prevented active learning (p. 28).

Play has always been a child's natural and developmental form of learning. It has provided children with experiences that allow them to grow physically, socially, cognitively, and emotionally (Wolfgang & Sanders, 1981). Playtime has long been held to play a role in the education of young children. Physical movement in play has been at the very center of a child's motor, cognitive, social, and physiological development (Gallahue, 1985). As children use their bodies in physical exercise vigorously and joyfully, they simultaneously have helped to refine and develop skills enabling them to feel physically confident, secure, and self-assured (Athey, 1984; Hendrick, 1986).

Play also has been shown to influence a child's social growth in that human beings tend to be social organisms that need to belong and feel as part of a group. Numerous studies have indicated that play with other children has given them the ability to analyze their behavior in the light of others, learn social skills, handle exclusions and dominance, share power and space, and also ideas with others (Fein, 1986; Rubin & Howe, 1986; Rubin, Maioni & Hornung, 1976; Rubin, Watson & Jamboor, 1978).
Play and cognitive development have been seen as inter-related. According to Bruner (1972) and Piaget (1962), play has been the primary source of cognitive growth in preschool age children, thus serving an important function in the process of growth and development in young children. Indeed, as found by Lieberman (1977), there is a positive relationship between play and standardized intelligence test scores. Further, Pepler (1982) and Dansky (1980) showed that play enhanced creativity and divergent thinking in children. In addition, as pointed out by Burns and Brainerd (1979), play has promoted children’s retention of content knowledge. Furthermore, play has been found to enhance language development of children (Levy, Schaefer, & Phelps, 1986). Understanding the relationship between play and cognitive development would be very important to educators and parents alike because levels of play can lead to more complex and sophisticated behavior in children (Saracho, 1986).

Despite the evidence of play’s contribution to the physical, cognitive, social, and emotional growth of children, preschool curricula have not seemed to maximize active play as a learning medium (Kantrowitz & Wingert, 1989; Isenberg & Quisenberry, 1988; Manning & Boals, 1987; Bagby, 1985; and Wolfgang & Sanders, 1981). History has indicated that teachers and parents in the United States have not fully acknowledged play as a valuable component of children’s cognitive development (Manning & Boals, 1987). All too often, children have been taught concepts in a formal classroom atmosphere where a sedentary (verbal learning)
appreciate approach to teaching has been used. If parents and teachers ignore the natural learning process of young children, then they may hinder, not help their physical growth and intellectual development. And, if indeed, children are creatures of physical movement, it would seem important to include as much motor activity (active play) as possible when developing preschool education curriculum.

**Purpose**

The major purpose of this study was to determine whether the MALM could develop symbol recall in three and four-year-old children equally or better than that of the verbal teaching method. Another purpose was to examine the methods of teaching three and four-year-olds for curriculum enrichment.

**Rationale for the Study**

This study was conducted to clarify the differences between the two teaching methods in the instruction of three and four-year-olds. The specific foci of the study were that: (1) There has been an increasing demand for knowledge about learning capabilities of preschool age children and teaching methods that maximized these capabilities. (2) The MALM has worked for children above the age of six, but little scientific evidence existed as to the benefits of the MALM to young learners of the preschool age. (3) Movement experiences needed to maximize a child's total development have been sought for by educators. Since trends in preschools at the
time of the study seemed to decrease children's movement possibilities in favor of a sedentary learning environment, concrete evidence necessary to substantiate the active play method of teaching and its importance to the preschool age children was required. Given this frame of reference, this study was undertaken to determine if there was statistical evidence to show that movement based teaching and sedentary methods of teaching could produce academic achievement in three and four-year-olds in similar or dissimilar fashion.

**Limitations**

Limitations for this study were influenced by the size of the groups tested, subjects' IQ, physical and psychological conditions of the children, subjects' attention span, subjects' motor ability, and the teacher's lack of prior experience in teaching through the MALM method.

Specifically the limitations were:

1) Relatively low numbers of subjects in the samples which may have compromised the generalizability of the results.

2) That no attempt was made to control for variations in subjects' IQ so there was no guarantee that the samples were of approximately equal intelligence.

3) That no attempt was made to control for variations in subjects' attention span, motor ability, other cognitive psychomotor characteristics that may have influenced group performance in different ways.
4) That although the teacher was trained by the researcher to appropriately utilize the MALM approach, she had significantly more experience with traditional method which may have had an effect on the results of the study.

**Delimitations**

Delimitations of this study included the two age groups tested, and the treatments (verbal learning and active learning) which were given to the children by the same instructor. The teacher met the criteria developed by the author, by successfully completing a pre-MALM lesson (teaching the number seven) before the experiment. The author taught the MALM method, and the pre-test and post-test procedures to the classroom teacher.

**Definitions**

**Active Learning.** Acquisition of knowledge through motor experiences (Humphrey & Humphrey, 1980).

**Conceptual Knowledge.** Ideas which exist in the mind as a representation (Spitzer, 1977).

**Curriculum.** An organized framework that delineates the content children are to learn, the processes through which children achieve the identified curricular goals, what teachers do to help children achieve these goals, and the context in which teaching and learning occur (National Association for the Education of Young Children and the National Association of Early Childhood Specialists in...

**Edu-Beam.** A four-sided balance beam with numbers (1-10) on one side, colors (yellow, blue, and red) on another, shapes (triangle, circle, and square) on the third side, and the alphabet (upper case and lower case) on the fourth side. This apparatus is useful in motor development.

**Feedback.** Evaluative or corrective information about an action or process (Zion & Raker, 1986).

**Human Movement.** Act or process of moving involving gravity, static and dynamic equilibrium, motion, leverage, force, space/time, mass/weight, and inertia energy (Zion & Raker, 1986).

**Kinesthesia.** A sense mediated by end organs located in muscles, tendons, and joints, and stimulated by movement intentions (Zion & Raker, 1986).

**Knowledge.** Fact or condition of knowing something with familiarity gained through experience or association such as terms, facts, methods, procedures, concepts, and principles (Biehler & Snowman, 1982).

**Learning.** An enduring change in behavior or in the capacity to behave in a given fashion resulting from practice or other forms of experience (Schunck, 1991).

**Long Term Memory.** Stage of information processing corresponding to the permanent repository of knowledge (Schunk, 1991).

**Memory.** Power or process of reproducing or recalling what has been learned or retained (Cermak, 1972).
Motor Activity Learning Medium (MALM). Acquisition of knowledge predominantly through movement (Humphrey & Humphrey, 1980).

Play. Total or near total physical response on the part of the child as he/she interacts with others and/or natural forces (Humphrey & Humphrey, 1980).

Recall. Remembering what has been learned or experienced (Cermak, 1972).

Short Term Memory. Information processing stage corresponding to awareness, or what one is conscious of at a given moment (Schunk, 1991).

Symbol. Something that stands for, or signifies, something else (Berger, 1988).

Verbal Learning. Acquisition of knowledge through passive experiences (Humphrey & Humphrey, 1980).

Verbal Learning Method. Learning through abstract symbolic manipulations in a predominantly sedentary state (Humphrey & Humphrey, 1980).
CHAPTER II

REVIEW OFRELATEDLITERATURE

Contemporary researchers of today, parents, and teachers, know more about child growth and development than at any other point in history. Researchers and practitioners like Froebel (Gordon & Browne, 1989), Glickman (1979), Hartley & Goldenson (1963), Margaret (McMillan, 1919) and Rachel McMillan (Gordon & Browne, 1989), Hill (Gordon & Browne, 1989), Montessori (Cratty, 1969), Fernald (Cratty, 1969), Mitchell (Seefelt, 1990), Piaget (1962) and Bruner (1972) have known for instance that children need play and movement in order to maximize their cognitive growth and physical development. They understood that a child is better able to learn if all his/her senses are used in the learning process: The more exposure a child has to various experiences, the better he/she will be able to learn in later life (Spitzer, 1977). These research findings should be used to guide parents and teachers in their decisions about how to raise, educate, and care for their children. Unfortunately, this research information seemed to have vanished when attempting to put theory into practice. This was noticed in early childhood education. Instead of creating and providing for movement experiences, our society seemed to discourage children from using their bodies as a learning and growing modality. Research, past and present, has stressed the importance of play and movement in a child's growth and development. This review of literature has
examined the importance of early childhood education, explored the nature of learning, investigated the theories surrounding cognitive learning in early childhood, examined the curriculum in early childhood education, discussed the importance of play and learning through movement, and defined and cited research done in the motor activity learning method (MALM).

**History of Early Childhood Education & Importance**

The idea of preschool education is not new or revolutionary. Early childhood education has had a rich and rousing history. The story of its development was the chronicle of individuals who extended themselves to improve the lives of children. Several factors have contributed to the growth of early childhood education. The first dealt with social reform. Early childhood education programs had the expectation that schooling for the young would lead to social change and improvement. Montessori, McMillan's, Hill, Pratt, and Head Start Program all tried to improve children's health and physical well being by addressing the physical and social welfare issues of children's lives (Gordon & Browne, 1989). The Head Start Program brought social reform one step further by trying to improve the whole family situation and incorporating the entire community. Educators believed that children could learn well when properly nourished (Schweinhart & Weikart, 1983). They held fast to the idea that the early years form a foundation for later development, physically, intellectually, socially, and emotionally (Schweinhart &
Weikart, 1983). Recognizing young children's special needs has led to research on learning theories and learning programs.

Events in past history have had an effect on the shaping of early childhood education. The importance and uniqueness of childhood was not taken seriously until the 1700's. Prior to this time, Western society showed little concern for children. In fact, infanticide took place frequently and actually was an accepted practice (Gordon & Browne, 1989). As people in society became more educated, the valuing of children and their lives changed dramatically. People realized the importance of childhood and began to take responsibility for the quality of life children received. Society began to provide for the health and physical welfare of children, and realized their importance on the children's cognitive growth. The McMillan sisters, in the early 1900's gave documentation of the importance of the environment and its ability to change children's lives; they were positive that early education centers, which they named nursery schools, could dramatically affect children, their families, and all of society (McMillan, 1919). They wrote that, "All the world [should awaken] to the fact that human destiny is largely shaped by the nurture or neglect of early infancy and childhood" (McMillan, 1919, p. v.).

Around the turn of the century, wartime created jobs for women which resulted in a need for day care. Out of World War II came the Kaiser Child Care Centers, which provided for the health and physical welfare of the children of working mothers (Gordon & Browne, 1989). The war on poverty in the 1960's
stimulated the development of the Head Start Program. The baby boom of the 1970's, combined with ever increasing numbers of working mothers and single parent households, caused an explosion in child care facilities. The push by parents and society to give a competitive edge both at home and abroad shaped the format of early childhood care and education as it is known today. Further, several disciplines have shaped early childhood education by contributing to the knowledge and development of early childhood programs. Through years of research and observation, the fields of education, medicine, and psychology, have developed guidelines for what has been considered best for children. The medical field concluded that childhood is both maturational and environmental. Psychology supported this by adding the issue of nature versus nurture and offered observational study as a format for studying educational practice in early education. As a result of this, early childhood theory focused on the physical growth and developmental stages of children as well as on the understanding of personal experiences in learning. The field of education contributed a holistic approach to the child and family, learning tools and materials, as well as a host of activities geared to stimulate a child's growth and development. Past research has indicated that an enriched early childhood experience can affect a child's physical and cognitive growth. Seefeldt (1990) has pointed out that:
With the clear certainty of any number of hard, unyielding statistics, we now have abundant, cold data to buttress the beliefs of Patty Smith Hill and the McMillan sisters, as well as those of other pioneers in early childhood education, Barbara Biber, Lucy Sprague Mitchell, Susan Blow. We now know that early educational experiences do influence all of later life.

The data are clear. Early educational experiences are beneficial for children, families, and all of society. Lazar (1977), Lazar & Darlington (1978), and Schweinhart, Weikart, & Larner (1986) leave no doubt about the lasting benefits of early educational experiences (p. 9).

