CHAPTER I
INTRODUCTION

MEASUREMENT AND EVALUATION

Measurement and evaluation are independent concepts. Evaluation is a process that uses measurements. In the evaluation process, information is interpreted according to established standards so that decisions can be made. Clearly, the success of evaluation depends on the quality of the data collected. If test results are not consistent (or reliable) and truthful (or valid), accurate evaluation is impossible. The measurement process is the first step in evaluation; an improved measurement leads to accurate evaluation.

People are different. They vary in body size, shape, speed, strength and many other respects. Measurement determines the degree to which an individual possesses a defined characteristic. It involves first defining the characteristic to be measured, and then selecting the instrument with which measured.

Test scores vary between being objective or subjective. A test is objective when two or more people score the same test and assign similar scores. Tests that are most objective are those that have a defined scoring system and are administered by trained testers.

A subjective test lacks a standardized scoring system, which introduces a source of measurement error. We use objective measurements whenever possible
because they are more reliable than subjective measurements. (Barrow and Rosemary, 1979)

Evaluation is a dynamic decision-making process focusing on changes that have been made. This process involves:

(i) Collecting suitable data (measurement)

(ii) Judging the value of these data according to some standard; and

(iii) Making decisions based on the data

The function of evaluation is to facilitate rational decisions. For the teacher, this can be to facilitate student learning; for the exercise specialist, this could mean helping someone establish scientifically sound weight reduction goals.

There are certain characteristics essential to a measurement; without them, little faith can be put in the measurement and little use made of it. The first important quality of measurement is reliability. A reliable test or instrument measures whatever it measures consistently. That is, if an individual whose ability has not changed is measured twice with a perfectly reliable measuring device, the two scores will be identical. The second important characteristic is validity. A test or measuring instrument is valid if it measures what it is supposed to measure.

The third important characteristic of a measurement is objectivity. Objectivity is sometimes called rater reliability because it is defined in terms of the agreement of competent judges about the value of a measurement.
Logical validity, concurrent validity and predictive validity are essential methods to examine validity.

Construct validity is used with abstract rather than concrete tests. An abstract test measures something that is not directly observable. Attitudes towards physical activity are abstract human traits that are neither readily apparent nor easily understood by an untrained professional. The number of basketball free throw made out of 100 trials, on the other hand, is a concrete measure of skill.

Construct validity is determined by judging the extent to which theoretical and statistical information support assumed constructs.

Scientists may not consider this a scientifically “true” example of a construct validation process; however, it does demonstrate that the process can be applied in physical education and exercise science. Whenever a superior performer does not achieve a score comparable to those of previously administered tests, the teacher must be alert to the possibility that the test lacks either reliability or validity (Safrit, 1990)

FACE VALIDITY

A test has face validity, if it appears obvious that it is a measure of the ability in question. (Johnson and Nelson, 1982)
Face validity refers to the acceptability of test and test situation by the tester in terms of apparent use to be made of a test. The test has face validity when it seemingly measures the variable in question. (Barrow and Rose Mary, 1979)

**RELIABILITY**

The reliability of a test or measure is the consistency when the test or measure is reproducible under the same conditions with the same subjects. (Eckert, 1974)

**OBJECTIVITY**

Objectivity is often defined as the degree of agreement between different examiners who measure the same group of subjects in the performance of same activity (Johnson and Nelson, 1982)

**FACTOR ANALYSIS**

A statistical procedure that is used to reduce a large number of variables to a much smaller, representative set of variables is called factor analysis. The object of factor analysis is to achieve parsimony, and often to discover the essential variables that underline and summarize the information in a large set of variables (Safrit, 1990).

**NORMS**
The norms taken for the study identifies a person in relation to a given sample. Grade, age, percentile and standard score norms are the four types of norm, which have been most commonly used. Computing the average of raw scores for each grade, and using the grade equivalent in place of the average determine grade norms. Computing the average of the raw scores for each age, and using the equivalent in place of average determine age norms. Percentile norms are determined by the percentage of individual in his norm group who falls below an individual score. Standard norms are represented by the distance of a given raw scores above or below the mean of the norm group as expected in the standard deviation units. Although all types of norms have advantages and disadvantages, the use of the standard scores or percentile is generally recommended (Safrit, 1990).

