Chapter II

REVIEW OF RELATED LITERATURE

The Research Scholar made very sincere efforts to locate the critical, allied and general literature related to the present study. Relevant studies reviewed from the libraries of the Netaji Subhash National Institute of Sports, Patiala and Bangalore, and from that of Lakshmibai National Institute of Physical Education, Gwalior are given below:

Yachter et. al.\(^1\) conducted a study on 25 male swimmers of varying ages to find out the value of power training and stroke training in determining the appropriate training procedures for competitive swimmers. Swimmers were tested on their strength, stroke, height, weight, segmental swimming and 50 yards swim. The required swimming velocity was acquired by measuring 5-yard interval in 50-yard sprints. Their swimming velocities were transferred into Fraud numbers so that the swimmers could be compared independent of their length (standing height form floor to fingertips).

The results of the study suggested that: (1) Strong-inefficient swimmers should emphasise more on stroke technique and not on further strength development. (2) Weaker-inefficient swimmers should train on a combination of stroke technique and strength development.

To determine the relationship of selected metabolic, pulmonary and anthropometric factors to performance in 100 yards Butterfly swimming,

Manly\textsuperscript{2} conducted a study on Virginia Polytechnic Institute and State University male swimmers who were members of several Blacksburg and Virginia area AAU Youth Group Swimming Teams. He concluded that maximal breathing capacity was the only predictor in the youth group swimming performance at the .05 level of confidence. The stepwise multiple correlation revealed that strength, somatotype index, oxygen debt and maximal vital capacity are contributing factors of performance in 100 yards Butterfly swimming event. Further, a high multiple correlation was found between strength and swimming performance in 100 yards butterfly.

Komadell\textsuperscript{3} conducted a study in the Czech Sports School on 45 fourteen-year old male swimmers. The results revealed that swimming performance was up to 62 percent determined by physical development. The means of body weight and body size of the swimmers were above average as compared to that of untrained males of the same age. Accelerated growth, combined with regular training influenced swimming performance for more than the assumed talent.

Rahn and Matweyev\textsuperscript{4} in their study observed that the amount of training in water increases the physical demands and intermittent stressing on dry land is necessary, particularly in fresh air and Sum. Running in the woods, cycling, cross country, skiing, rowing or canoeing contribute considerably to maintaining or improving the desired vitality of the swimmer.

\textsuperscript{3} L. Komadell, "Sportmedizinische Probleme beim Training mit Jugendlichen," Leistungssport 5:1, (Sportsverlag:Berlin), 1975, pp. 74 – 84
Don Gambril & Alfred Bay⁵ told Swimming Techniques that there was a strong evidence from most successful programmes in the United States that shorter (but higher quality) yardage supplemented with strength work both in water and dry land, was a more effective vehicle than the traditionally popular long - slow distance in age group swimming.

Matheson⁶ studied the relationship between Swimming and selected physiological and anthropometric development and skill variables among 10 – 12 years old female competitive swimmers. Forty girls were tested and measured over selected the variables. Each swimmer competed 400 yard and 50 yard time trials. Swimmers were classified into two rounds, i. e., top and bottom level Group. The Inter - correlation matrix indicated that best single predictors of Swimming Performance were height, aerobic capacity, and stroke efficiency.

Filippovich and Turevskii⁷ concluded that the greatest structural change in the motor skills occurs at the age of 10 to 11 and 15 to 16. At these ages there is also a change in the athletic movements. This means the periods prior to these phases of rapid movement changes should be used for systematic preparatory instructions. As far as the emphasis is concerned, this applies to the entire area of swimming technique and co-ordination training up to 11 years of age and general training specific to swimming. Much is possible such as - Basic swimming endurance, flexibility, and general stamina before the age of fifteen

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years. If these periods are omitted from training schedule, it is unlikely that personal best swimming performance will be developed.

Thiess and Gropler\(^8\) conducted a study and the basic findings of their study showed that the learning and practicing of numerous movement patterns dominated first years of training (so called technique training) and occupied up to 60% or 70% of training time. Periodic practicing of other sports, such as, athletics, gymnastics and games, increased the number of movement patterns, which could be learnt. In addition to contributing to general athletic development, this helps the co-coordinative abilities and flexibility of a young swimmer.