The Curriculum Of Early Childhood

The curriculum was considered to be an organized framework that delineated the content children were to learn, the processes through which children achieved the identified curricular goals, what teachers did to help children achieve those goals, and the context in which teaching and learning occurred (National Association for the Education of Young Children and the National Association of Early Childhood Specialists in State Departments of Education, 1991). According to the position statement of the National Association for the Education of Young Children and the National Association of Early Childhood Specialists in State Departments of Education (1991):

Curriculum should be planned based on the best knowledge of theory, research, and practice about how children develop and learn with attention given to the individual needs and interests in a group in relation to program goals (p. 24).
When children enter an early school program they need to be afforded many opportunities to receive and express ideas and knowledge. They need to attend, store, recall, discriminate between visual and auditory stimuli, to be directionally oriented, to be effective in oral presentations, and to follow oral directions. The degree to which these modalities were utilized had a reciprocal effect on the degree to which the essential or basic skills areas were developed (Range, Layton, & Roubinek, 1980, p. 197). In an early childhood setting, curriculum consisted of art activities, language games, gymnastics, songs, and digging in the sand. It became, literally, everything that happened in the course of a school day. Curriculum was the planned and the unplanned. Appropriate curriculum did not violate, but rather respected children's biological needs. The curriculum provided for active physical play and periods of more restful, quiet activity since this pattern was compatible with children's physical needs. According to the National Association for the Education of Young Children and the National Association of Early Childhood Specialists in State Departments of Education (1991) the curriculum reflected the belief that:

1. Children learn[ed] best when their physical needs were met and they felt psychologically safe and secure.

2. Children learn[ed] through social interaction with adults and other children.


6. Human development and learning are characterized by individual variation (pp. 24 - 27).

Young children were like sponges; they absorbed everything going on about them. Since they were young, the whole world was new and fresh. Therefore, children did not discriminate between what was prepared and structured for them to learn and whatever else happened to them at school. It was all learning (Gordon & Browne, 1989, p. 310).

**Early Childhood Education Philosophy**

There were two major, sharply contrasting approaches to teaching young children. They were the child-development approach and the academic approach (Greenberg, 1990).

The child-development oriented nursery school (traditional nursery school) placed an emphasis upon the child's social and emotional development more than his/her intellectual development. The emphasis of this program was on personality development, social adjustment, and creativity. Motor development as well as language development were not regulated. The role of the teacher in all of these activities was to guide children's behavior and development; children were allowed considerable freedom to explore the possibilities in equipment, to use it
creatively alone or with others, and to develop at their own rate. Play was the cornerstone of learning in this environment (Lavatelli, 1970).

The second major type of preschool curriculum revolved around academics. Academically-orientated preschools at their most extreme were run like mini high schools, where children moved from class to class for formal lessons in arithmetic, pre-reading skills, and language. At a lesser extreme, children in the academically-orientated preschool traced patterns, colored outlines with prescribed colors, and engaged in reading readiness activities involving workbooks. Play was de-emphasized, and so was freedom of movement. Preschools were seen as a miniature first grade where children spent most of their time in their seats, working on activities quietly (Lavatelli, 1970).

Traditional preschools, those schools in which play was established as the central focus of the curricula, were criticized for neglecting intellectual development. Academic preschools on the other hand, were under fire for offering little in the way of social, emotional, and physical growth for children. One possible solution for this dilemma was to provide part of the school day for structured, directed learning, and the rest of the day for relatively free activities.

Since the 1970's, we have seen a swing toward the academically-orientated preschool. Elkind (1990) cited a number of reasons for this direction in the curriculum of preschools in the United States. 'Earlier is Better' has become an entrenched conviction among many contemporary parents and educators. Seefeldt (1990) made the statement that:
rather than children learning concepts, achieving mastery over self and their world, today's young children [have been] given a sterile curriculum revolving around learning to recognize, read, and write letters and numerals, and to make letter-sound correspondence. Knowledge of the ABC's, rather than mastery of knowledge, [has been] the curriculum (p. 10).

Learning Theories In Early Childhood Education

Several fields of study and a number of professions have added to the knowledge of children and, therefore, have influenced educational theory. From the professions of education, medicine, and psychology, early childhood education developed a theory of what was best for children.

Early childhood educators drew upon several developmental and learning theories and their direct experiences with children, and tried to enhance cognitive development in children. By combing theoretical and practical viewpoints, teachers took a blended, or eclectic, perspective on the development of the thinking processes in children (Gordon & Browne, 1989, p. 357). The connection with the field of psychology was particularly strong. Much of what we know about children today came from child development and child psychology research. These studies tried to answer the following questions: How have children developed; what have they learned, and in what order; what have the people needed in order to get children ready to learn; what has affected their learning; and, have all children learned in the same way?
Two of the more commonly accepted learning theories have been the behaviorist theory and the cognitive theory (Godon & Browne, 1989, p. 100). The behaviorist's theory began with the notion that a child was born with a "clean slate," a tabula rasa in John Locke's words, on which events were written throughout life (Gordon & Browne, 1989, p. 105). The conditions of those events caused all important human behavior. Learning took place when an organism interacted with the environment. Through experience, behavior was modified, or changed. In the behaviorist's eyes, three types of learning occurred: (1) classical conditioning; (2) operant conditioning; and (3) observational learning or modeling (Gordon & Browne, 1989, p. 106). The first two were based on the idea that learning was mostly the development of habit. What people learned was a series of associations, forming a connection between a stimulus and response that did not exist before. Classical conditioning focused on the stimulus affecting the response, whereas operant conditioning focused on the response rather than the stimulus. The third was based on a social approach called "observational learning" or modeling. Here, a child learned through watching others' behaviors and actions (Gordon & Browne, 1989, p. 106).

Developmental psychology, particularly through the works of Jean Piaget (1896-1980), provided a deeper understanding of cognitive development. The cognitive theory relied on both maturational and environmental factors (Gordon & Browne, 1989, p. 109). This theory was called maturational because it set out a
sequence of cognitive (thinking) stages that were governed by heredity. For example, heredity affected our learning by (1) how the body was structured biologically, and (2) automatic, or instinctive, behavior, such as an infant's sucking at birth. The cognitive theory was an environmental theory because what experiences children had would directly influence how they developed. According to Biehler and Snowman (1982), Piaget concluded that there were recognizable stages of cognitive development. These stages followed a continuous, but often zig-zag, pattern. Their cognitive development followed a definite sequence. The rate at which a particular child proceeded through these stages varied, but Piaget believed that the sequence was the same in all children (Biehler & Snowman, 1982).

Piaget (1950) defined intelligence as that which enabled humans to adapt to new situations. The origins of intelligence were found in what Piaget called the sensorimotor stage which began at birth (Piaget, 1952). The infant came into the world with two kinds of reflexes: those like the knee jerk, that were not altered by experience, and others, like grasping and sucking, that were modified as the infant exercised them. The modification occurred through assimilation and accommodation.

To understand these two processes it [was] first necessary to comprehend another basic Piagetian concept - schemes. Schemes [were] organized patterns of behavior or thought that children formulate[d] as they interact[ed] with their environment, parents, teachers, and agemates.
Schemes [could have been] behavioral (for example, [throwing a ball]) or cognitive (realizing that there [were] many different kinds of balls). Whenever a child encounter[ed] a new experience that [could not] fit into an existing scheme, adaptation [was] necessary. A child [would] adapt either by interpreting the experience so that it [did] fit an existing scheme (assimilation) or chang[ed] an existing scheme to incorporate the experience (accommodation) (Biehler & Snowman, 1982, p. 52).

During the sensorimotor period, the infant laid the foundation for later representational thought. Structures were built which were essential for the mental operations that were to be carried out on a later stage of development. The sensorimotor foundations of one structure that adults recognized most easily were those involved in orienting themselves in space. Gradually, actions became internalized; the child represented in thought processes what was first developed on the sensorimotor system. This second stage began at eighteen-months and extended to roughly seven-years of age. The stage was called preoperational, the logical operations that had not yet appeared. During the early part of this stage (18 months to 4 years), language was developing at a fantastically rapid pace. Furthermore, thought and language became interrelated; from thinking only in images, the child thought in words. He/she expressed ideas in words and could understand the communications of others.

Piaget used the term preoperational to refer to the thinking of two- to seven-year-olds (Biehler & Snowman, 1982, p. 57). This thinking of preschool children
centered on mastery of symbols (such as words), which permitted them to benefit more from past experiences. Piaget (1952) believed that many symbols were derived from mental imitation and involved both visual images and bodily sensations. Even though their thinking was more sophisticated than that of one- and two-year-olds, preschool children tended to center attention on only one quality at a time and were incapable of mentally reversing actions.

Revolutionary change has been seen in the thinking about the development of intelligence. Early childhood learning theories have given direction and guidance in the quest for knowledge about early childhood learning. Gordon and Browne (1989) gave this insightful conclusion:

Since the field of child development [has been] broad, encompassing a wide variety of opinion and fact, not all the experts [have agreed], or even [have thought] alike. Indeed, there [have been] differences among them about how children grow, think, and learn, and what motivates them. Each theory [has described] children and their processes in a different way. The teacher thus [has] a diversity of thought on which to establish a professional philosophy (p. 100).

The Nature Of Learning

Most of what has been understood about the world and its civilizations has been learned and carried down through the ages by human memory. Learning is the process by which we acquire new knowledge, and memory is the process by
which we retain that knowledge over a period of time (Kandel & Hawkins, 1992). According to present thinking a form of memory known as associative memory acquires facts and figures and holds them in long-term storage. In order for this knowledge to be used however, the information needs to be accessed and brought to mind. Working memory does just that. Working memory compliments associative memory by providing for short-term activation and storage of symbolic information, as well as by permitting the manipulation of that information (Goldman-Rakic, 1992).

According to Kandel and Hawkins (1992), the merger of two traditionally separate fields of science: neurobiology, the science of the brain, and cognitive psychology, the science of the mind has resulted in a new intellectual framework for examining perception, language, memory, and conscious awareness. The framework has been based on the ability to study the biological substrates of these mental functions. An example of this has been seen in the study of learning. Elementary aspects of the neural mechanisms important for several types of learning have been studied on the cellular and molecular level. It has been found that learning produces change in nerve cells, strengthens existing synaptic connections, produces an activation of genes, enhances expression of new proteins, and produces growth of new connections (Kandel & Hawkins, 1992). Studies conducted on laboratory animals have found that an enriched environment (with perceptualmotor toys and activities) caused these animals to have significantly
higher IQ's than dull environments (no toys at all). They also found that the animals in the enriched environment had developed more complex neurological structures, better blood supplies, and more acetylcholinesterase and cholinesterase in the brain (Zion & Raker, 1986).

Learning has been considered an enduring change in behavior or in the capacity to behave in a given fashion resulting from practice or other forms of experience that is relatively permanent (for example, enters the long-term memory store) (Schunk, 1991). Spitzer (1977) defined memory as, "the process of storing information for future use" (p. 65). Neurobiology has allowed researchers to see how this has been done. The storage of initial information is held in a type of short-term memory, which lasts minutes to hours and involves changes in the strength of existing synaptic connections. The long-term changes (those that persist for weeks and months) are stored at the same site, but require something entirely new: the activation of genes, the expression of new proteins and the growth of new connections (Kandel & Hawkins, 1992).

According to Spitzer (1977), memory consisted of recognition, recall, and recollection. Recognition has been the most basic process of memory. Recognition has been an extremely important process because it has provided the young child with the stability of perception necessary for building for himself/herself an enduring world view. Recognition has developed as experience progress with the parents, common objects within the immediate environment, familiar
surroundings, and familiar sounds. The more experienced the young child has been with his/her environment, the more he/she becomes familiar with it and the more he/she recognizes objects in the environment. Recognition has represented the primary mechanism for remembering until about the age of two, when the child becomes ready for higher forms of remembering (Spitzer, 1977).

Recall has been the next advance in memory. Recall has been the ability to recognize and retrieve pieces of information for use. It has been at this stage that the child begins to imitate words and associate meaning with them. Recollection has been more advanced level of memory. It has included not only recall but also has predicated the ability to group information meaningfully. It has also meant the ability to locate events and objects in space and time. For this study, symbol recall and the above definition of recall were used.

