CHAPTER-II

REVIEW OF RELATED LITERATURE

For collecting existing knowledge about this study related literature were found from books and professional journals and internet. The researcher had considered the major three areas of the study, namely - growth pattern, motor ability and cognitive ability while undergoing the review work for its convenience.

Growth Pattern

Body weight found to be increased steadily from age five to twelve years of age observed by Gupta (1989).

Dey (1970) analyzed the maturity and physical growth of boys ages seven through twelve years. He found that maturity and physical growth tests showed high levels of inter-age consistency, especially between adjacent ages. As the boys advanced in age, their means on all measures increased, the measures of three indexes increased and decreased at different ages; the means of sitting height to standing height ratio steadily decreased.

Rarick and Smoll (1981) reported from their study on childhood age subjects and adolescents that height, weight and physique showed relatively stable. Growth slows from 7 to 12 years of age and increased from childhood years to seventeen years.

Eiben et al. (2005) conducted a study in Hungary to compare the growth and development pattern of urban and rural boys and girls. A sample of 40 school age boys and girls from selected schools were included in the study. Internationally standardized tools were used to compare the anthropometric measurements of urban and rural children. Study analysis identified that the urban boys and girls were taller and heavier compared with the rural boys and girls.
Cameron et al. (1992) conducted a study to compare the growth of urban and rural school children of high (n=307) and average (n=867) socioeconomic status and two groups of rural children in South Africa. The rural children came from farm labourer's families (n=392) and traditional subsistence farming environments (n=420). They revealed that urban children were taller than all other groups and 'average' urban children were consistently and at times significantly smaller and lighter. The rural children were significantly smaller and lighter.

Adams (1934) found little predictive value in height and weight to track and field performance of 200 junior high school girls.

Beunen et al. (1981) studied the peak height velocity (pH) of Belgian boys and girls. The values were more than 5.5 cm per year for boys and more than 3.5 cm per year for girls.

Jain and Ramiah (1968) found that the height of the tribal (tribal) boys was higher than that of the non-tribal boys.

Thomas (1972) opined that each and every normal child grew in size as represented in increased height, weight and ultimately developed strength. Infancy was marked by rapid growth and was followed by slow growth in childhood. He also opined that growth in height as slower and relatively gradual from 3 years to 12 years. Then adolescent spurt resulted.

Brabant and Jose (1983) conducted a comparative study of anthropometric and motor fitness measurements of Brazilian and American school children. The subjects taken for this study were 2342 boys and girls enrolled in a public school system in Brazil and America during 1982 school year. Health related physical fitness test battery and athletic ability tests were administered. The height and weight of the subjects were also undertaken that height and weight increased at approximately same rate and girls were significantly taller and heavier than boys during adolescence. American girls and boys were taller and heavier than Brazilian boys and girls.
Mathew (1988) conducted a study on 3000 boys from three distinct ethnic groups found in Uttar Pradesh and Bihar with age ranging from 12 - 16 years, the subjects were tested to determine growth in standing height, sitting height, weight, upper arm girth, chest girth, thigh girth and calf girth and motor fitness was measured by AAHPER youth Fitness Test. To determine the differences between the means of different ethnic groups the two-way analysis of variance was applied and to find out the correlation between the motor fitness and selected growth variables, co-efficient of correlation was employed. The significant difference obtained for upper arm girth, calf girth, chest girth and weight, and no difference (significant) observed in standing height, thigh girth and sitting height; however, no relationship was found between any growth and motor fitness variables.

Clarke and Wickens (1962) conducted a study in which for each of the maturity, structural, muscular strength, and motor ability measures, the mean, standard deviation and co-efficient of variation were computed from 40 boys of every age group from 9 to 15 years inclusive. In presenting the mean growth curves for each various measures, an attempt was made to identify the differences in form which occurred. Where only slight differences in curve forms were encountered, they were identified together; where consistent differences were found, separate description were made.

Buckellew (1969) collected data at each grade, level, subject were evaluated in physical fitness (AAHPER Youth Fitness Test), physical growth (WELZEL Grid).

Espenschade and Eckert (1967) revealed that physical growth signifies physiological and anatomical changes within bodily structures. The changes that occur as a result of growth and development of bones, muscles, nerves, etc. followed the same directional sequence with advancement of age.

Shumway-Cook and Woollacott (1985) suggested that between the ages of four and six years there is a period of disproportionate growth which would possibly have an effect on physical performance.
Motor Ability

Forbes (1950) concluded the study that children aged 6 - 12 years generally become progressively more flexible each year until they reached adolescence. Similar results have been reported by Huprich (1950).