Rahn and Rasch\(^9\) found that age group swimmers who had spent up to 70% of their training on dry land had attained the same levels of achievement in swimming events as those swimmers who have had the opposite proportions in training and were exposed to one sided training programme for the development of specific endurance.

Demeter\(^10\) suggested that the main concern of basic sports motor coaching and large part of the basis swimming training should be to learn all four competitive strokes and to consolidate them by frequent and correct grooving. In addition to this fixed store of movement pattern, which are to be practiced very precisely, beside the multiplicity of different movement patterns in view of the varying anatomical relationships of the body during puberty and

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adolescence, the coordinative skills too should be continuously put into the test. This involves learning of at least one new movement pattern is every instructional session.

Troy\textsuperscript{11} observed that almost all their younger swimmers were trained in all the four strokes. He said that, "We feel like, with all different body types and every thing it is really hard to tell what they are going to swim later on. We prefer they have pretty good basics in all four strokes. We will enter them in all four events and really try to press them into swimming the Individual Medley especially around 13 for the girls, and for the guys, 14 – 15. We encourage them to swim the 400m IM a couple of times a year to give them a feel for it. We do weights three days a week and then basic exercises for abdominal three days a week".

Scott\textsuperscript{12} studied 26 senior high school male swimmers who bettered or equaled a time of 56 seconds for 100 yards Crawl Stroke. They were tested for the flexibility of ankle, knee, hip, trunk, and shoulder followed by strength test of knee, hip, shoulder, and trunk. Upon completion of tests, the swimmers were timed for 100 yard kick, pull and swim. It was concluded that certain flexibility measures were significantly related to swimming time. However, it was determined that knowledge of certain flexibility and strength measures could not be used to predict 100 yards crawl stroke times.

For determining the learning rate of beginning swimmers and the relationship of this learning rate with learner's ability McLay\(^1\) conducted a study on 20 female non-swimmers at the University of Iowa. The subjects were taught swimming in small classes to facilitate very close records. Lessons were carefully timed to 30 minutes. Each student was asked to continue coming on lesson beyond required to pass the 15-minute test and was permitted to continue as long as the rest of the group. If any student chose, Lessons were terminated at 12\(^{\text{th}}\) to 17\(^{\text{th}}\) lesson for the slower learners. On the lesson following the passing of the test, five judges observed the swimmers and rated them on from, which was also rated at the end of the series of lessons. Motor ability was measured by Scoot Motor Ability Battery. The sum of the judges' ratings given on the 20 swimmers was correlated with the motor ability scores. The author noted some indication that motor ability was one factor determining learning rate, but it was not sufficient to counteract all other influences. There was a great individual variation in learning rate and majority of swimmers could be taught sufficient swimming skills to pass the test in 15-16 lessons or less.

Johnson\(^2\) attempted to investigate the possibility that man's ability to learn motor tasks is associated with his physical work capacity. The study was conducted over a six-week period. Forty undergraduate woman students form Smith College volunteered as subjects. All practiced a double ball-tossing task three times a week. Twenty subjects of the experimental group concurrently participated in a physical conditioning programme that was designed to improve

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their physiological working capacity. The other twenty subjects, members of the control group, did not participate in the conditioning regimen. The criterion measure for physical work capacity was oxygen consumption as ascertained by use to the bench stepping test and the Astrand-Rhyming monogram. Statistical treatment of the data included a Type-1 design as suggested by Lindquist and Grants trend analysis procedure. The .05 level of confidence accepted as indicating significance. The findings of the study indicated no significant relationship between a person’s ability to learn motor tasks and his level of physical work capacity.

Schroeder\textsuperscript{15} explained varied basic physical exercise and sports instruction i.e. required as a basis for the development of good performances in a sport or discipline, because the young organism needs varied growth stimuli, whereby the maximum development of the various physical factors determining performance is possible. Since this task cannot be performed by a particular sport or discipline on its own, other training methods, so called, general training methods, should be used in training in addition to the training methods specific to the sport or discipline.