According to Spitzer (1977) most basic learnings were perceptual learnings, such as form, color, texture, taste, and relationship to other things (p. 64). These basic learnings were fundamental to subsequent experiences and, to a large extent, determined the meaningfulness of future experiences. Eventually, most learning was shifted from an emphasis on perception to an emphasis on language. From that point on, most learning was based on words and their meaningfulness was largely assumed. Memory became largely a verbal mechanism, and experiences became coded in the memory in the form of words. If a child's early perceptual experiences were rich enough, then his/her language and verbal memory would be
rich. When a child heard a word used, he/she had rich mental images or remembrances as a result of the perceptual experiences. It was a fact that most memory became dependent upon language that made early perceptual enrichment and sensory learning so important.

Early experiences should be active, sensory, and manipulative. It has been through such experiences that the child has developed perceptual abilities, motor coordination, and physical abilities. Spitzer (1977) stated that; "Perception and motor coordination were the foundation for intellectual growth, for it was through the process of perception that we 'took in' our world and through motor coordination that we act[ed] upon it" (p. 51). According to Gallegos (1983),

Play has significant influence in obtaining the mastery of academic readiness skills. In order to heighten the academic learning taking place, the inclusion of play in early childhood programs has seem[ed] to be necessary (p. 23).

Piaget (1952) believed that perception and motor coordination through play contributed to the store of experiences; in fact, children's exploration of materials and objects resulted in the acquisition of stored wealth which became the basis for further cognitive development.

With the recent merger of neurobiology and cognitive psychology a new understanding of learning has begun to emerge. By realizing how each of these areas would influence learning parents and teachers could have a better
understanding of the nature of learning.

Learning Through Movement & Active Play

Throughout the years, educators have tried to find more effective ways to educate children. More recently, play and movement have been researched and their possibility as a learning modality for children has been encouraged. Spitzer (1977) claimed that,

play [may be] the most useful context for early childhood education. Play [was] active, fun, manipulative, dynamic; and it provide[d] a child with an opportunity to experiment, to test new ideas, and to attain mastery without having to also cope with the complexity of reality. Play provide[d] the proper mix between serious learning and enjoyment (p. 72).

Bruner (1972) and Piaget (1962) made reference to play as the primary source of cognitive growth in preschool age children; it served an important function in the process of growth and development in young children.

Dobbert's (1985) play research on primates and human children supported the argument that young children needed to be active learners to maximize their learning potential. Play was particularly important because humans were polyphasic learners, and they learned through all sensory modalities simultaneously. The senses involved during play were not only those that sampled
external information, such as sight, hearing, and smell, but also those that sampled internal states such as effort, tension, and emotions. The memory of enjoyment acquired during play was stored in the brain in the form of a multisensory holography, which was able to be accessed by the affective components of play (Henry, 1960).

Sharpe (1979) conducted a study which examined the contribution of movement education on the development of children's thinking skills between the ages of four and seven, and his research demonstrated that cognitive gains may be made by children experiencing a carefully structured program of movement education. Hendry and Kerr (1983) investigated whether an integrated program of motor and cognitive tasks enhanced learning disabled children's motor and basic cognitive skills. Results showed that the group treated with the movement program showed greater improvements in motor and cognitive skills than the verbal learning group. This study suggested that a physical activity program can influence basic cognitive skills as well as motor skills.

In another study conducted by Sylva, Bruner, and Genova (1976), it was found that a relationship existed between play and learning. Their hypothesis stated that play reduced stress of anticipating success and failure. They also believed that play significantly influenced children's cognitive development. Glickman (1979), showed a positive relationship between children's play and their cognitive development, advocating more play as a solution for declining achievement.
scores. He considered the research showing that play was a basic component of experimental education. Children needed to play different roles to experience fantasy in play and play with others. This play facilitated a child's cognitive development and increased academic achievement.

Other studies suggested a strong relationship between play and cognitive development: (a) Lieberman (1977) found a positive relationship between play and standardized intelligence test scores, (b) Pepler (1982) and Dansky (1980) showed play enhanced creativity and divergent thinking, (c) Burns and Brainerd (1979) showed memory was enhanced by play, and lastly, Levy, Schaefer, & Phelps (1986) found that play could enhance language development. Understanding this relationship of play to cognitive development was important because levels of play led to more complex and sophisticated behavior (Saracho, 1986). Play influenced a child's social growth. Social play provided children with an opportunity to develop social skills necessary for human interaction. Numerous studies indicated that play with other children gave them the ability to analyze their behavior in the light of others, learn social skills, handle exclusions and dominance, share power and space, and also ideas with others (Fein, 1986; Rubin & Howe, 1986; Rubin, Maioni & Hornung, 1976; Rubin, Watson & Jamboor, 1978). Human beings are social organisms that need to belong and to feel as part of a group.
The concept of learning through movement and active play was not novel. Twenty years ago, much attention and refinement was given to this approach. This attention was due to the interests and the education of handicapped children, as well as the current research trends in education. The term developed for this learning method was the motor activity learning medium (MALM).

The motor activity learning medium (MALM) was developed based on the fact that children, being predominantly movement orientated, learned better when academic learning took place through pleasurable physical activity. Children seemed to learn better when the motor component (active play) operated at a maximal level, in skill and concept development (Humphrey & Humphrey, 1980).

It should be noted that academic play learning and verbal learning were not different kinds of learning. Verbal learning involved almost complete abstract symbolic manipulations, using at a minimal level motor components such as tension, subvocal speech and physiological changes in metabolism. Active play on the other hand, involved movement of almost the entire body (Humphrey & Humphrey, 1980).

Humphrey and Humphrey (1980) cited several factors that allowed children to learn better through the use of the MALM. They included: motivation, muscle sense, and reinforcement. Motivation was something that caused a person to act when he/she discovered that something had meaning, purpose, and enjoyment. If
the child received the impression that he/she was having fun and was successful in a given situation, then motivation came from inside the child (internal motivation). Knowledge of results (feedback) was another factor involved in motivation. Learning theorists have agreed that knowledge of results has been the strongest, most important aspect controlling performance and learning (Humphrey & Humphrey, 1980). Further, studies have repeatedly shown that feedback was necessary for any improvement, and the deterioration of learning resulted from unavailability of feedback (Humphrey & Humphrey, 1980). Moreover, an abundance of objective evidence indicated that learning was more effective when one received immediate feedback on how he/she was progressing. The active learning method provided almost instant feedback. Children could actually see and feel themselves participating in the activity.

The muscle sense was another factor that made learning easier. Three-fourths of our knowledge has come from our visual sense. Therefore, it could be said that a human being is eye-minded. But, a large portion of the nervous system has been involved with receiving and integrating sensory input originating from the muscles and joint structures. Six hundred muscles keep correct posture in a human (Humphrey & Humphrey, 1980). Because of such a large number of sensory nerve terminals, it has been contended that man is muscle sense minded. Children have been so movement orientated that it would be reasonable to assume that proprioceptive feedback from the receptors of muscles, skin, and joints could
contribute to learning when active play is used (Humphrey & Humphrey, 1980).

The last factor that Humphrey and Humphrey (1980) have attributed to the ease of learning has been the reinforcement factor. Active play has been found to reinforce attention to the learning task and learning behavior, thereby a child's involvement in the learning of the activity would be enhanced.

Humphrey and Humphrey (1980) noted that the procedure for learning through active play would involve the selection of an activity such as an active game, stunt, or creative activity, which would be taught to the child and would be used as a learning activity for the development of a skill or concept in a specific area. Gallahue (1985) indicated that movement activities for children enhanced the understanding of fundamental academic concepts when they were integrated with material dealt with during the academic portion of the day (p. 13). There were a variety of indirect and direct reasons why this occurred. Among them was the fact that active participation was fun. It was a more natural approach that closely approximated the needs and interests of children. Active participation in a game in which academic concepts were being dealt with made it difficult for children's attention to be diverted by extraneous stimuli. Also, a large percentage of today's children have placed a high negative value on academic understandings but have had a high positive regard for physical abilities (Gallahue, 1985). Using active games as a learning medium tended to pair pleasurable and highly regarded activity with that which was not as highly valued, and thus tended to give more pleasure to the
practice of the academic skill. Active learning through movement activities enabled children to deal with their world in concrete terms rather than in the abstract terms. Humphrey and Humphrey (1980) conducted a number of controlled studies over a several year period, on the active play approach to learning, and concluded that by using active play experiences, young children could learn to read, write, and develop understandings in mathematics. Compared with some of the traditional ways of teaching, the approach tended to enable children to learn better and retain what had been learned longer.

In a study conducted by Cratty (1973), an advocate of the MALM, children's academic achievement was enhanced when they were exposed to movement experiences:

1) Games [were] fun - thus motivating.

2) An active approach to learning academic skills many times provide[d] a natural "match" between program content and the need [for] some children to be active.

3) Physical activities in which children's total body [was] engrossed [intended] to produce a type of qualitative attention to the task.

4) Using active games as a learning methodology tend[ed] to pair a pleasurable and highly regarded activity with one that may [have] not [been] as highly valued, and thus might [have] give[n] more pleasure to the practice of the academic skill.
5) Studies indicate[d] that children [were] often more comfortable dealing with concrete situations, rather than those in the abstract. Movement activities provide[d] concrete acts to experience, to observe, and to think about.

6) Movement activities allow[ed] for immediate feedback by student and teacher (pp 7-8).

Werner and Burton (1979) supported Humphrey and Cratty's findings. They stated that children needed to develop fully, as human beings, and indicated that today's children have tended to use mainly their visual and auditory senses. Thus, children need to develop multisensory perception. They need to interact with subject matter physically, sensorially, as well as mentally. By doing so, they would gain a better understanding of what would be learned in school. Several reasons existed for using physical movement for a learning medium.

1. Children more readily attend[ed] to learning task if it [was] through the physical.

2. Children [were] dealing with reality. The facts [were] tangible through the physical.

3. It [was] a process approach which develop[ed] the affective domain, thus act[ed] as a reinforcer for concept learning.


5. Physical learning [was] result orientated, [providing] immediate feedback for learner and teacher.

MALM Research

The utilization of the motor activity learning medium (MALM) in the acquisition of academic concepts has not been new. Various forms of MALM have been around for many years. In the past two decades, the majority of MALM research has focused on evaluating its effectiveness on the extent to which it improves children's academic achievement. One of the first studies in MALM research was conducted by Ison (1961), who examined the relationship of active movement and play on cognitive development. Ison used physical education activities as a learning medium for the development of selected fifth grade science concepts and compared it to verbal teaching procedures. Stunts as well as active games were used as learning activities in this study. Eighteen science concepts were selected. Nine of these concepts were taught through the physical education method and the remaining nine were taught through the verbal learning classroom methods. One period was used to teach each concept, and the two methods of teaching were alternated, for a total of eighteen days. No significant difference was found between the post-test scores of the concepts that were taught through the different methods. Significant differences were found at a high level of confidence in both classes between pre-test and post-test scores of the concepts taught through
the physical education medium.

In another study involving the MALM, Humphrey (1965) used a group of third grade students, to determine if children learned better through an active game medium or through a traditional workbook medium. Twenty third grade children were divided into two groups on the basis of pre-test scores on ten language understandings. One group was taught through an active medium. The other group was taught through traditional language workbooks. Both groups had the same teacher. The study was carried on over a ten-day period, two days for pre and post-tests, and eight days for instruction. Comparisons were made of pre-test and post-test scores of both groups. The Wilcoxon Signed-Rank Test of Differences was applied to the post-test scores which indicated a significance of .05, in favor of the active group. The statistical results showed that both groups learned, but the active game group learned at a higher level of significance. It was concluded that these third grade children could develop language comprehension through both mediums, but the active game medium produced greater changes. Humphrey (1970b) noted that he would have liked to carry the studies out over a longer period of time but it was impractical to do so because it usually involved some interruption of the regular school program. Humphrey concluded that the third grades could develop language comprehension through either method, although the active game method produced greater changes.

Another study done by Humphrey (1966a), equated children rather than
concepts. A large number of fifth grade pupils were pre-tested, forty were chosen for the study. One group was designated as the physical education group, and the other as the verbal learning group. The same teacher taught both groups nine science concepts. The verbal learning group was taught through such procedures as oral presentation, visual aids, class discussion, and experimentation. The physical education group was taught through physical education activities in which the concepts were inherent. After a period of nine days, they were retested. Comparisons of post-tests of both groups showed a statistically significant difference in the mean scores in favor of the physical education group. It was concluded that learning took place better through the physical education median than through the verbal learning procedures.

