Chapter 2

REVIEW OF THE LITERATURE

Efforts to obtain a means for classification of children into homogeneous groups for physical education classes and competitions are evident from a number of investigations most of which can be traced to early decades of the twentieth century. The following review indicates that a majority of Investigators have attempted to evolve satisfactory indices using measures of body size and maturity like age, height and weight.

Prior to 1917, according to Bovard and Cozens\(^1\) a sort of classification of pupils into homogeneous groups based upon weight was being followed as middle weights, light weights and heavy weights etcetera. It was soon recognized that such a grouping on weight only, was inadequate for the purposes and that other factors as age and height also had considerable role to play.

A pioneer study was that of Reilly\(^2\) who established a classification plan for boys and girls known as age-grade-height-


weight plan, so that they may be fairly matched for competition. Boys and girls are classified broadly into Junior (fifth and sixth grades) and Seniors (seventh and eighth grades) based on the grades of instruction to which they belong. For each of these classes a table is provided to score an exponent for each of the factors of grade, age (years), height (inches) and weight (pounds). Boys and girls in Junior or senior Class are placed in the five groups A, B, C, D and E depending on the sum of the exponents scored by a boy or girls. (up to 21–A; 22 to 25–B; 26 to 29–C; 30 to 33–D; 34 or over – E).

Analogous to Reilly’s plan, California plan\(^3\) was developed in 1918, providing age-grade-height-weight classification for homogenous of high school boy for competition in Decathlon events. A tale of scoring the exponents for each of the four factors of grade, age (years and months), height (inches) and weight (pounds) has been provided. Sum of exponents for a boy gives placement for him in either A, B, C or D class according to the group norms. (67 or more-A; 57 to 66-B; 50 to 56-C; Below 50-D). No such classification scheme is provided for girls under the plan.

Since Reilly’s plan was designed for boys and girls in fifth, sixth, seventh and eight grades only, Hetherington and

Stolz modified the Reilly’s plan “to take care of the age level in the senior high school by formulating a new index which runs as 2 Age (years) + 0.2 Height + 0.1375 Weight⁴. The new formula was widely adopted by the California Interscholastic Federation.

Delaney’s⁵ study on Junior High School Girls revealed that 10 Age + Weight correlated better with performance ($r = .319$) than age alone under fourteen years of age, and for fifteen years and over 10 Age + Height yielded better correlation ($r = .260$). Hence these two formulae were recommended to be used for purposes of classification of girls than mere age.

McCloy⁶ in an experimental work with a group of boys found that in predicting athletic ability, height was of little importance with respect to elementary school boys, when age and weight were used, and age ceased to make any contribution at

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seventeen years and after, while all the three factors were of greater validity for the high school level. Accordingly three indices were suggested as follows.

(a) For High School Level:

\[ \text{Index I} = 20 \text{ (Age)} + 5.5 \text{ (Height)} + 0.15 \text{ (Weight)} \]

(b) For College Men:

\[ \text{Index II} = 6 \text{ (Height)} + \text{Weight} \]

(c) For Elementary School:

\[ \text{Index III} = 10 \text{ (Age)} + \text{Weight} \]

It is stated that classification Index I was arbitrarily changed by McCloy himself as 20 (Age) + 6 (Height) + Weight\textsuperscript{7}.

Subsequent study by Neilson and Cozens in Clifornia with a large number of pupils yielded first a classification formula which read 20 (Age) + 4.33 (Height) + Weight and it was modified by a further study by the same authors to read as 20 (Age) + 5.5 (Height) +1.1 (Weight)\textsuperscript{8}. A chart also has been provided for the easy computation of Neilson and Coezens Index and group classification on the basis of the sum of exponents reached there from. A close resemblance of Neilson and Coezens Index with that of McCloy (classification index I) is evident and the

\textsuperscript{7}Ibid., p.46.

\textsuperscript{8}Ibid., p. 49.
correlation coefficient obtained between the two is reported to be .98\(^9\).

Bookwalter\(^10\) classified 807 boys by McCloy's formula and also by California classification for boys and girls. He found 84.1% agreement in the two systems of classification.

There appears to be a general agreement that factors of Age, Height and Weight correlate with performance to a lesser extent in girls than in boys. \(^{11, 12, 13, 14}\) McCloy\(^15\) observes that "no evidence of an objective nature has been brought forward to explain why the accuracy of age, height and weight variables as predictors of athletic ability is greater for boys than for girls".