Israel and Buhl\textsuperscript{16} emphasized that young swimmers training up to the age of eleven years includes primarily teaching of technique. Improvement in basic swimming endurance and reaction time, short term acceleration, all round co-ordination and flexibility should be done. It should not be forgotten that at this age, the muscular strengthening exercises should be light, however, should


start weights after puberty. The increase in strength before puberty is based
mainly on improved co-ordination within the individual muscles and between
various muscles. The flexibility of the muscles should also be increased by
regularly performing stretching exercises. Only with a very good neuro-
muscular co-ordination and excellent flexibility is the transition between
loading and relaxing the driving muscles guaranteed, which is crucial for
economical execution of swimming movement which have to be continuously
repeated over long distances.

Dubey\textsuperscript{17} studied the relationship of selected anthropometric
measurements, physiological variables and arm and leg speed to front crawl
swim speed. Thirty swimmers of national level were the subjects for her study.
The dependent variables of 50 meters and 100 meters timing were selected to
take front crawl swimming performance. The independent variables selected for
the study were anthropometric, physiological, arm length, and leg length speed
variables. The length, leg length and body composition. The physiological
variables included vital capacity, maximum expiratory pressure, and maximum
breath holding capacity, peak flow, pulse rate, and blood pressure. Pearson's
product moment correlation was used to assess the relationship between front
crawl swim speed and each of the independent variables. In order to predict the
crawl stroke swimming speed ability on the basis of most contributing
anthropometric, physiological and arm length, thigh, fore leg length, leg length
body composition, vital capacity, maximum expiratory pressure, peak flow, arm
speed were significantly related with 50 meters front crawl swim speed.

\textsuperscript{17} Alka Dubey, "Anthropology of Arm and Leg Speed Performance of Indian Top
Class Swimmers As Predictors of Swim Speed," \textit{Unpublished Ph.D. Thesis}, Jiwaji University,
Watson\textsuperscript{18} prepared test items for the physical fitness tests consisting of long jump or vertical jump, 50-yard dash, sit-ups, stick jump and 300-yard distance run. The norms were established for each test item for girls and boys according to chronological age. Percentile tables were constructed based on the results of investigation. Watson further recommended that at elementary level, there should be some test items and norms to evaluate shoulder girdle strength.

Yadav\textsuperscript{19} conducted a study on standardisation of physical fitness norms for the school going boys of Haryana in the age group of 13 to 16 years with the purpose of estimating the fitness level and for comparing the physical fitness standards of urban and rural boys. For the purpose of this study 3600 school boys from twelve districts of the state were randomly selected. Their performances were recorded on 50m Dash, Shot put, Standing Broad Jump, Zig-Zag Run, Sit-ups and Step-up test. The norms in terms of percentile rank of the said group were developed.

Athicha Pillai\textsuperscript{20} conducted a study on computation of norms on Twelve Minute Run and Walk for school boys. Data were collected from 20 districts, except that of Nilgiris, in Tamil Nadu. Two Way Analysis of Variance was applied to find out whether there was any significant difference between different districts and age groups. It was found that different age groups had different performances.


Baskaran\textsuperscript{21} constructed norms on Agility Co-ordination Test for Tamil Nadu college men Basketball, Football, Hockey and Volleyball players. One thousand and eighty five subjects were selected for the study at random from sixty three colleges in various districts of the State. In AGCO test (Agility co-ordination test) as per the qualitative grading for the constructed norms, it was evident that 140 players out of 1085 (12.9\%) were poor in this test, 259 players (23.87\%) were fair, 267 players were (25.71 \%) average, 267 players (24.60\%) were found to be good, 140 players were (12.9\%) found to be very good and none of them were in excellent group.

Senthil Kumar\textsuperscript{22} conducted a study on construction of Norms for health related physical fitness test for Kanyakumari, Tirunelveli, Chidambarnar and Madras District school boys. Two thousand and eleven students in the age group of 13 to 14 year were selected as subjects for this study. In nine minute run/walk as per the qualitative grading for constructed norms, 298 were poor, 457 were fair, 482 were average, 432 were good, 220 were very fair, 533 were average, 458 were good, 270 were very good and 65 were excellent.