Yet another study done by Humphrey (1966b), sought to determine how well a group of first grade children developed number concepts through the active game medium and at the same time determined which approach was more favorable for boys or for girls. Thirty-five first grade children were pre-tested on eight number concepts, which were included in their regular class work during over a two week period. Ten boys and ten girls were selected based on pre-test scores. Active games were taught to the twenty children, and used as learning media for the development of number concepts. They were retested after the active game medium was used. After computing the results, the statistical analysis showed that as a total single group, there was a highly significant difference between pre-test to post-test student
scores. In comparing boys to girls, boys seemed to learn better through the active game method.

Humphrey (1967b) designed a study to evaluate the effectiveness of active games as a means of reinforcing reading skills with fourth grade children. The purpose of the study was to determine how well certain reading skills could be reinforced by the active game medium as compared with some of the verbal ways of reinforcing these skills. A parallel experimental procedure was used. Thirty children were divided into two groups on a matched pair basis. One group of fifteen was the active games group and the other the verbal learning group. Reading skills were introduced verbally to both groups at the same time. The groups were then separated, and one group was reinforced through active games. The other group was reinforced by traditional media, such as; language workbook, dictionary, and ditto sheets. Both groups were taught by the same teacher. The experiment covered ten-days; one day for pre-testing, eight days for experiment procedures, and a final day for post-testing. Results showed that in fourteen of the fifteen matched pairs, the child in the active game group scored higher on the post-test than did his/her counterpart in the verbal learning group. A comparison of both groups showed the active game group learned significantly more than the verbal learning group. It was concluded that the kinds of reading skills used in this study could be better reinforced by active game learning medium than by some verbal approaches.

Humphrey (1968a), sought to determine how well second grade children
learned certain number processes through verbal procedures compared to learning through active game orientated reading content. In the area of mathematics, this kind of reading content was referred to as mathematics motor activity storing. Two groups of second grade children with twenty-one in one group and twenty-three in the other group were pre-tested on two number addition facts, three number addition equations, and subtraction facts. One group of children designated as the experimental group was taught through motor activity stories. The other group, the verbal learning group, was taught through traditional procedures such as the printed number line, plastic discs, and abstract algorithms. Both groups were taught by the same teacher. The experiment was conducted over a four day period. Post-tests were conducted after the four-day period and were re-tested after an extended period of ten days. The gain from pre-test to post-test favored the experimental group. The same results were shown in gain from post-test to extended interval tests. Results of this study concluded that these second grade children developed certain number processes better and retained them longer through the active game learning medium than through some of the verbal learning procedures.

Prager (1968, 1974), conducted a study to determine if reinforcement of learning through physical activity was better than that of reinforcement through verbal learning classroom procedures. Twenty-three first grade children were pre-tested on a science unit. They were divided into two groups on the basis of the pre-test. The classroom teacher taught eight science lessons to the entire class. The
teacher used regular verbal learning teaching procedures. Immediately after, the physical education teacher took eleven of the children (experimental group) on the basis of the pre-test scores and reinforced the concepts of science through physical education activities. The other twelve children (control group) took part in pleasurable activities, such as art work or story telling with the classroom teacher. None of the verbal learning group activities were science-related. After the procedure was followed for a two-week period, the children were retested. The results showed that the experimental group scored significantly higher than the verbal learning group. It was indicated that the group reinforced by the physical education learning activities gained significantly at a very high level of probability, while the other group did not improve significantly.

A further study done by Crist (1968), sought to determine whether an active game medium showed greater results in the learning of third grade children compared to that of two other methods: developmental learning method and drill method. Forty-two classes of third grade pupils, for a total of 1147 children were used as subjects in this study. The 42 classes were divided into 3 groups which resulted in 14 classes in each group. One group was taught through the developmental learning method, the second group through the drill method, and the third group through the active game approach. All classes were taught by their classroom teacher for ten days. All teachers were required to teach each lesson twenty minutes. After ten days, post-tests were given. In comparing pre-test and
post-test of each individual group as its own control, it was indicated that all groups learned significantly from pre-test to post-test. However, the highest level of probability was shown in the active game group, the second highest was in the developmental-meaningful group, followed by the drill group. A comparison of all three groups of the post-test scores showed no significant difference between any of the groups. Crist (1968), emphasized that the teachers taking part in the experiment had never taught academic concepts using the active game technique, but had considerable experience with the other two methods, both of which had to be taken into consideration.

Cratty and Martin (1970) developed a study to see if active learning games enhanced academic achievements of Black and Mexican American children, in the central part of Los Angeles. One hundred and twenty-seven first grade to fourth grade children were selected based on IQ scores. Subjects were exposed to one of four programs during an 18 week period. The first group was given no extra class tutoring or special physical activity and served as a control. The second group received a special program of physical education for one-half hour, three times a week. The third group received small group tutoring in a classroom, and the fourth group was given a variety of learning games for one-half hour three times a week. The learning games were designed to promote self-control, verbal letter and pattern recognition, the ability to write and recite the alphabet, spelling, serial memory, and to increase attention. The researchers found that the learning games group
improved more and achieved significantly higher scores in tests of motor ability. They further found that this group learned the letters of the alphabet earlier than the children in the other three groups. Subjects exhibited greater self-control, scored higher on serial memory tasks, and scored significantly higher on reciting the letters of the alphabet. As a result of these findings, the authors concluded that the active learning games approach had a beneficial effect on selected academic operations when applied correctly.

Penman, Christopher, and Wood (1977) compared the effectiveness of learning capitalization and punctuation skills through active games, passive games, and verbal teaching methods. Two third-grade classes were taught these language arts skills using passive and active games over a four-week period. Their performance was compared to a third class (control) from the same district which was taught in the verbal learning manner for the same period. Pre-tests and post-tests utilized different forms and levels of the Iowa Test of Basic Skills, Language Arts. Post-test scores were the covariates. The investigators found that, in regard to capitalization, the class taught through active games learned a significantly greater amount than either the class taught through passive games or the control class. In regard to punctuation, it was found that the active games class scored significantly better than the other two groups and in addition, the passive games class performed significantly better than the control class. In a second post-test six months later, there was no significant difference in capitalization skills. For punctuation, there
was a significant mean difference for the second post-test; the passive games class slightly increased their scores. It was found that retention was significantly better only for the passive games class. The investigators stressed that the experimental groups enjoyed the games used and that they constantly asked to play the language arts games.

Cratty and Szczepanik (1971) investigated the effects of a program of learning games upon selected academic abilities in children with learning difficulties. One hundred and fifty-seven first grade children were selected. Subjects in this study were considered, by their teachers, to have low learning potential and scored low on the Metropolitan Reading Readiness test. One group was given a program of learning games, intended to improve academic learning, in the first half of the school year for one-half hour daily. At the same time, the second group stayed in their regular classroom environment. During the second half of the year, the groups reversed roles. A test was designed to evaluate the ability to identify verbally geometric patterns and letters, to write each letter of the alphabet, to remember a series of letters and numbers, and to demonstrate self-control. This test was administered to both groups after the treatments. Significant improvement was seen in each group, as a result of the enriched program (learning games). The investigators concluded that the program of learning games had significant effect on selected measures of academic achievement.

A further study conducted by Gallegos' (1983), involved two groups of pupils.
Group one was introduced to learning skills through verbal learning instruction and seat work, while the other group was introduced through active play. The play group scored higher in eleven skills tested while the verbal learning group scored higher in only one. Both groups scored alike in four skills. Gallegos' (1983) concluded that,

Play [has] significant influence in obtaining the mastery of academic readiness skills. In order to heighten the academic learning taking place, the inclusion of play in early childhood programs [has] seem[ed] to be necessary (p. 23).

It was noted in research by Humphrey & Humphrey (1974), Cratty (1972), Humphrey & Sullivan (1970b), Cratty & Martin (1970), and Humphrey & Moore (1958) that certain observations did not show up in their statistical analysis. One observation that was made was that the children in the experimental group appeared to be stimulated by the use of the active game learning medium. Also, the affective domain seemed to be more prevalent with the active game learners.

Humphrey and Humphrey (1980) stated that,

research over a period of several years [had] shown that by use of active play experiences, young children [could] learn to read, write, and develop understandings in mathematics. Compared with some of the traditional ways of teaching, this approach tend[ed] to enable them to learn better and retain what ha[d] been learned longer (p. 4).
Humphrey and Sullivan (1970b) suggested that three types of factors positively influenced learning when children were exposed to the active games approach.

1. Motivation: including the suggestion that games [were] motivating because they possess[ed] intrinsic interest to children, motivations result[ing] in the competition in games, and motivation [that arose] from the immediate knowledge of results [that] concern[ed] the relative success which games provide[d].

2. Proprioception: sensory experience [which arose] from muscle action act[ed] as a kind of coordinating process that aid[ed] in the integration of visual and auditory input, [which formed] a holistic kind of perceptual experience as a child move[d] his body and limbs in the games he ha[d] devised. They coin[ed] the term "motivation to describe the phenomenon that result[ed] from the combination of the psychological concept of motivation with the physiological factors of proprioception, both purportedly [were] involved when [the] child participate[d] in active games.

3. Reinforcement: active games [were] helpful, because they [were] compatible to Premack's reinforcement hypothesis. Although this hypothesis [was] not developed fully in Humphrey's writings, he suggest[ed] that within the reinforcement concept [there was a] tendency of games to provide a kind of focusing situation, one that "reinforce[d] attention to the learning task and to the learning behavior" (p. 41-50).

Humphrey (1985) further concluded that although the available data was not extensive enough to carve out a clear cut profile with regard to learning through
motor activity, they were suggestive enough to give attention to some interesting generalizations which may be briefly summarized as follows.

1. In general, children [have tended] to learn certain academic skills and concepts better through the motor activity learning medium than through many of the traditional media.

2. The approach [has been] most favorable at the primary level, the next most favorable at the immediate level and the next most favorable at the upper elementary level.

3. The approach, while favorable for both boys and girls, appear[ed] to be more favorable for boys.

4. Significant gains [were] made with children of all levels of intelligence.

5. For children with high levels of intelligence, it [was] possible to introduce more advanced concepts at an early level through the motor activity learning medium (p. 24).

In summary, all research which involved the motor activity learning medium (MALM) indicated that it could be a useful learning modality. The MALM motivated learners, held their attention, provided them with an opportunity for physical activity while learning academic concepts, reinforced and incorporated many of their sensory systems while learning. Advocates of the MALM were careful to point out that it was a valid approach rather than the approach for teaching academic concepts. They also pointed out that everything could not be
taught through this approach, and recognized that children learn differently.

**Defining Play**

The period from age two to six was referred to as early childhood or the play years. According to Berger (1988):

Play occurr[ed] at every age. But the years of early childhood [were] the most playful of all, for children [spent] most of their waking hours at play. They chase[d] each other and dare[d] themselves to attempt new tasks, developing their bodies; they play[ed] with words and ideas, developing their minds; they play[ed] games and dramatize[d] fantasies, learning social skills and moral rules. In the process, they acquire[d] the skills, ideas, and values that [were] crucial for growing up (p. 177).

Caplan and Caplan (1973) stated in their book, *The power of play*, that:

Physical activity [has been] the prime aspect of play. Children [have used] their bodies when they follow their natural impulses to run and shout, skip and hop, jump and climb, and so on. The more [the] child uses all his muscles, the greater [is] his physical and emotional release and his growth and enjoyment of life.....All play is active and, in most instances, is associated with bodily activity (p. 1).

Throughout the years, theories of play have been developed. In general, the theories were divided into two categories: (1) classical and (2) dynamic. Classical
explains why people play and dynamic explains the process of play (Humphrey & Humphrey, 1980). For the purpose of this study the author was concerned with dynamic play.