Yadav (1982) conducted a study on 270 male students with all age groups having an equal representation of 45 students each ranging in ages between six to eleven years. The subjects were tested within two months of their birthdays in flexed arm hang, push-ups, bent knee sit-ups (one minute), power, co-ordination, speed, agility, 600 meter run/walk, sit-and-reach test and shoulder rotation test. To determine the difference between means of different motor fitness components of various age groups, the level of significance chosen was 0.05. Since the F-value obtained for all the tests were significant, to find which of the differences among the paired means on various tests, Scheffe’s test was applied. The performance of boys ranging in age between six and eleven years, in motor fitness components increased as the age advances, except in the case of sit-and-reach test item.

Upadhyay (1985) conducted a study on 105 subjects aged between 6 to 12 years. The Kirchmars Motor Fitness Test was applied to collect data from the above mentioned age groups after which seven tests were applied to find out the differences in various age groups for the boys in above mentioned motor fitness test. A post-hoc Scheffe’s test was applied for the significant seven values to find out that which of the paired means was most significant. All the groups indicated significant difference in power and speed. The higher age groups were found comparatively superior than those of lower age groups. In most of the variables, it was found that the difference was significant.

Anyanwu (1977) conducted a study to establish physical fitness norms for Nigerian boys and girls of ages 11 through 18 years. Included in the study were the following test items: agility, push-ups for boys, chair push-up for girls, flexed knee sit-ups, speed, power, pull-up for boys, flexed arm hang for girls; 9-minute run for subjects of 11 - 12 years and 12-minute run for subjects of 13-18 years. The study contained the conclusions: i) most of the test items the performance of
the boys improved from the lower to the upper age levels, ii) the boys performed better than the girls in all test items, and iii) the girls of lower age level tend to possess better physical fitness status than the girls of the upper age levels.

Adams and Creamer (1962) noted the importance of proprioceptor variables in contributing to proficiency in performance.

Barrow (1983) mentioned that motor fitness is a limited phase of motor ability, emphasizing capacity for vigorous work. Motor fitness is regarded as readiness or preparedness for performance with special regard to big muscle activities without undue fatigue.

Corbin and Pangrazi (1992) had suggested that the fitness of today’s youngsters had not regenerated showing they do quite well when compared to past students. The data were compared and showed that the children and youth were as fit as they were in the past.

Kock et al. (1969) observed that significant correlation between motor ability and cognitive ability.

Clarke (1971) opined from his study on shuttle run that the performance increased in a straight line rise from ages 8 to 14 years.

Hatey (1972) conducted a study to investigate the effect of age on physical performance of elementary school boys of grades one through six by administering twelve motor performance tests to measure sprint speed, power, agility, reaction time, static balance, hip flexibility and elbow flexion, and strength. He observed a significant difference between grades levels on all twelve variables. The largest performance increase was observed between grades one and two and between grades five and six within middle grades providing a plateau effect. The performance scores formed a curvilinear relationship for all variables.

David (1968) conducted a longitudinal analysis of the rate and pattern of growth of selected maturity, structural, strength and motor ability measures of boys of ten to sixteen years of age. The yearly velocity rates of skeletal age and most of the functional variables of 100 boys were relatively consistent for the six
years; the structural variable shows less consistency. Most of the variables displayed a near linear growth pattern. The highest correlation between velocity rates and the experimental variables were for the structural measures. The correlation between the velocity rates and standing height and leg length increasing from 0.44 at 11 years to 0.81 at 16 years of age.

**Milne (1971)** conducted a longitudinal study of 110 children belonging to 5 through 11 years and data expressed in cross sectional form, of performance changes in motor items. The test items were bent arm hang, speed, sit-and-reach, jump and reach, agility, power. Longitudinal performance curves, based upon the mean score for each age group were plotted for each motor performance item semi-annually from through eleven years. Motor performance scores generally indicated an improvement with successive years for both sexes in all items with the exception of sit-and-reach.

**Nelson (1983)** conducted a study to determine the physical fitness as a function of gender differences explained by age and body size characteristics. The sample consisted of 12,362 boys and girls, ages 6 through 17, from throughout the United States. The performance of boys was superior to the girls by age. The performance of boys was superior to girls on the mile-run and sit-up tests while girls out performed boys on the sit-and-reach test. For all three tests, an age by gender performance interaction existed, which demonstrated that the cross-sectional performance curves for boys and girls were not parallel over the ages studied. Boys continued to improve through 17 while girls leveled off and decreased in performance after age 15.

**Bремей (1966)** conclude that little relationship existed between the anthropometrical, motor ability and reaction time movement variables.

**Ренсон et al. (1983)** made comparisons of growth, motor ability and sport involvement of 12 to 19 years old Belgian boys from rural and urban areas and observed that boys from urban areas tend to be taller, performed better in most ability tests and showed a greater amount of sports involvement compared to rural boys.
Seils (1951) observed that, in motor skills, as a general rule performance increases with age throughout childhood. Means performances were found to be greater with increasing age.