CRITERIA FOR SELECTING NORMS

Even though there are many tests to measure the ability of an individual, attempt should be made to construct norms. Norms are very useful in classifying the students in a particular activity according to their ability. Norms are also used to grade the students.

Educationists have also been interested in this function of measurement. One way of knowing how much a student has achieved is to examine his score in relation to the score of others on the same test. STANDARD
Evaluation is the process of giving meaning to a measurement by judging it against some standard. The two most widely used types of standards are criterion and norm referenced.

The criterion-referenced standard is used to determine if a student has attained a specified level of skill.

The norm-referenced standard is used to judge an individual’s performance in relation to the performances of other members of a well-defined group.

Non-referenced standard is developed by testing a large number of individuals of a defined group. Descriptive statistics are then used to develop standards. A common norming method is to use percentile ranks. This type of norm reflects the percentage of the group that can be expected to score below a given value. Percentile rank norms are commonly used to evaluate health status.

**CRITERION REFERENCE**

Criterion reference standard is a predetermined standard of performance that indicates that the individual has achieved a desired level of performance. The performance of this individual is not compared with other individuals as in the case with norm-referenced standard, but rather just against the standard. (*Safrit, 1990*).

**STANDARD TEST**

A systematic sample of performance is obtained under prescribed conditions, scored according to definite rules, and capable of evaluation by reference to
normative information. Some writers restrict the term to tests having the above properties, whose items have been experimentally evaluated and/or for which evidences of validity and reliability are provided (Yobu, 1988).

Measurement and evaluation are considered a part of the teaching/learning/process. The process of assessment involves both measurement and evaluation. Measurement is the process of assigning a member to some property of an entity. We speak of ‘properties’ of the student because we are not actually measuring speed or arm strength or a game skill. Evaluation is the process of making judgments about the results of measurement (Safrit, 1981).

Assessment can serve many useful purposes in a school or college setting. Because most school or college systems enforce the practice of giving grades, grading is often the foremost reasons given for assessment.

Some of the purposes of assessment are:

1. To diagnose weaknesses
2. To classify according to ability
3. To exempt from aspects of the programme
4. To predict future ability level
5. To determine achievement level
6. To specify improvement of achievement
7. To motivate students

8. To determine grades

9. To evaluate coaching

10. To justify programs to administrators

11. To evaluate the curriculum

CLASSIFICATION ACCORDING TO ABILITY

Once the students’ initial ability levels have been determined, the teacher may wish to separate the students into ability groups for the duration of a unit. The membership of these groups may change several times. For example, a student might be able to execute an effective volleyball pass, but he might have difficulty in performing the over arm serve. Therefore, he would be a member of the high ability group when working on the serve. Because a given student may perform different skills at different levels, the maintenance of intact ability groups throughout a unit, although convenient for a teacher, may be undesirable for the students. In addition, the teacher may occasionally wish to combine low ability and high ability students in the same group. The high ability students can help the low ability students by correcting errors and by providing an opportunity for them to be exposed to well executed skills.
Prediction of Future Performance

Theoretically, tests given at the beginning of a unit could be used to predict the future performance of students. In some schools or colleges, tests are used to determine initial team membership of an athletic squad, but such tests are usually supplemented by the coach’s subjective judgement.

Determination of Achievement Level

Evaluation is essential for providing feedback on the student’s level of achievement. There is considerable evidence indicating that students who are provided with knowledge of results learn faster than students who receive no feedback.

If students know the standards of achievement set by the teacher, they will know how well they are progressing towards attaining them.

Determination of Improvement

Evaluation provides information on the degree of improvement made by the student over a period of time. Improvement at any skill level is undoubtedly encouraging to a student.

Motivation of Students
The students who know how well they are performing and how they can improve are likely to be better motivated than those who receive no feedback.

**Determination of Grades**

Evaluation is essential for determining grades. As grades are part of a student’s permanent record, a teacher’s decision can have far reaching implications.

**ASSESSMENT NEEDS IN PHYSICAL EDUCATION**

The process of evaluation in physical education is hindered by the lack of standardized measures, available testing materials and trained personnel who can devote their time to developing appropriate measures.

There is a great need for an organized approach to the development of physical education evaluation tools.

**Application of Skill Tests**

Skill tests reflect the ability of the pupil to perform in a specified sport. By knowing the ability of a youngster in a particular game or sport it then becomes possible to use his skill ability score for such purposes as classification determining progress and marking.