Berger (1988) stated there were many forms of play. Sensorimotor play was play that captured the pleasures of using the senses and motor abilities. Infants regularly engaged in this kind of play, were delighted in such things as watching a turning mobile or kicking the side of the basinet. This pleasure in sensory experiences and motor skills continued throughout childhood. Mastery play was play that helped children master new skills. Mastery play was most obvious when physical skills were involved, but it included almost any skill the child felt motivated to learn. Mastery play increasingly included activities that were clearly intellectual, such as play with words or ideas. Rough-and-tumble play was play that mimicked aggression. Rough-and-tumble play was a significant part of the daily activities of many children in preschool. Pretend play or imaginative play was play that used symbolic thought in the cognitive and physical domains. Pretend play was used with children who are old enough to think symbolically but too young to distinguish reality from fantasy.

The term play has had as many as sixty definitions according to the (1987) edition of Webster's Ninth New Collegiate Dictionary. According to Humphrey (1980), the reason for this was that the word play was used in so many different ways. He further stated that authors who wrote about the subject of play needed
to give their own operational definition of it. In his book, *Help your child to learn the 3R's through active play*, he defined play as any enjoyable active interaction with one or more persons and/or natural forces. Humphrey put an emphasis on active play as opposed to that which was more passive in nature. The kind of play he was concerned about was one that involved a total or near total physical response on the part of the child as he/she interacted with others and/or natural forces. When Humphrey used the term natural forces (i.e., space, gravity, leverage, force, inertia energy, motion, static and dynamic equilibrium, and mass weight) he was primarily concerned with the child playing by himself/herself and not interacting with one or more persons. For the purpose of this study the author has aligned himself with Humphrey's definition of play.

**History of Play**

What a child learns as well as how much he/she learns and how long it is retained can be determined by the stimulus properties of the learning medium and the effect these have on the child. When a child uses his/her whole body as a learning medium, the interaction between the child and subject matter becomes more complete.

Play has held a role in the growth and development process of children. In fact, play's role in child development seems to be as old as humanity itself.

Artifacts and playthings have been uncovered in excavations of the oldest
civilizations. Ancient drawings and artwork have given evidence of human play. In these ancient cultures, the work of the adult was that of survival by hunting and gathering. The play of children imitated these activities closely; play was preparation for survival. Later, in the ancient cultures of Rome and Sparta, play centered around the making of a warrior. In Athens it centered around athletics and music. Plato related the importance of play by stating that,

> [When] teaching young children, train them by a kind of game, and you will be able to see more clearly the natural bent of each. The humanists of later centuries also incorporated movement activities with educational programs they developed. They hoped to preserve the natural inclinations of the child to move and explore, while confronting the child with academic content (Cratty, 1973, p. 2).

The period of the Renaissance exploded with new scientific facts and inventions. Great progress in all areas of science led to a new importance of physical exercise in education. Educators such as Mulcaster, Ratke, Comenius, and later Locke, Rousseau, Pestalozzi, and Froebel, all emphasized the importance of physical activity and health (Gordon & Browne, 1989). French writer Fenelon, who died in 1715, observed that some children could learn to read while playing (Cratty, 1973). The association between the child's mind and body became increasingly important during this time. Experiments to determine if play should be included in the school curriculum were started. Rousseau emphasized education from direct

The seeds that were sown by Comenius, Rousseau, and Pestalozzi later helped to create a positive case for play in United States education (Monighan-Nourot, 1990). It wasn't until the middle 1800's however, that play was taken seriously as an important component in early childhood education. During this period, the narrow perspective on play began to change dramatically. Educators like John Dewey, Carolyn Pratt, Patty Smith Hill, Maria Montessori, and Lucy Sprague Mitchell all contributed to the idea that play was a useful educational activity (Caplan & Caplan, 1973). Prior to this time, however, colonial religious beliefs and the industrial revolution's strong work ethic caused play to be viewed as frivolous and a waste of productive time (Sutton-Smith, 1967).

By the twentieth century, emphasis was placed on the scientific study of children in the fields of education, medicine, and psychology. Moreover, the importance of play began to work its way into the curriculum of the kindergarten and the ever-growing number of preschools.

**Play in Education**

An abundance of evidence dating back as far as the late 1700's has suggested that play and movement stimulate cognitive and social development (Glickman,
Fredric Froebel, (1782-1852) founder of the kindergarten, considered play to be important for developing children. In fact, he believed so strongly about this that he advocated play as a basis for all childhood activity. It was toward the turn of the century that play began to gain some educational value. In 1914 Margaret and Rachel McMillan (1860-1931) opened the first open air, Play-Oriented Nursery School in London, England. Around the same time, in the United States, Caroline Pratt, one of the great preschool educators and toy makers of the time, saw one day, a child playing with a miniature railroad system which he had created out of blocks, toys, and paper boxes, and other handy material. She was so impressed by the intensity of his play that she decided that play activity might be developed into an ideal way to teach young children. Pratt developed and expanded a successful nursery school in New York City as well as developed educational toys to aid children in their learning. Many of her ideas and toys are still used today (Caplan & Caplan, 1973).

Patty Smith Hill (1868-1946) was another educator who made play materials for children. She incorporated many play activities in her curriculum. She knew that enriched environments during early childhood were a necessity. She wrote that the environment must, "provide for health of body and the refinement of beauty, saturated with all those human values which make for morality, and mental, and emotional health" (Biber, 1919, p. v). Perhaps the best known educator of early childhood was Maria Montessori (1870-1952). She believed that a child
best learns through using all of his/her senses, and developed her entire curriculum around structured play things. Her didactic materials were unique in that they provided self evaluation devices, so that children could tell whether they were mastering a given concept. Marble Fernald, another known educator of early childhood in the 1920's and 1930's, employed kinesthetic learning to improve reading, letter recognition, and handwriting skills (Cratty, 1969).

The late Lucy Sprague Mitchell, one of the founders and first president of the Bank Street College of Education in New York City, enriched the public schools with her belief that play was important and all human beings needed to develop a zest for living that came from taking in the world with all five senses. Jean Piaget (1972), perhaps the most respected early childhood development researcher believed that one could not teach children concepts and vocabulary without using the element of play and movements. He also believed that at the sensorimotor-preoperational stages (2-7), play was the major source of cognitive growth (Piaget, 1962). Piaget (1952) contended that play contributed to stores of experiences and that a child's exploration of materials and objects resulted in the acquisition of stored information which later became the basis of cognitive development.

Studies on Preschool Education Programs

Many studies past and present have tried to determine how the quality of early childhood education affected a child's later development and what ingredients
would maximize a child's later potential. One dramatic study, conducted by Skeels and Dye (1939) sought to determine whether babies reared under minimum conditions of stimulation would be handicapped in intellectual development as compared with babies raised in a stimulating environment. Unlike today, in the past it was possible to find babies living in conditions of minimum stimulation. Skeels and Dye (1939) did just that: they described babies that they had found in an orphanage as being dull, withdrawn, and inactive. The babies were receiving excellent physical care, but little stimulation in the way of social play or toy play from the caretakers. Three babies in particular showed little viability. The psychologists decided to take these three out of the orphanage and put them in the only other available institution, a home for mentally retarded girls. There, the babies were cared for by (3) 14-year-olds. Several months later, the psychologist went back to the home for retarded girls and observed the three infants they had left. They were greeted with bright, alert, intelligent-acting infants. What happened was that the 14-year-olds cared for the babies and gave them the care and physical affection they were missing in the orphanage, where they received little if any affection. Thirteen additional babies were taken from the orphanage and the results were the same. After 2 years, their IQ scores actually went up on the average of 27 points. A follow up study was conducted 21 years later and showed that the adults who had grown up in the more stimulating environment were self-sustaining adults, while those who had remained in the orphanage in infancy where still
institutionalized.

The Perry Preschool Project was a longitudinal experiment designed to reveal the effects of early educational intervention on disadvantaged young people. It traced subjects from the age of 3 through the age of 15. The Perry Preschool Project (1962) presented convincing evidence of the effectiveness of early intervention programs. The findings of the Perry School Program showed that:

The positive effects of preschool education on school performance and antisocial behavior were meaningful and lasting. Improvement in the cognitive ability at school entry of children who attended preschool was indicated by their increased IQ's during kindergarten and first grade. Greater school achievements for these children were shown by higher achievement test scores during elementary school and substantially higher scores at eighth grade when compared to control group children. Greater commitment to schooling was shown by a higher value placed on schooling by teen-agers and by several other aspects of commitment to schooling. Reinforcement of a more positive student role for children who attended preschool was represented by more highly rated social development in elementary school, fewer years spent receiving special education services throughout their years in the public schools, and greater satisfaction and aspirations by parents with regard to the schooling of their children. Decreased antisocial behavior at school by children who attended preschool was indicated by more favorably rated classroom conduct and personal behavior during elementary school and by teenagers' reports of being kept after school less often. Decreased delinquent behavior was shown by lower frequencies of self-reported delinquent behavior and serious delinquent behavior (Schweinhart & Weikart, 1983, p. 71).
Another early childhood program was the federally-funded Head Start Program. It began as an action against poverty in the mid 1960's. The guiding idea behind this program was: "If underprivileged, disadvantaged, poverty-stricken children could be exposed to a program that enhanced their schooling, their intellectual functions might increase, and these gains would help break the poverty cycle" (Gordon & Browne, 1989 p. 45). One of Head Start's most valuable contributions has been its comprehensive program including intellectual development and a concern for health, nutrition, and physical growth of the child as seen as a whole.

To evaluate the Head Start program, the Westinghouse Study was initiated (Gordon & Browne, 1989). The Westinghouse Study concluded that the gains made by Head Start children did not persist after a few years. This study was criticized for flawed research criteria. Among the criticisms were poor research design, poor post-test design, flawed sampling, and lack of documentation (Condry, 1983, p. 21). Its findings have been disproved by subsequent research (Gordon & Browne, 1989, p. 47).

The consortium for longitudinal studies provided evidence to support the long term effects and importance of preschools formed in the mid 1970's. Researchers from across the country pooled data from a number of smaller studies hoping that further proof could be offered in regard to the effectiveness of early childhood intervention programs and their effects on enriching the lives of
children. The findings by the consortium clearly demonstrated the positive effects of preschool programs. They were as follows:

1. Preschool programs increase[d] individual scores on standard intelligence tests, and these increases remain[ed] statistically significant for a three- to four-year period after the preschool experience.

2. During most of the elementary school years, arithmetic and reading achievement scores of program graduates [were] higher than those of controls.

3. Preschool graduates [were] less likely to be placed in special education or remedial classes than [were] their controls; they [were] more likely to meet the ordinary requirements of the schools and to graduate from high school.

4. Preschool graduates [had] higher self-esteem and value[d] achievement more than their controls. Their parents [had] higher occupational aspirations for them than [did] control parents - or the children themselves. The program graduates [had] higher occupational aspirations and expectations than [did] their controls, and these [were] predictive of their actual attainments.

5. Indirectly, the preschool experience increased labor market participation in late adolescence and the early adult years (Lazar, 1983, p. 461).

Researchers like Bloom (1964) and Jensen (1969) have been convinced that intelligence is not fixed, but grows. Bloom (1964) stated that cognitive growth would be most rapid during early childhood. Fifty percent of total IQ could be predicted by
age four, and an additional thirty percent from ages four to eight. Since mental growth was most rapid during early childhood, it was important to provide stimulating experiences which stimulated intellectual growth during the early childhood years. Jensen (1969), on the other hand, argued that environmental factors were not really as important in determining IQ as were genetic factors. Whatever the case, psychologists and educators alike have continued to emphasize the importance of quality education in early childhood (Lavatelli, 1970).

Movement and play have been at the heart of the early childhood education curriculum. Gallahue (1985) stated:

For children, movement [has been] at the very center of their life. It [has] permeate[d] all facets of their development, whether in the motor, cognitive, or affective domains of human behavior….. The world of children [has always been] a play world. Play [has] serve[d] as a primary vehicle by which they [have] learn[ed] about themselves and the world about them" (p. 3 & 17).

During the early years of a child's life, a foundation for future learning has been set; these have been the building block years, during which the child learns to walk, talk, print, and count. Later, the child builds on these skills to be able to participate in sports, speak a language, read, write cursively, and apply mathematical concepts (Gordon & Browne, 1989). It is important to consider early school years in studying children's content knowledge acquisition in early childhood.
Summary Statement

The review of literature has pointed out that early childhood education has been important to most societies in the United States. Throughout the years different professions have contributed to its rich history. The fields of psychology, medicine, education, and more recently the merger of neurobiology and cognitive psychology have paved the way for a deeper understanding of childhood education. All these professions have contributed to the development of the early childhood curriculum. All their research and data has paved the way to what might be the best possible curriculum for a child's maximum growth potential.