Humphries and Shepherd (1959) trained ten subjects from 4-10 years of age. They noted that the leaved of performance was positively related to age and that all age levels constantly improved with training.

Paterson (1930) made the general statement that nothing more than low, positive relationship existed between physical status and mental status. Much of the present research permits the same conclusion.

Botwinick and Thomson (1966) indicated that pre-motor and reaction time were highly related while no direct relationship could be discerned between motor and reaction time.

Brar and Shrivastav (1985) conducted a cross-sectional study of motor fitness components of 100 school children (grade V – VIII) of Gwalior whose average age was 10 to 12 years. They administered the AAHPER Youth Fitness Tests and concluded from the study that the students studying in grades VI and VIII did vary in their motor fitness due to different physical education programme and different evaluation programme.

Govatos (1959) attempted performance to determine for the relationships and age differences in growth measures and motor skills, and reported that when the individual aspects of growth and age are correlated with each motor skill, the resulting relationships were found to be positive and significant for both boys and girls.

Girish (1989) tested hundred subjects from the rural area and hundred students from the urban area high school boys to compare the physical fitness. AAHPERD youth fitness test was administered to obtain the physical fitness level of the subjects, he concluded that there was no significant difference in physical fitness level obtained from AAHPERD youth fitness test between rural and urban high school boys.
Pena et al. (2003) conducted a comparative study on the physical fitness of school children having resident in an urban colonia and in a rural indigenous community in Oaxaca, southern Mexico. Two measures of performance-related fitness power, speed and four measures of health-related fitness grip strength, sit and reach, timed sit-ups, distance run were taken on 355 rural (175 boys, 184 girls) and 324 urban (163 boys, 161 girls) school children of 6-13 years of age. Urban children were taller and heavier than rural children. Absolute grip strength did not consistently differ between rural and urban children, but when adjusted for age and body size, strength was greater in rural children. Explosive power and abdominal strength and endurance were better in urban than in rural children without and with adjustment for age and body size. Urban-rural differences in speed and flexibility varied by age group and also sex. Younger rural children and older urban girls performed better in the distance run, where as older rural and urban boys did not differ in endurance. The size advantage of urban children does not necessarily translate into better levels of performance- and health-related physical fitness. The observed differences were related to activity habits associated with school physical education and lifestyle in the respective communities.

Stone (1978) conducted research with Negro and White boys (N=112) aged 10 through 12 years, who were arranged into four matched groups, on the basis of age and physique. And an upper middle and lower middle socio-economic status Negro boys were significantly superior in sit-ups, power, speed, agility, and co-ordination. Co-ordination was the only item showing the difference between the two social groups, with the lower middle being superior. No difference found in the other seven items.

Ulrich and Ulrich (1985) found that balancing ability was an important predictor of overall performance of fundamental gross motor tasks in pre-school children.

Rosentswieg (1980) explained that motor ability could be measured through particular tests those measure different components of motor ability.

Ulrich and Ulrich (1985) as well as Cratty (1986) have found that balancing ability improved with age. They came to the conclusion that there is often a dramatic improvement in balancing ability from the age 5-7 year.

Cratty (1986) suggested that studies to determine the systems involve in balance, especially in young children, are essential for an understanding of their behavior.

Cognitive Ability

Elliot et al. (1978) found that kinesthetic perception that one has for the body and its parts during the performance of movement activities affects the quality of performance.

Witte (1962) tested boys and girls in the 7-9 years age range and observed no difference in kinesthesia.

Singer (1982) explained that kinesthesia is specific to the test and part of the body involved in the skill.

Richardson and Tandy (1973) pointed out that that kinesthesia involve the proprioceptors of the body and practice is required in order to establish the proprioceptive pathways for movement. Kinesthetic acuity or the accurate awareness of specific movements and positions of various parts of the body required for an individual to be familiar with these movements and positions.

The term ‘proprioception’ was first used by Sherrington (1906). Goodwin (1976) credited to describe the senses sub-served by receptors in the muscles, tendons, joints, and the labyrinth. Baumgartner and Jackson (1982) explained that these proprioceptors are highly developed sense organs which constitute a “highly sensitive system of kinesthetic perception”.

Mwamwenda (1992) conducted the study among 240 urban and rural school children to compare the cognitive development. An observational check
list was used to assess the cognitive development. The findings revealed that the cognitive development of urban school children were more compared with the rural school children of Africa.

Check et al. (1959) found that there is a relationship between motor ability and intelligence.

Hay et al. (1982) suggested that all the senses work together in the observation task of qualitative analysis. They used the term kinesthetic observation to describe the assessment of performers’ sensations of movement.