Rao\textsuperscript{23} constructed norms for health related physical fitness variables for high school boys 15 years of age in Andhra Pradesh. He selected 1005 subjects from various schools in Andhra Pradesh. The following variables were selected for this study: Aerobic endurance, body composition, muscular strength and upper body strength. Means, standard deviations and Hull scale were the

\textsuperscript{22} Senthil Kumar, "Construction of Norms for Health Related Physical Fitness Test for Kanya Kumari, Tirunelveli, Chidambarnar and Madras District School Boys", Unpublished M. Phil Thesis, Alagappa University, Karaikudi, (July 1990).
\textsuperscript{23} Bommadevara Hanumantha Rao, "Construction of Norms for Health Related Physical Fitness Test for High School Boys of Fifteen Years of Age in Andhra Pradesh", Unpublished M. Phil Thesis, Alagappa University, Karaikudi, (July 1993).}
statistical techniques used. In aerobic endurance as per the qualitative grading for the constructed norms, 185 subjects were poor, 194 subjects were fair, 319 subjects were average, 182 subjects were good, 84 subjects were very good and 41 subjects were excellent. In body composition as per the qualitative grading for the constructed norms, 181 subjects were poor, 218 subjects were fair, 383 subjects were average, 102 subjects were good, 63 subjects were very good and 58 subjects were excellent. In flexibility as per the qualitative grading for the constructed norms, 170 subjects were poor, 259 subjects were fair, 242 subjects were average, 210 subjects were good, 72 subjects were very good and 52 subjects were excellent. In muscular strength/Endurance as per the qualitative grading for the constructed norms, 334 subjects were poor, 249 subjects were fair, 202 subjects were average, 97 subjects were good, 68 subjects were very good and 55 subjects were excellent. In upper body strength/Endurance as per the qualitative grading for the constructed norms, 296 subjects were poor, 159 subjects were fair, 290 subjects were average, 170 subjects were good, 52 subjects were very good and 38 subjects were excellent.

Robson\textsuperscript{24} and others conducted a study on a simple physical fitness test battery for elementary school children. 152 boys and 150 girls of Kendriya Vidyalaya, Gwalior, studying from grades one through five, acted as the subjects. All the subjects and assistants were oriented to the test battery comprising 50 meters dash, 600 metres run/walk, straight leg sit ups, vertical jump, 4x 100 metres shuttle run and modified push-ups. The subjects were given practice in these items so that they were able to give the correct

performance in each item. The assistants were properly oriented to record measurements accurately so that mistakes could be avoided. The test items were administered to the subjects on two days, administering three items each day. After a day's rest, the same students were tested on the fourth and fifth day for finding out the reliability. The value of 'r' obtained was 0.87 which showed that the subjects had achieved consistency of performance in the test items. The readings were taken during forenoon sessions. Norms were computed for the six physical fitness test items.

Zuti and Carbin\textsuperscript{25} conducted a research study on physical fitness norms for college freshman. They took 3000 freshman of Kansas State University, within the age from 17.6 years to 19.5 years. The tests were conducted for strength, flexibility, body composition and cardiovascular fitness. The results appeared to indicate that the college freshmen at Kansas State University were above average and that the standards were appropriate for use for Americans.

The Vermont Governor's Council on Physical Fitness\textsuperscript{26} had provided a motor fitness test battery for students from kindergarten to grade twelve for use by the school in the state. To keep school levels intact and to utilise the AAHPERD battery when applicable, the modified test were recommended for the elementary school and AAHPERD tests for the secondary school. The modified test battery composed standing long jump, bent knee sit-ups, desk push ups and a figure-8 run are optional for secondary school boys and girls in order to enter achievements for special Vermont fitness awards. Norms for the

\textsuperscript{26} R.E. Sparks (Ed), Vermont School Fitness Test Manual, (Montpelier: Governor's Council on Physical Fitness, 1982).
test items were available separately for boys and girls at each age from five to eighteen years, they took the form of performance required for four award levels, known as: certificate, 30th percentile, standard 50th percentile, merit 80th percentile, Governor 85th percentile.