Past research has shown a positive correlation between the amount of movement/play time a child has been given and their intellectual and physical development. More specifically, a review of literature on motor activity learning medium (MALM) has given statistical evidence that children learn better when movement has been used as a learning modality. There has been no research evidence to support that the MALM is effective on children younger than six-years of age. In this research study an attempt was made to try to prove that the MALM was effective with children three and four-years of age. If the MALM proved to be effective as a learning modality with three and four-year-olds, it should be incorporated in the curriculum of the early learners. This may be especially important, since youngsters today are leading sedentary life-styles, and fitness levels are at an all time low.
CHAPTER III

Methods

Procedures:

Several procedures were used in the administration of this study. First, the study was approved by the Human Subjects Thesis Review Board at SUNY Brockport. Second, written permission was sought from the director of Gananda Day Care. The director was asked to allow three and four-year-olds enrolled at Gananda Day Care Center to participate in the study (Appendix 1). Gananda Day Care was chosen on the basis of general location, student population, and their openness to allow such a study to occur. Other day care centers were asked to take part in this study but declined for various reasons. Sixteen four-year-olds and 14 three-year-olds were identified as potential subjects for the study. Out of the 30 students, 18 children were used for this study: 9 each in the active learning and verbal learning group. The children involved in the study were European Americans from middle-upper middle class families.

One month prior to starting the research, parents were sent a cover letter which explained the purpose of the study, and a consent form which indicated their permission (Appendix 2). No student was included without a signed consent form from the parents. Children who had a medical history or an injury warranting their exclusion from participating, or those children who did not have the consent form
signed were not tested. The parent/guardian and/or the child had the right to withdraw from the study at any time. Parents also had the right to request information received through testing at any time.

The teacher, who had received a Bachelor of Science in education, and was certified by New York State in early childhood education, and had 20 years of experience in preschool education, administered all the treatments. The author had no involvement with the children. The author, however, taught the instructor the active learning method (active play method) and demonstrated the procedures to be followed. To ensure that the teacher had the knowledge and ability to teach the children using the active play method, the author observed the teacher teaching a mini-lesson to the children, using the active play method prior to the start of the experiment. The author evaluated the performance of the teacher based upon a predetermined lesson plan involving the active play method (MALM) to teach the number seven (Appendix 3). The number seven was chosen on the basis that it would be the next number learned in the children's regular curriculum for that month. After following the lesson plan and successfully teaching all eighteen of the children to name and identify the number seven, the teacher completed the objectives of the MALM lesson plan, which was a necessary prerequisite to participate in this study.

The children between the ages of three and four were selected on the basis of signed consent forms. A three-by-five card was assigned to each subject and it
consisted of: 1) a number at the right hand corner, 2) sex of the student, and 3) age. An example of the type of card used can be seen in Figure 1. After the grouping, the child was unknown to everyone except to the researcher conducting the study. The three-by-five cards were divided by sex, into two piles, male and female. Each pile was shuffled and each card was randomly placed in either the active learning pile or verbal learning group pile. The three-by-five cards were put into each pile until no more cards existed in the instructor's hand. The number from the card was placed on the appropriate data forms, based on where the piles came from (active learning or verbal learning pile).

Name: Sex: M or F (circle one) Age: 3 or 4 (circle one)

- Figure 1 Notecard for grouping the children -

The results of the random sampling procedure produced samples of five females and four males in the active learning group, and six females and three males in the verbal learning group. The random sampling produced an age sampling of (five) three-year-olds in the active learning group, (four) three-year-old-
olds in the verbal learning group, (four) four-year-olds in the active learning group, and (five) four-year-olds in the verbal learning group. Figure 2 demonstrates this. The mean average age for the active learning group was 3.4. The mean average age for the verbal learning group was 3.5.

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Figure 2 Random Sampling Results

The symbols pi, sigma, omega, and theta of the Greek alphabet were chosen for the learning content, because of their uniqueness to the children. After pre-
testing the children it was found that none of the subjects knew any of the symbols.

**Content Knowledge: Active Learning Method**

The active learning method lesson plan was conducted over a thirty-minute period of time. The activities utilized are described below.

**Finger Trace:** Subjects sat around the Edu-Bean with the instructor and they traced all four Greek alphabets with their finger(s) and verbally recited them.

**Walking on the Edu-Beam:** Subjects walked on the Edu-Beam four times its length. They were asked to step on various Greek letters and they were told their name by the instructor. They were then asked to walk down the Edu-Beam a fifth time, but this time the instructor asked them to walk to certain selected symbols and stand on them.

**Bean Bag:** Subjects walked on the Edu-Beam holding a bean bag that had a Greek symbol on it, and were asked to place the bean bag over the symbol that matched it. This was performed four times using different bean bags that had different symbols on it. Children were verbally reinforced as to what the symbol stood for. All symbols were introduced in the same fashion.

**Balancing on Edu-Beam:** Subjects first practiced balancing on one foot on their own for thirty seconds on the floor. They were then asked to walk down the Edu-Beam to a specific Greek symbol and cover it with either foot (left/right) and balance on it by lifting either foot. This was repeated once for each symbol.
Hand Touch: Subjects were asked to walk to a predetermined symbol and bend over and touch it with one hand, while saying it's name. This was done once with all symbols.

Large Floor Symbols: Large Greek symbols pi, sigma, theta, and omega were placed on the floor and the subjects played follow the leader, with the instructor being the leader. The instructor and subjects walked on each symbol following its shape while saying its name. This was repeated three times for each symbol.

Cue Card Matching Using Large Wall Symbols: The large symbols pi, sigma, theta, and omega were placed on a wall. The subjects were asked to stand twenty feet away from the wall with the symbols facing them. Each subject was given four cue cards containing each symbol. The instructor held up a symbol and called it out. The subjects were asked to hold up their corresponding cue card and verbally shout it out. This was repeated for all symbols while they stood on the line. Then, they were asked to run, walk, skip or hop to the corresponding symbol on the wall, when the instructor held up and called out a symbol. They were then asked to come back where they started, and the procedure was repeated with a different symbol, twice for each symbol. (Refer to Appendix 3).

A post-test was started within five minutes after the lesson. Each child was tested out in the hall by the instructor. The instructor held up a symbol cue card and asked the child; "What is this symbol?" The instructor recorded the child's response on a data sheet. A minus sign designated no symbol recognition and a
plus sign designated symbol recognition. This procedure was followed for all four symbols.

**Content Knowledge: Verbal Learning**

Directly after the instructor finished post-testing the active learning group, the instructor taught the verbal learning group, for thirty minutes, using the verbal teaching methods.

Children in the verbal learning group sat around the teacher, and the teacher held up a cue card with a symbol on it, and told them what it was. The instructor repeated this method for all the symbols to be learned. The children also traced symbols on the cue card with their fingers. The children then had coloring sheets with symbols on them, and they colored the symbols while verbally repeating the symbol being colored. The instructor checked for understanding while the children colored. After all four symbols were colored, the instructor had them spread the symbols out on their desk and they were asked to match their symbol flash cards to the appropriate colored symbol. They were asked to identify the symbol when the instructor pointed to it. (Refer to Appendix 4).

**Procedures For Testing:**

**Day One** The instructor first took the active learning group into the gymnasium while the verbal learning group stayed in their classroom. She
taught the children the symbols using the active play method for thirty minutes. The children were pre-tested by the instructor for prior knowledge of the symbols pi, sigma, theta, and omega. Each child was tested out in the hall by the instructor. The instructor held up a symbol cue card and asked the child what symbol it was. The instructor recorded the child's response on a data sheet. A minus sign designated no symbol recognition and a plus sign designated symbol recognition. This procedure was followed for all four symbols. Only plus signs designating correct recognition of symbols were added together. The maximum correct responses would have been thirty-six.

**Day Two** The same procedures were followed for day two as they were for day one, except the verbal learning group was taught first and a post-test followed the treatments. Each group completed two lessons, one per day.

**Ten-Day Follow-up Post-test** After ten days had passed since the last testing day, the instructor gave the children a post-test on all four symbols. Each child was tested out in the hall by the instructor. The instructor held up a symbol cue card and asked the child to identify the symbol. The instructor recorded the child's response on a data sheet. A minus sign designated no symbol recognition and a plus sign designated symbol recognition. This procedure was followed for all four symbols. Again, only plus signs designating correct recognition of symbols were added together. The maximum correct responses would be thirty-six.
CHAPTER IV

RESULTS OF THE STUDY

The major purpose of this study was to determine whether the motor activity learning medium (MALM) could develop symbol recall in three and four-year-olds equally or better than that of the verbal teaching method. Another purpose was to examine the methods of teaching three and four-year-olds for curriculum enrichment. Finally, the study was to add to the scientific evidence the fact that the MALM could enhance learning in three and four-year-olds.

After post-test and ten-day follow-up testing of children from the Gananda Day Care Study were completed, the results of the pre, post, and follow-up tests were tabulated as seen in Appendix 6. The data were statistically analyzed to determine whether the motor activity learning medium (MALM) developed symbol recognition in three and four-year-olds equally or better than that of the verbal teaching method. Comparisons of pre-test and post-test scores of the verbal learning method and active learning method were statistically analyzed with the Wilcoxon Signed Rank Test of Differences. All data were analyzed as group data and individual results remained anonymous.
Students' Learning: Active Learning Versus Verbal Learning

Active Learning and Verbal Learning Group Outcomes:

All 18 subjects scored 0 out of 4 on the pre-test, a test designed to determine prior knowledge of the symbols theta, omega, sigma, and pi. After 2 days of treatment, the verbal learning group scored 20 out of a possible 36 on the post-test. The active learning group scored 25 out of a possible 36 on the post-test. The 10 day follow-up post-test yielded a score of 14 out of 36 for the verbal learning group and 20 out of 36 for the active learning group (Figure 3 and Table 1).

Figure 3 Raw Score Graph

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Analysis of Data

The Use of Nonparametric Statistics:

Nonparametric tests have been used when parametric assumptions have been violated. To use a parametric test the variables tested need to be normally distributed in the population, the data must represent an interval or ratio scale of measurement, and variances of the population comparison groups need to be equal. In this study parametric assumptions were violated due to the limited range of scores, small sample size, and the ordinal nature of the data. Taking these factors into account it was decided that a nonparametric test of significance should be used for the comparison. It was decided to analyze the data by using a nonparametric test, the Wilcoxon Signed Rank Test of Differences, because nonparametric assumptions
would be met. The Wilcoxon Signed Rank Test of Differences test was chosen for two additional reasons. First, a review of statistical literature indicated that the Wilcoxon Signed Rank Test of Differences is the most useful and most powerful test for comparing dependent and correlated data. Second, a similar study conducted by Humphrey (1965), used the same statistical analysis to compare the MALM to a traditional workbook medium, using a group of third grade students.

The mean scores and standard deviations from post-test and follow-up tests were computed for both the active learning and verbal learning groups. These data were presented in a pre-test, post-test, and ten-day follow-up test format in Table 2 and Figure 4 respectively.

Table 2
Mean Scores and Standard Deviations For The Three Trials.

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th></th>
<th>Post-test</th>
<th></th>
<th>Follow-up</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N x SD</td>
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<td>Post-test x SD</td>
<td>Follow-up x SD</td>
<td></td>
<td></td>
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<tr>
<td>Verbal Learning Group</td>
<td>9 0 0</td>
<td>2.22 1.09</td>
<td>1.56 1.33</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Active Learning Group</td>
<td>9 0 0</td>
<td>2.78 .83</td>
<td>2.22 .83</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Findings:

The data presented in Table 2 indicate that both treatments were effective in teaching the subjects to name and to identify the four selected Greek symbols. The active learning treatment, however, seemed to produce slightly better subject performance. After 2 days of treatment, the verbal learning group's mean score
went from 0 to 2.22 out of a possible score of 4. The active learning group's mean score went from 0 to 2.78 out of a possible score of 4. After a 10 day follow-up, the verbal learning group's mean score went from 2.22 to 1.56. The active learning group's mean score went from 2.78 to 2.22. It became evident from the data that both groups lost some Greek symbol recognition. But again, the active learning treatment seemed to produce a slightly better retention performance for symbols.