Kirkendall (1969) measured forty-five variable on pre-adolescent children (n=205). The variables represented from the intellectual domain, the motor domain and the personality domain. It was found that in all three categories of boys and girls, intelligence and the motor performance variables were consistently correlated in a positive direction with the intellectual variables.

According to Lamberth (1976), development is the result of heredity, environment and interaction of the two. Heredity characteristics are innate and do not have to be learned. Environmental characteristics are acquired from experience, often as a result of learning.

Milne et al. (1943) found no relationships between motor-ability and cognitive ability. In fact, the question of relationship between performance of physical activity and cognitive ability has always been a controversial issue.

Rose and Mountcastle (1959) made a convincing argument against the traditional belief that stretch receptors of muscles alone are responsible for kinesthesis.

Phillips (1941) indicated that both psychologist and coaches seem to agree, based on a prior knowledge that kinesthesia is necessary for superior motor performance.

Lipman (1988) first defined critical thinking as skillful, responsible thinking that facilitates good judgment because it (i) relies upon criteria, (ii) is self-correcting, and (iii) is sensitive to context. Critical thinking therefore is
considered to be a form of cognitive accountability based on concept formation in which the learner notes relationships and makes conscious decisions based on established criteria.

McBride (1992) was the first to define reflective thinking that is used to make reasonable and defensible decisions about movement tasks and challenges. To link critical thinking with Physical Education, McBride proposed a four-phase model that includes the following steps: (i) the learner engage in cognitive organization, (ii) the learner engages in cognitive action, (iii) the process leads to cognitive outcomes, and (iv) the process leads to psychomotor outcomes.

Rose and Mountcastle (1959) did a convincing argument against the traditional belief that stretch receptors of muscles alone are responsible for kinesthesia. These receptors have not been found to provide information about joint position since they discharge over their full frequency range at any muscle length. They stated that the joints contain the source of kinesthetic sensations and designate the following receptors located in articular tissue: the Ruffini receptors, which have spray-type endings and are the most common in connective tissue; the Golgi tendon organs, which are less numerous; and the Pacinian corpuscles. Whether or not muscle spindles that react to muscle stretch also play an important role in kinesthesis is open to question. They rejected the traditional acceptance of their contribution in this sense.

Adams and Creamer (1962) noted the importance of proprioceptor variables in contributing to proficiency in performance. Since movements give rise to proprioceptive stimuli, they provide feedback information which aids in similar future situations. They concluded that proprioception has not only its traditional role of information feedback but also a role in response timing, which is extremely important in skilled performance. Leading physical educators in recent years have endorsed the importance of kinesthesia. In fact, some called it the most important of all the senses.

Cooke (1969) conducted a study to investigate the relationship between balance and cognitive abilities of children in the age range 8 to 13 years.
Information of cognitive abilities consisted of scores on the 1963 versions of the California Mental Maturity Scale and Iowa Tests of basic skills. Balance performance was measured by means of balance beam and balance board tests which were developed as a result of several pilot studies.

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Peterson and Felton-Collins (1986) mentioned that Jean Piaget was among the first to demonstrate a link between motor processes and cognitive learning. Piaget’s work highlighted the important role that movement plays in the cognitive development of infants and young children.

Goodenough (1935) tested the reaction times of 246 children from two and half to eleven and half years of age. She observed a decrease in reaction time with age.

Hodgkins (1962) tested 480 female subjects with ages ranging from 6-84, discovered that reaction ability improved from childhood to nineteen to twenty-six and decreased afterwards.

Cron and Pronko (1957) tested 501 children on balance, spanning in age from 4-15 observed that balance ability improved with age, then leveled off, and declined in the 12-15 years old group. The girls were superior in the 4-8 years bracket, but the boys exceeded the girls in the 8-15 years range.

Ismail (1963) found that motor coordination and balance tasks were highly related to the intellectual achievement of normal children.
Lautenbach and Tuttle (1932) were interested in detaining the relationship of reflex time to time recorded in running events. The reflex was the knee jerk. The study indicated a direct relationship between reflex time and running event time.

Loyd (1971) made a study to determine the difference between Negro and White boys in physical fitness. Physical fitness was measured by administrating the three sub test of AAHPER youth fitness (sit-ups, power and co-ordination). He concluded that Negro boys obtained a higher mean score than white boys on gross body co-ordination at both ninth and tenth grades levels. The difference was significant at in power at both fifth and sixth and ninth and tenth level.

Hamilton (1937) argued that kinesthetic sensitivity develops early and remains stable until fifty, then deteriorates.

Kinesthetic or motor memory was acknowledged by Barrow (1983) as being a very important factor, but he also emphasized the factors such as stress, fatigue, expectancy, and habituation, which could have a disorganising effect on performance.

Phillips and Summers (1954) supported the hypothesis that kinesthesis is more related to learning in the early stages of acquiring a motor skill than it is in the later stages of life.