For example, the first time teacher or coach meets a class in a game, it would be advisable to place the pupils of like ability in order to facilitate teaching.
Administering a skill test during the first meeting of the class permit the teacher to group the youngsters for instruction immediately.

Administering the skill test at the beginning and end of the course permits the instructor to observe the progression of the class and provides a means for making the pupil.

Skill tests are constructed in most cases by careful studies of the various components or skills in the game deemed vital for successful performance. One might proceed in accordance with the following general outline in constructing (Mathews, 1973)

Measurement and evaluation are a means of an end, not an end in themselves.

Measurement is to evaluate the effects of instruction in the light of educational outcomes.

**Skill Tests for a game**

1. Critically examine the game to determine the skills most essential for successful performance in the game. These most essential skills may be selected as variables in making up the skill test.
2. Then, once the variables are selected for measurement, they are administered to a large sample of the group of subjects to whom the test results are to be applied, say, college or university players.

3. The final step is to ascertain whether those who scored high on the test were also the better players in that game. This may be done by having the coaches (broad of experts) rank each one of the players in regard to his playing ability. If there is a close relationship, that is, a high correlation between the experts’ ratings and test scores – the test is valid.

HISTORY OF TABLE TENNIS

Like many other sports, Table Tennis began as a mild social diversion, descending, along with lawn tennis and badminton, from the ancient medieval game of tennis. It was popular in England in the second half of the nineteenth century under its present name and various trade names such as Gossima and Whiff-Whaff. After the name Ping-Pong (an imitation of the sound made by the ball striking the table and the vellum bats that were used) was introduced by J. Jaques & Son, the game became a fashionable craze. There are many contemporary references to it and illustrations of it being played, usually in domestic surroundings.

By the early years of this century, Ping-Pong had already acquired some of its present day complexities, though it was still seen by many as an after-dinner amusement rather than a sport. An account published in 1903 found it necessary to warn against wearing a dress suit and stiff shirt—or, for ladies, a white satin gown—but
went on to give detailed technical advice about pimpled rubber, the penholder grip and tactics. The game was popular in Central Europe in 1905-10, and even before this is a modified version had been introduced to Japan, where it later spread to China and Korea.

After a period when it had dropped out of favor in Europe, the game was revived in England and Wales in the early twenties. By that time 'Ping-Pong' had been registered as a trademark, so the earlier name of Table Tennis was re-introduced. National associations were formed and standardization of the rules began, both in Europe and the far East.

Then, over the next sixty years, Table Tennis developed into a major worldwide sport, played by perhaps thirty million competitive players and by uncountable millions who play less seriously. However, the game itself has not changed in essence since its earliest days, though it is faster, more subtle and more demanding than it was even only twenty years ago. A constant concern of the ITTF has always been to insure that Table Tennis remains a contest of human skills and that technological developments which add a new factor to the game do not give too great an advantage to the players who have the first opportunity of making use of them. Thus, equipment specifications are carefully laid down, and rigorously enforced.

Table Tennis also called “Ping-Pong” is a game patterned after Tennis but is played indoors on a table. Simplicity of its rules and the fact that its equipment is so easily and cheaply available had made this game a most popular sport.
Introduction of the hollow, feather light, celluloid ball has completely revolutionized the game giving it new impetus, extraordinary speed and split-second precision. Studded rubber cash mat on ping pong bat has added to its effective control of the ball and has made the game more fascinating.

Table tennis, like any other sport, is an educational process demanding psychological and physiological attributes. It is still a question that who first invested Table Tennis as it is played today is not known nor is the country to its origin quite definite.

Great Britain, the United States of America, as well as India and South Africa have each been named as the birth place of this popular sport but most people concede that it began in England. Even those who suggest that Table Tennis was played first in India or South Africa agree that British arm officers stationed there were probably responsible for its introduction into those countries.

The game lost its appeal around 1904 and did not revive until after World War I when in 1921 the Ping Pong Association was established in Britain. The name of the Association was subsequently changed to Table Tennis Association in 1926 and it became a worldwide governing body.

In 1933, the U.S. Table Tennis Association was formed as one of its affiliates- Japan, China, Hungary and Czechoslovakia have made especially strong showing in International play.
Table Tennis was included in Olympic Games in 1928. It was introduced in the 3rd Asian Games held in Tokyo (Japan) in June, 1958.