In order to determine whether the change in mean scores observed in Figure 4 and Table 2 were statistically significant, the Wilcoxon Signed Rank Test of Differences was performed. The results of this analysis has been presented in Table 3 which shows a post-test p of .29, and a 10 day follow-up of .19, between the active learning and verbal learning group, and among the ranks of subjects within the 2 groups. The analysis presented indicated no significant differences at the .05 level, between the 2 groups, for both the post-test and 10 day follow-up test.
Table 3

Results of the Wilcoxon Signed Rank Test of Differences

<table>
<thead>
<tr>
<th></th>
<th>Mean Rank</th>
<th>Mean Rank</th>
<th>Wilcoxon</th>
<th>p</th>
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<tbody>
<tr>
<td>Active Learning</td>
<td>10.83</td>
<td>8.17</td>
<td>73.5</td>
<td>.29</td>
</tr>
<tr>
<td>Verbal Learning</td>
<td>11.17</td>
<td>7.83</td>
<td>70.5</td>
<td>.19</td>
</tr>
</tbody>
</table>

*p ≤ .05

In summary, the major findings indicated the following: the mean scores between active and verbal learning groups were not significantly different, thus providing evidence that one method was not superior over the other. However, the verbal and active play learning methods produced positive changes in raw and mean scores, which indicated a positive trend in favor of the active learning method.
CHAPTER V

DISCUSSION OF THE FINDINGS

The findings of this study showed no significant difference between the active learning group and the verbal learning group. There may have been several reasons for this. First, the instructor had many years of experience with the verbal learning method and only a few days with the active learning method. Crist (1968) believed his study was affected by the fact that instructors performing the study had never taught academic concepts using active games. Another reason for finding no significant difference may have been due to the small number of days the treatments were given (two days). Ison (1961), in part, also attributed his findings of nonsignificance between groups to the limited number of learning days. Ison only administered two days of treatment. Most MALM studies showing significance between treatments, provided a period of learning ranging from 8 to 20 days (Humphrey, 1966a, 1966b, 1962, 1967b, and 1972; Prager, 1968, 1974; Ross, 1970; Cratty and Martin 1970; Werner, 1971; and Cratty and Szczepanik, 1971).

The number of scores resulting from the limited number of subjects and test answers may have also been another variable in the outcome of this study. With only 9 subjects and 36 possible answers per group to work with, significance between the two groups may have been difficult to calculate at the statistical level using a nonparametric statistical analysis. In this study parametric assumptions were
violated and therefore a nonparametric test was needed for the analysis. Nonparametric tests are more likely to show no significance between groups when there are a limited number of subjects and test scores.

After analyzing other research on the active learning method (the MALM), two variables stood out as possible reasons for the outcome of this study. One, as mentioned earlier, was the number of days the treatments were given, and the other was the number of subjects per group. According to Gay (1981):

for many experimental studies, a minimum of 30 subjects per group is generally recommended. Experimental studies with tight experimental controls may be valid with as few as 15 subjects per group. Some authorities believe that 30 subjects per group should always be considered minimum. However, considering the difficulty involved in securing subjects, and the number of studies that are reported with less than 15 in a group, requiring 30 seems to be a little on the idealistic side. Further, while we would not be super-confident about the results of a single study based on small samples, if a number of such studies obtained similar results, our confidence in the findings would generally be as high, if not higher, than for a single study based on very large samples. There is a lot to be said for replication of findings (p. 98).

Because the number of subjects in most of the MALM studies, including this study, were low, Gay's comments need to be taken into consideration. The successful replication of a study with limited subjects was demonstrated by Prager (1974, 1968). Prager (1968) had 11 subjects in one group and 12 in the other, and concluded
significant differences between the active and verbal learning method, in favor of the active learning method. Prager (1974) later replicated the same study and obtained the same results. Therefore, it appears that the number of days the treatments are given is important compared to the number of subjects per group in determining significance. Although Prager (1974, 1968) and Humphrey (1972, 1967b, 1965, 1962) statistically had a low number of subjects, they found a significance difference between groups. Again, these researchers provided for a range of teaching days from 8 to 20. In other studies conducted by Ison (1961) and Link (1958), and in this research study, a similar number of subjects existed, but the treatment days were considerably less. Perhaps this contributed to the findings of nonsignificance between the active and verbal learning groups. Because previous studies have shown significance with a small number of subjects, but had numerous teaching days, it may be speculated that the number of treatment days could be an important factor in determining significance between the groups.

Although there was no significance between groups in this study, the raw and mean score data did indicate a trend in favor of the active learning group with regard to symbol recall. By providing more days of treatment, as done by researchers in the past (Humphrey, 1966a, 1966b, 1962, 1967b, and 1972; Prager, 1968, 1974; Ross, 1970; Cratty and Martin 1970; Werner, 1971; and Cratty and Szczepanik, 1971), perhaps a level of significance between the active and verbal learning group could have been attained in this study.
Several informal observations were made by the researcher and instructor during this study that have paralleled other research on the MALM. First, the children in the active learning group seemed more motivated to learn. The movement games stimulated competition, which seemed to help motivate the children. They looked forward to the second day of treatment, while the verbal learning group seemed indifferent. Second, the MALM allowed for large muscle stimulation. The children in the active learning group enjoyed the opportunity for movement. The children in this group were able to move, play, and learn all at the same time. Lastly, while the verbal learning group seemed indifferent, the children in the active learning group appeared to be more affectively involved. They laughed, squealed, smiled, talked, and socially interacted. They seemed to have had fun while they learned.

To summarize the findings, evidence past and present has indicated that physical movement can influence cognitive learning in children. The degree of that influence varied among different studies. Some found significance between the active learning method and verbal learning method in favor of the active learning method (Humphrey, 1966a, 1966b, 1962, 1967b, and 1972; Pragrer, 1968, 1974; Ross, 1970; Cratty and Martin 1970; Werner, 1971; and Cratty and Szczepanik, 1971), while others including this study showed no significance between the active and verbal learning methods (Link, 1958; Ison, 1961; Crist, 1968; and Penman, Christopher, and Wood, 1977). All studies, including this one, found a tendency in favor of the active
learning method. No studies involving children under the age of six were available for comparison. To the author's knowledge, this study has been one of the first of its kind involving children under the age of six.
CHAPTER VI

CONCLUSION

Physical movement in play seems to be at the very center of a child's motor, cognitive, social, and physiological development (Gallahue, 1985). As children use their bodies in physical exercise, they refine and develop skills enabling them to feel physically confident, secure, and self-assured (Athey, 1984; Hendrick, 1986).

The more movement opportunity a child is afforded, the more likely it will be that their physical, mental, and social potentials will be reached later in life. Preschool age children especially need physical movement to maximize their growth and development. Unfortunately, in an attempt to increase our society's academic standing and parents' desires, many preschool age children have been taught through sedentary teaching methods, which have failed to take into account the child's natural need to learn through movement (Kantrowitz & Wingert, 1989).

Parents and teachers need to be aware of the teaching techniques for preschool age children. Research findings from several fields of study have provided a wealth of knowledge about how a child best learns, grows, and develops. One factor that must be considered when developing a preschool curriculum is the fact that young children are physical learners (Wolfgang & Sanders, 1981; Gallahue 1985; Athey, 1984; Hendric, 1986; Bruner, 1972; and Piaget, 1962). This study gave evidence that
preschool-age children can learn through movement.

The author set out to determine whether active learning could develop symbol recall in three and four-year-old children equally or better than that of verbal learning. The mean scores between active and verbal learning groups were not significantly different, thus providing evidence that one method was not superior over the other. However, the verbal and active play learning methods produced positive changes in raw and mean scores, which indicated a positive trend in favor of the active learning method.

The results of this study and the review of literature have indicated that the active learning method may be employed as an effective method of teaching academic concepts. The active learning method holds learners' attention, provides physical activity time, allows for immediate feedback and reinforcement, provides for affective learning, plus utilizes a variety of sensory systems. In short, the motor active learning method may make learning more age appropriate and enjoyable for teaching academic concepts to three and four-year-old children.

**Recommendations**

One important objective in Piaget's stages of cognitive development, at the preoperational phase, is the acquisition of symbols for later cognitive connections and learning. Although additional research may be necessary to determine the theoretical nature of the motor activity learning medium, it is apparent that the
MALM can be utilized in symbol recall and retention in three and four-year-olds. By using the MALM, the physical and affective domains can be incorporated and variety can be added into the curriculum. This author therefore recommends that the motor activity learning medium be considered when determining preschool curriculum; especially an academically-based preschool curriculum. It should be noted that the author does not consider the use of the motor activity learning medium as the approach but an approach to preschool education.

It is recommended that education planners: (1) consider the MALM when choosing preschool curriculum, (2) use the MALM to capitalize on a child's natural physical curiosity to motivate him/her to learn, and (3) promote the utilization of the MALM in enhancing physical, mental, and social growth of children. If children are the fiber that is spun into the thread that is later woven into the fabric of society, then it would be worthwhile to educate them on their own terms: Let Me Do and I Will Understand.

For future research the following recommendations have been provided below:

(a) Determine the effect of the MALM on gender in preschool age children.

(b) Determine the effect of the MALM on three and four-year-olds with special needs.

(c) Determine the effect of the MALM on groups of preschool age children with various homogeneous levels of intelligence; from very high to very low.
(d) Devise a long term study using three and four-year-olds that spans over a period of years, to determine the long-term effects of the motor activity learning medium.

(e) Devise an experimental design that incorporates a control group.

(f) Devise an experimental design that provides for more treatment periods.

(g) Devise an experimental design that utilizes more subjects if at all possible.
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APPENDIX 1

Consent letter for testing children at Gananda Day Care Center.
2/4/92

Mark Herman

Do you permit us to conduct a study of our 3-4 year olds at Gananda Day Care?

Sue Moore
Asst. Director
Cover Letter and Consent Form For Testing.
March 12, 1992

Dear Parent/Guardian:

In 1987, while working on my masters degree at Brockport State, I was lucky enough to have the experience of teaching physical education to the children at Gananda Day Care. Thanks to the Center's children, parents, faculty, and staff, I was able to develop a number of products designed to enhance children's physical and intellectual abilities. One such product on the world market today is called the Edu-Beam TM. It was designed to teach children concepts such as colors, alphabet, numbers, and shapes through movement activities. With this letter, I am requesting parent's permission to allow their child to participate in a study I am conducting for my masters thesis, in conjunction with the State University College at Brockport.

Merging movement with the cognitive domain has been considered important by many educators. It is believed that cognitive concepts can be learned through movement. The purpose of this research is to determine if active play aids in the acquisition of conceptual knowledge. Pre-test and post-test will consist of verbal questions given by your child's classroom teacher, who has been trained by the researcher, to test knowledge before teaching methods are used and after teaching methods are used. One method will be the teacher's 'normal' style of teaching (verbal tactile) and the other will be the active learning method which will utilize active play. The researcher will be present at all times during the testing. The concepts they will be tested on are symbols which are to be determined.

Your cooperation would be greatly appreciated. If you have any questions you may call me at [redacted] (work). Your son/daughter is free to withdraw from the testing at any time without any prejudice to the subject. Testing will be done during the last week of March and first week of April.

Sincerely,

Mark R. Dorman

-102-
Parent/Guardian Consent Form

Thesis: Verbal Versus Active Play Learning: Their Effectiveness on Symbol Recall in Three and Four-Year-Old Children

I AM REQUESTING THAT YOU SIGN BELOW

The purpose of this research study is to determine if in fact movements aid in the acquisition of conceptual knowledge. Students who voluntarily consent will participate in a pre-test (concepts known) and post-test (concepts learned). Concepts on which they will be tested on are symbols, which are to be determined. All testing will be conducted by the classroom teacher, who has been trained by the researcher. The researcher will be present at all times during the testing. All testing will be completed during a period of two (2) days. The data collected for this study will be saved for future studies. Students will be known by number rather than by name. All data will be analyzed as group data and individual results will remain anonymous.