Muthusamy constructed norms for physical fitness for school girls of the union Territory of Pondicherry. He selected the school girls between the age of 13 and 15 years. AAHPERD youth fitness tests were administered. Mean, standard deviation and Hull scale were computed for the construction of norms. He conducted the test on 100 girls of 13 years of age 64 were poor, 10 were good and 3 were excellent. In 14 years of age as per the qualitative grading for the constructed norms, 24 were poor, 34 were good and 7 were excellent. In 15 years of age as per the qualitative grading for the constructed norms, 27 were poor, 28 were good and 4 were excellent.

Australian Council of Health, Physical Education and Recreation had surveyed throughout Australia to ascertain the current levels of fitness, health and physical performance of school children between the age of seven and fifteen years. The results were used to establish age and sex norms for a cross-section of the school based on population. Information gathered was intended to aid future planning and evaluation of school physical education programmes. The physical performance tests would provide the basis for a fitness award scheme introduced for school children.

Singh established norms for physical fitness of primary school children of Punjab and Haryana. The data relating to Punjab and Haryana, male and female, rural and urban elementary school children of age groups 6-11 years were collected by using Grover Physical Test Battery on 2500 children each from Punjab and Haryana. To assess physical fitness of elementary school children means, standard deviations were computed and to determine the differences in selected variables among five levels, one-way of analysis was computed. "t" - ratio was computed to see significance of differences if any, existing in inter-groups as well as on physical fitness test battery. Further, Scheffee test of post hoc mean pair difference was applied to see significance of differences in pairs and finally, percentile scale, T -scale and Hull-scale were computed for norms for various age groups and in different variables of physical fitness of school children. Based on the findings and within the limitations of the study, the following conclusions may be drawn:

1) The subjects belonging to age groups 6-11 years of Punjab and Haryana showed varied performance in standing broad jump, shuttle run, sit-ups and seat crawl.

2) There were variations in performance in Punjab, male, female, rural and urban elementary students in ages 6-11 years in standing broad jump, shuttle run, sit-ups and seat crawl.

3) There were variations in performance in Haryana, male, female, rural and urban elementary school children in ages 6-11 years in standing broad jump, shuttle run, sit-ups and seat crawl.

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Judy\textsuperscript{30} conducted a Normative study of the AAHPER youth fitness test for girls in grades seven through ten in the state of South Dakota. One school was selected to represent each region or section of the South Dakota High School Activities Association. The number selected from each school was in proportion to the school's enrollment. The AAHPER youth fitness test was administered to 1000 South Dakota girls in grades 7 through 10. Norms were established by computing every fifth percentile. The Scores of South Dakota girls were compared with scores of national girls, using age only. The medians of South Dakota girls were then compared with the medians of the National girls on each test item. The medians for South Dakota girls were higher than those for National girls on all except the flexed arm hang. The scores of South Dakota girls tended to show improvement as age increased whereas the scores for National girls tended to level off or drop.

Gurusamy Inbarajan\textsuperscript{31} conducted a study on construction of norms in selected Athletic events namely 100m, 1500m, Long Jump and Shot – put for under-Graduate physical education men students in Tamil Nadu. Three hundred and eighty one men students were selected from various physical education colleges in Tamil Nadu and the students studying B.Sc.(Physical Education) were selected as subjects. The data collected from 381 subjects were statistically analysed with the help of means and standard deviations. The raw scores were converted into the Hull Scale norm score. In 100m, as per the qualitative


grading for the constructed norms, 53 subjects were poor, 78 subjects were good, 54 subjects were very good and 1 was excellent. In 1500m as per the qualitative grading for the constructed norms 58 subjects were very poor, 72 subjects were fair, 117 subjects were average, 71 subjects were good, 58 subjects were very good and 5 subjects were excellent. In long jump as per the qualitative grading for the constructed norms 45 subjects were poor, 113 subjects were fair, 103 subjects were average, 58 subjects were good, 46 subjects were very good and 16 subjects were excellent. In shot put, out of 381 subjects 62 were poor, 112 were fair, 95 were average, 35 were good, 50 were very good and 27 were excellent.