The game was in England in the early days of the 20th century and was originally called Ping-Pong, a trade name. The name Table Tennis was adopted in 1921-22 when the old Ping-Pong Association formed in 1902 was revived. The original association had broken up about 1905, though apparently the game continued to be played in parts of England outside London and by the 1920s was being played in many countries. Led by representatives of Germany, Hungary, and England, the Federation Internationale de Tennis de Table (International Table Tennis Federation) was founded in 1926, the founding members being England, Sweden, Hungary, India, Denmark, Germany, Czechoslovakia, Austria, and Wales. By the mid 1990s more than 165 national associations were members.

Modern Table Tennis at national and international level is a rigorous as any sport in its demands for the highest degree of physical fitness and mental concentration, attained only by arduous training to develop natural skill. Fred Perry, World Men's Singles Table Tennis Champion in 1928-29, later achieved even greater fame at Wimbledon; perhaps it would not be quite true to say that he moved to the larger court when his play became too slow for the table, but it is certainly true that no sport requires faster reactions and more delicate muscular co-ordination than Table Tennis.

The first world championships were held in London in 1927, and from then until 1939 the game was dominated by players from central Europe, the men’s team
event being won nine times by Hungary and twice by Czechoslovakia. In the mid
1950s, Asia emerged as a breeding ground of champions, and from that time the
men’s team event has been won by either Japan or China, as has the women’s event,
though to a lesser extent; North Korea also became an international force. Guo
Yuehaua of China won the $12,500 first prize. In 1980 the first World Cup was
held, and Table Tennis became an Olympic sport in 1988, with singles and doubles
competitions for men and women.

Table tennis is now one of the most popular sports, possibly because players
of all ages can participate in a game which can be played all the year round in almost
any room which is large enough to take a Table Tennis table.

There are competitions for those under eleven years of age to veterans of
over forty. In fact, Table Tennis can be a span of lifetime enjoyment. Any one find
competitions to suit all abilities whether he plays at school, college, work, youth
club, in a holiday competition, or in an organised tournament—such is the span of
Table Tennis.

In recent years, Table Tennis has undergone rapid development throughout
the world. One of the reasons for this is the introduction of new materials which
allows for many combinations, giving a wide variety of racquet types. The sport has
not been slow to introduce new techniques to accommodate the new-found
technology.
Because of this, the sport has reached new boundaries and the variations in styles of play, together with a greater variety of strokes, make the game more flexible. Players today are imparting greater speed, spin and power to their strokes, thus making the sport more dynamic.

There has emerged from this a number of original styles of play, developed by particular countries, such as the dynamic topspin of the Hungarians, the drive style of Sweden, but none more original than the variety of styles that has come from China. They have close-to-the-table drive players, or all-round players have an invincible repertoire of services which they disguise so well. The techniques the Chinese have introduced have made them Table Tennis masters of the world.

Although sponge rackets were being developed by John Jacques and Company as early as 1928, the players had limited success with them.

Before 1937, certain players used to combine the effects of the finger spin service and their sponge racket to produce some surprising results in leading competitions. Their services were almost unplayable and the rallies were usually very short. However, after 1937, the 'fingersping' service was banned and rallies tended to become quite prolonged.

By 1951, a few players who used sponge rackets were producing good results and by 1954 several Japanese players using sponge rackets were gaming world supremacy, even though Japan did not enter the World Championships until 1952. They had been using sponge rackets in internal competitions for the previous
twenty years. With the development of the sponge racket, the whole game of Table Tennis has changed in character.

Although, sponge rackets as commonly known today have been on the scene for over two decades, the quality of the rubber has changed, and the same degree of speed and spin could not have been achieved in the past. As competition has thrived in the last twenty years, coaches all over the world have developed more and more advanced skill techniques and tactics. The sponge racket was found to be ideal for putting tremendous spin on the ball and when it was being established in world play, a point was often won by the service or, if not, by the smash which was used as the follow-up stroke.

In the 1950s, there was the introduction of a new stroke. It was really an exaggerated topspin where there was a greater preparation, fellow-through and wrist action. The ball was given a finer touch and the stroke was nearer to the vertical plane. The loop drive in its simpler form had arrived. It had most probably been first thought of because players were getting used to their opponent's services and were able to return them - in such a position that the server could not follow-up with a smash.