Certification

This is to certify that I allow my child to participate in the above testing. I understand the purpose of this research. I further understand that if I have any questions I may contact the author. I hereby give my consent for: ________________________________

Student's Name Printed

to participate in the study. I reserve the right to withdraw my consent and discontinue participation at anytime.

______________________________

Parent/Guardian's Name Printed

Date: ____________________________

Parent/Guardian's Signature

Researcher: Mark R. Dorman

Institution: SUNY-Brockport
APPENDIX 3

Lesson Plan Involving the Active Play Method (MALM)
Active Learning Lesson Plan

Equipment: Edu-Beam/ Large Floor/Wall Letters/ Cue Cards

Objectives:

**Psychomotor:** Subjects will perform various movements on the Edu-Beam. They include; forward walking, balance on right and left foot, and touching the beam with right and left hand.

Subjects will follow the instructor tracing large floor Greek letters with their feet and perform various locomotor movements.

Subjects will walk, run, skip, and hop to corresponding large letters on the wall, when a cue card is held up or verbally announced.

**Cognitive:** Subjects will understand directions when given, they will know their left hand/foot from their right, they will recognize and recall the letters pi, theta, omega, and sigma of the Greek alphabet.

**Affective:** Subjects will socially interact, cooperate with peers, laugh, smile, and enjoy learning through movement.

Method:
Teacher Demonstration and Student Participation

Activities:

1. **Finger Trace** - Subjects will sit around the Edu-Beam with the instructor and trace all four Greek alphabets with their finger (s) while verbally reciting it’s name.

2. **Walking on Balance Beam** - Subjects will be asked to walk on the Edu-Beam four times it's length. As they step on the various Greek alphabets they will be told what it is by the instructor, and they will be asked to repeat it. They will then be asked to walk it's length for the fifth time, but the instructor will ask them to walk to a certain selected symbol and stand on it.

3. **Bean Bag** - Subjects will be asked to walk on the Edu-Beam holding onto a bean bag that has a Greek symbol on it. They will be asked to place the bean bag over a symbol that matches their bean bag. This will be performed four times using different bean bags. Subjects will be verbally reinforced.

4. **Balancing With One Foot on a Greek symbol** - Subjects will first practice balancing on their own for thirty seconds. They will then be asked to walk to a specific symbol and cover it with one foot (left/right) and balance on it. This will
be repeated two times for each symbol.

5. **Hand Touch** - Subjects will be asked to walk to a predetermined symbol and bend over and touch it with one hand, while saying it's name. This will be done with all symbols.

6. **Large Floor Symbols** - Large Greek symbols; pi, theta, sigma, and omega, will be placed on the floor and subjects will play follow the leader with the instructor being the leader. The instructor and subjects will walk on each symbol following it's shape, while saying it's name. This will be repeated three times with each symbol.

7. **Cue Card Matching Using Large Wall Symbols** - The large symbols pi, sigma, theta, and omega will be placed on a wall. The subjects will be twenty feet from the wall, with the symbols facing them. Each subject will be given four cue cards. Each cue card will contain one Greek symbol. The instructor will call out a symbol and the subjects will be asked to hold up the correct cue card. This will be repeated for all symbols. Then, they will walk, run, skip, or hop, to the corresponding symbol on the wall. They will be asked to come back to where they started and the procedure will be repeated, with a different symbol and a different physical movement. The procedure will be repeated two times with each symbol in random order.

*Note* - The instructor will correct and reteach Greek symbols when necessary.
APPENDIX 4

Lesson Plan Involving the Verbal Learning Method
Verbal Learning Lesson Plan

Activity: Seat Work

Objectives:
Psychomotor: Subjects will develop fine motor skills through coloring.

Cognitive: Subjects will recognize and recall the symbols pi, theta, omega, and sigma of the Greek alphabet.

Affective: Subjects will enjoy coloring.

Method:
Teacher Demonstration and Student Participation

Activities:
1. Finger Trace with Cue Cards - Subjects will be seated together with the instructor. The instructor will pass out four three-by-five cards to each student. Each card will contain one Greek symbol. They will be told the name of each and asked to repeat it. Then, they will trace each symbol with their fingers and name it as they go along.

2. Greek Symbol Coloring - Subjects will be given all four Greek symbols to color. As each coloring sheet is passed out the subjects will be asked to name it. Next, they will color each symbol. While coloring, the children will be asked to name the symbol they are working on.

3. Cue Card Matching - Subjects will be asked to spread out their colored symbols. Next, they will be asked to match their cue cards with their colored symbols. The teacher will check for understanding by making sure that the correct cue card matches the colored symbol.

*Note* - The instructor will correct and reteach Greek symbols when necessary.
APPENDIX 5

Edu-Beam
Edu-Beam™

TEACHER'S MANUAL

Congratulations...you can now own one of the most valuable pieces of educational equipment on the market today. The Edu-Beam was designed by Educators for Educators. The Edu-Beam is a four sided balance beam consisting of letters, numbers, shapes, and colors. Children love to explore through movement, and it is here where a child's attention is best captured. The Edu-Beam provides children with this movement, capturing their attention and allowing you to then teach symbols and concepts with the fun and excitement of play.

The following pages will give you ideas on how to use the Edu-Beam. Feel free, however, however, however to be creative and explore other exciting uses for the beam. Have fun!

Mark R. Dorman
Mary Bates Dorman

The 4 sides of Edu-Beam™

SIDE 1
ALPHABET

SIDE 2
NUMBERS 1-10

SIDE 3
BASIC SHAPES

SIDE 4
COLORS

Gross Motor (large muscle) application

Provided for you are diagrams of selected gross motor movements. Use these as a guide to give your children a wide range of movement experiences. Remember, children love to imitate and will understand much more quickly if you or another adult can demonstrate. Again, use these diagrams only as guides. Feel free to experiment and encourage your children to experiment with other movements.

1 Forward and Backward Walking

2 Tip Toe Turn

© 1987 PCA Industries Inc.
All rights reserved
Patent pending
3 One Foot Balance

7 Rear Lying Position

4 Lying Down on the Beam
(Front, Side, and Back)

8 Knee Scale

5 Crawling Forwards
and Backwards

9 Squat Turn

6 V-Seat

10 Scale

Try these skills with bean bags resting on different parts of the body.
Merging Movement with Cognitive Learning

The uniqueness of the Edu-Beam lies in its ability to allow for gross motor activity and cognitive learning at the same time. You the instructor play a key role in this process. Below are some suggestions on how you might merge movement with cognitive learning.

1. Use the Edu-Beam to initially introduce letters, numbers, colors, and shapes. Have the children sit around the beam so that they may touch and trace with their fingers.

2. As the child performs a selected activity on the beam, ask him/her to identify a color, shape, number, or alphabet along with way, by stepping on it and saying it at the same time. Preselecting and having them perform a movement to a letter, number, color, or shape, is also a good way to teach, test, and reteach. Try having them mark the spot not only with their feet but with other body parts as well. This gives your children an opportunity to learn body parts and challenges their movement in different ways.

A favorite of children is to be asked questions relative to their egocentric focus. Have them walk to the first letter in their name and balance on it with their left foot, or side step to the number of their age and squat down and touch it with their right hand. Do you get the picture? In just this one
activity, you have asked them to perform a gross motor movement, cognitively and physically identify their own name or age, and requested a left or right orientation. This type of activity can be done with any word and number sequence you may be working on. And for you teachers who have a letter, number, color, or shape of the week, the Edu-Beam can be a great tool to teach and reinforce those concepts.

3. The uses of the beam are not confined to specific gross motor activities. The Edu-Beam can be used for educational games. For example, the cue card game in which the teacher makes up the alphabet, number, color or shape cards and the child must match it with its match on the beam.

For a real challenge try the bean bag game where bean bags are balanced on the head, hands, or other body parts while the child performs a selected activity on the beam. See how long they can maintain their balance without dropping the bean bag! And finally be creative and make up your own games using the Edu-Beam.

4. For older children, the Edu-Beam can be used to introduce simple match concepts. Have the children walk up to 10 and backward down to 1. While they are doing this, use more/less, plus/minus, add/subtract, cues as they go up and down the number scale. Have them count out loud. Another idea is to incline the beam using only one base support. This gives the children the feeling of going higher as they go up to 10 and a feeling of going lower as they walk backwards to 1.

Use the Edu-Beam to teach adding and subtracting calculations. For example:

\[ 2 + 3 = 5 \]

Take two steps to 2 and add three more steps and you are on 5.

or

\[ 5 - 2 = 3 \]

Stand on 5 and subtract 2 steps and you are on 3.

Other uses of the Edu-Beam

1. Use it as a bench for your group talks.

2. Use it as an example of a straight line, and have the children line up in single file beside it so that they get a clear picture of what is in fact meant by a straight line.

3. Use it as a giant scale to show even and uneven concepts. This can be done by using one base support in the middle of the beam.

4. Use it to teach group cooperation by having all the children help you change the beam to a new side.

5. And lastly, use the beam to facilitate creativity in the teaching and learning process. Use your imagination to spark their imagination.

Have fun!!

Safety Considerations

1. If possible pad the floor around the beam with carpet or other soft material.

2. Encourage children to use sneakers.

3. Children should not change the faces of the beam unsupervised.

4. A child should always be spotted when attempting any new skill on the beam, especially jumping skills.

5. Encourage children to keep their hands to themselves when on the beam with other children.

6. Keep the beam low.

Suggested Vocabulary while using the Edu-Beam

COLORS:
Red • Blue • Yellow • Black

NUMBERS:
One • Two • Three • Four • Five • Six • Seven • Eight • Nine • Ten

SHAPES:
Circle • Square • Triangle

DIRECTIONS:
Up • Down • Backward • Forward • Side-ways • Crossover • Over • Across • High • Low • Match • Left • Right • Middle • Center • Straight

SKILLS:
Walk • Crawl • Sit • Stand • Kneel • Jump • Balance • Side Step

BODY PARTS:
Arms • Legs • Hands • Feet • Head • Fingers • Elbow • Knee • Hip • Shoulder
APPENDIX 6

Data Recording Sheet
VERBAL LEARNING GROUP pre-test

**KEY**

(+) Do know the symbol
(-) Do not know the symbol

**DAY 1**

<table>
<thead>
<tr>
<th>Number</th>
<th>Sigma</th>
<th>Pi</th>
<th>Omega</th>
<th>Theta</th>
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# ACTIVE LEARNING GROUP pre-test

**KEY**  
(+) Do know the symbol  
(-) Do not know the symbol

## DAY 1

<table>
<thead>
<tr>
<th>Number</th>
<th>Sigma</th>
<th>Pi</th>
<th>Omega</th>
<th>Theta</th>
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-117-
VERBAL LEARNING GROUP POST-TEST

**KEY**  
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ACTIVE LEARNING GROUP POST-TEST

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**VERBAL LEARNING GROUP (10 DAY) POST-TEST**

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ACTIVE LEARNING GROUP (10 Day) POST-TEST

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APPENDIX 7

Greek Alphabets Learned
Greek Alphabets Learned

\[ \Sigma \quad \text{sigma} \quad \Pi \quad \text{pi} \]

\[ \Omega \quad \text{omega} \quad \Theta \quad \text{theta} \]

GREEK:
\begin{align*}
\alpha & \quad \text{alpha} \\
\beta & \quad \text{beta} \\
\gamma & \quad \text{gamma} \\
\delta & \quad \text{delta} \\
\epsilon & \quad \text{epsilon} \\
\zeta & \quad \text{zeta} \\
\eta & \quad \text{eta} \\
\theta & \quad \text{theta} \\
\iota & \quad \text{iota} \\
kappa & \quad \text{kappa} \\
\lambda & \quad \text{lambda} \\
\mu & \quad \text{mu} \\
\nu & \quad \text{nu} \\
\xi & \quad \text{xi} \\
\omicron & \quad \text{omicron} \\
\pi & \quad \text{pi} \\
\rho & \quad \text{rho} \\
\sigma & \quad \text{sigma} \\
\tau & \quad \text{tau} \\
\upsilon & \quad \text{upsilon} \\
\phi & \quad \text{phi} \\
\chi & \quad \text{chi} \\
\psi & \quad \text{psi} \\
\omega & \quad \text{omega} \\
\end{align*}