\(^9\)Ibid., p.50
\(^{15}\)McCloy, Op. Cit., p.54.
Gross and Casciani\textsuperscript{16} evaluating factors of Age, Height and Weight in Secondary School Students as a classification device in AAHPER Tests, concludes that these factors are of very little value.

Though it is to be admitted that the factors of age, height and weight in no two events operated in the same manner, replacing factors of age, height and weight with functional measures for classification would only be theoretically sound and not practical. It is here that Kistler’s observations became relevant and important. Kistler\textsuperscript{17} in his comparative study of methods of classifying pupils into homogeneous grouping for physical education found that McCloy’s classification index came only third in its correlation with the criterion set up ($k = .832$). The first two were functional measures weighted strength and short strength test with correlations of .888 and .875 respectively. Considering simplicity of measurements and economy of time McCloy’s Index could be followed through it provided little useful knowledge on motor equipment of the boy.


Cozens, Trieb and Neilson\textsuperscript{18} framed a best fit index using factors of Age, Height and Weight. The formula runs as 20 Age + 4.75 Height + 1.60 Weight, which in fact was an average of five indices framed separately for running, jumping, throwing, weight and strength and kicking. The Five Indices framed are as follows:

\((a)\) Running Index:

\[ 20 \text{ Age} + 9.78 \text{ Height} + 1.26 \text{ Weight} \]

\((b)\) Jumping Index:

\[ 20 \text{ Age} + 5.02 \text{ Height} + 1.13 \text{ Weight} \]

\((c)\) Throwing Index:

\[ 20 \text{ Age} + 2.07 \text{ Height} + 1.77 \text{ Weight} \]

\((d)\) Weight and Strength Index:

\[ 20 \text{ Age} + 5.48 \text{ Height} + 1.97 \text{ Weight} \]

\((e)\) Kicking Index:

\[ 20 \text{ Age} + 1.41 \text{ Height} + 1.87 \text{ Weight} \]

Average of the Five: 20 Age + 4.75 Height + 1.60 Weight Dividing by 10, the best fit index = 2 Age + .475 Height + 0.16 Weight

But it is necessary to note here that the classification indices computed are with respect to American boys and girls.

Bovard and Cozens have pointed out that McCloy's 1927 classification Index \((20\ A + 3.75\ H + 2.50\ W)\) over emphasizes the influence of weight probably due to his Chinese Data, indicative of the possibility of variations in the physical build of girls in the different countries. McCloy himself observes that "these Chinese girls were more preadolescent in type of body build than are American Girls. As such, any classification index does not merit a universal application.

Some authors report the existence of some classification systems in India. In the State of Madras, \(\frac{1}{2}\) \(H + W\) is stated to be the classification index for Indian Schools and "4 Age + Height + Weight divided by 3" is reported to be the classification index for European Schools. Bombay State (now the State of Maharashtra) is stated to have a classification procedure different from those of Madras State.

Joseph suggests the following classification formula" 4 Age + Height + \(\frac{1}{2}\) Weight

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19 Bovard and Cozens, Op. Cit., p.201


Thirunarayanan and Hariharan\textsuperscript{23} have proposed Age + Height + $1/10$ Weight which "may be tried in our schools and adopted if found satisfactory". It appears obvious that the above classification formulae have not been evolved by any scientific investigations.

The Investigator tried in vain to trace the origin and genesis of these classification formulae.

Any classification procedure should be feasible in terms of the time consumed and equipment required for the purpose. The objective of classification at the secondary school level is to obtain homogeneity on the basis of general motor ability, in groups of boys and girls as they re exposed to wide variety of physical activities.

Preliminary classification on the basis of the easily assessable factors of age, height or weight or any combinations of these factors that bear a reasonably good correlation with motor ability, may if necessary be supplemented by a readjustment of groups on the basis of some character qualities like interest, persistence and courage which are unmeasured by the classification

indices based on measures of size, maturity.\textsuperscript{24}

Any such classification procedure, to be useful, should be evolved and tested for applicability for different regions.

The present investigation is an attempt to evolve a classification procedure applicable to girls of secondary school system of Bangalore City District.