Another vicious stroke was needed which could easily win the point and the loop drive seemed the most effective. This stroke really led to the downfall of the totally defensive player. Before its introduction, there had been many defensive players but they were just unable to control the greater amount of topspin and were
becoming easy opposition for people whom they had previously beaten. This disheartened many defensive players and they retired.

Others eventually found the control to cope with the spin, but the added advantage for the attackers with the sponge racket meant that very few major men's championships were even won by defensive players. Attacking players also had difficulties in coping with the player who could get his loop drive in first, but they eventually learnt to block the ball effectively.

**RATIONALE FOR THE SELECTION OF THE STUDY**

There are various factors contributing to the top performance in the competitive game of Table Tennis. The coach cannot analyse the strength and weakness of his players and predict their performance in competition without resorting to some measurement and evaluation procedure. Hence, it was considered necessary to construct skill tests for Table Tennis and compute norms for the tests. With these facts in mind, the research scholar made an attempt to construct skill tests in the game of Table Tennis for college men.

The game of Table Tennis is becoming more and more popular among the college students, especially men. It is evident from the history of measurement and evaluation that there is no specific skill test for the game of Table Tennis. Hence, the investigator felt the need to construct skill tests in the game which would suitably help trainers and coaches in the game to select players objectively at various levels of competitions.
**STATEMENT OF THE PROBLEM**

The purpose of this study was to construct Table Tennis skill tests and compile norms for college men players.

**HYPOTHESIS**

The following hypothesis was stated for this research:

\( \text{Ho}_1 \): The newly designed battery of tests would truly measure the table tennis skills of an individual.

\( \text{Ho}_2 \): The playing ability of elite male table tennis players can be measured through the performance of players in skill test of the battery proposed.

\( \text{Ho}_3 \): The players scores of the skill tests will have positive correlation with the experts rating on the game performance.

\( \text{Ho}_4 \): The table tennis skill tests battery constructed will have the reliability, objectivity and validity to be accepted as valid battery.

**LIMITATIONS**

The study is limited in the following aspects:

1. As a college team for inter-collegiate competitions consists of either singles or doubles only in a team, the number of players chosen from ten colleges were limited to only hundred.
2. The selection of subjects for the study was limited to Table Tennis players from colleges, who had participated at least one year in intercollegiate competition. This was because of the fact that the players would have secured precision in serving and rallying which in turn helped the researcher to have experimental control.

3. Though the investigator constructed many skill tests on rallying and service, he used factor analysis to select only four tests for compiling norms.

DELIMITATIONS

1. The study was delimited to male Table Tennis players only

2. The study was delimited to 100 Table Tennis players from various colleges in Tamil Nadu.

3. The age of the players ranged from 19 to 25 years.

4. The study was delimited to selected five skills in the game of Table Tennis

SIGNIFICANCE OF THE STUDY

This study may be significant for the following:

1. The present study will help in measuring the playing abilities of the college men Table Tennis players.
2. The validity, reliability and objectivity of the skills test battery for assessing the playing ability of college men Table Tennis players can be established and the same skills test battery can be used by coaches and experts for evaluation.

3. The performance of the players in skills test may give an insight to coaches and enable them to find out the strengths or weaknesses of the players and give the technical training accordingly.

4. It will provide means to classify the players of different levels, which may provide more objective basis of grading the players.

5. The result of the test can be used as feedback for the players to get motivated themselves (self motivation) to train and improve further.

6. Once the test is standardized for college men Table Tennis players, they can be used as research tool.

**DEFINITION AND EXPLANATION OF KEY TERMS**

**Skill**

Skill is the ability to use the correct muscles at the correct time with exact force necessary to perform the desired movements in the proper sequence and timing.

A skill associated with muscle activity is defined as a skilled movement can be defined as a product of four different elements: force, velocity, accuracy, and
purposefulness. In a skilful performance, all four elements must be performed at the same time in exactly the right combination and amount. (Oxford Dictionary of Sports Science and Medicine)

**Test**

Test is an instrument that is used to gain information about subjects or individuals. (Bucher, 1976)

Test is commonly defined as a tool or instrument of measurement that is used to obtain data in a specific trait or characteristics of an individual or group. (Philips and Hornak, 1979)

**Norm**

Norm is a standard point of reference that can provide a basis for judgement. A norm is an abstract pattern held in the mind that sets certain limits for behaviour.