Chapter III

PROCEDURE

This chapter contains methodology and procedure followed in this study. Precisely this includes, the design of the study, the description of subjects, tests, collection of data, process of experiment and statistical techniques used.

Subjects

The study was conducted on 160 male students of Sainik School, Kazhakuttam, Trivandrum (Kerala) India, in the age groups of 13-15 and 16-18 years, at random. All the students in this institutions have identical but controlled living conditions with variations in socio-economic background.

Prior to testing, the investigator acquainted herself well with the subjects and explained to them the test and its related procedure. They were requested to cooperate and participate actively throughout the programme. It is also noteworthy that such a study had not been conducted earlier in this school. The school authorities and the physical education teacher took a lot of interest in it and extended their unflinching support and cooperation.

Last but not the least, the environs of the school which abound in scenic beauty and open space was found to be extremely conducive to the administration of the mental training programme.
The subjects chosen in both the age groups belong to the adolescence stage. But one group i.e. the 13-15 years can be stated as of pre-adolescent stage and 16-18 years as of post-adolescent stage. Though many factors found at this age are similar, the intensity of morphological, physiological and psychological changes achieves its maximum value at the end of the pubescent period that is the beginning of pre-adolescent stage. Where as at adolescent stage intensity of these changes steadily decreases till a practical standstill is achieved.

This age was chosen for the study because of progressive stabilization of body form, the motor development, the development of mental capacities, values and beliefs.

On the basis of the pre-test, equated scores on the variables of accuracy, balance, coordination and speed, 60-students were assigned to the experimental group while 20 to the control group both in 13-15 and 16-18 age groups.

All the subjects in both the age groups except the control group underwent the mental training programme involving all the four tasks. For convenience mental rehearsal training was given to 120 subjects in convenient sized groups. Each subject thus underwent 10 sessions of mental rehearsal training programme during a two week stretch in each variable. Thus the total number of sessions for all the four activities were 40.
Each session was of 30 minutes' duration with four repetitions of maximum 4-5 minutes each. The tasks for which training was given were accuracy, balance, coordination and speed in that order.

**Selection of Variables**

The primary reason for the selection of these variables were, involvement of certain motor muscles of the body, which needs a considerable degree of challenge, the possibility of securing objective scores and to employ the mental rehearsal training programme for which all these variables are of different nature and also it is suitable for both the age groups.

The tasks chosen were:

1. AAHPER's Softball Throw for Accuracy (Brace, 1966).
3. 6-second Dash for Speed (Johnson and Nelson, 1982).
4. Figure of 8 Duck-Test for Coordination (Flieshman, 1942).

Description of all the tasks are given below and accordingly data were collected.
Collection of Data

AAHPER'S Softball Throw for Accuracy

Purpose:
To measure accuracy with which a softball can be thrown from a distance about that required for an infielder's throw to a base or home plate.

Equipment:
A gymnasium/outdoor space adjacent to a smooth wall on which the target can be placed, a target (See Diagram in Figure 1) painted on canvas or marked on the wall, softballs, measuring tape and chalk.

Description:
The target consists of 3 concentric circles marked by lines one inch wide pointed on a sheet of canvas at least 8 feet square on a wall. (The experimentor had done it direct on the wall which can be seen from the Photograph and used different coloured tapes such as Red, Green and Blue). The inner circle of 2 feet diameter (outside measurement); the middle circle of 4 feet diameter, and the outer circle of 6 feet diameter. The bottom of the outer circle is exactly 3 feet above the floor. The throw is made from behind a line parallel to and 65 feet from the face of the target. After one or two practice throws, the player takes ten throws.
Objective

To measure the ability to jump accurately and maintain balance during movement and after movement.

Equipment and Materials

The equipment and materials needed are stop watches, 3/4-inch marking tape, and q-connectors. Cut eleven 1-by 2 1/2-inch pieces of marking tape and tape them in the proper pattern to the floor. (See this pattern in Figure 1.)

Fig. 1: AAHPER'S SOFTBALL THROW FOR ACCURACY.
Rules:

1. Throws are made with both feet behind the throwing line.
2. One or two steps are taken in making the throw.
3. Ten throws are taken.

Scoring:

Balls hitting the inner circle count three points, balls hitting the middle area count 2 points, and balls hitting the outer area count one point. Balls hitting on a line count as the higher number of points. The score is the sum of points made on ten throws. Record points on each throw as made. The maximum scores if 30 points.

Modified Bass Test for Dynamic Balance

Objective:

To measure the ability to jump accurately and maintain balance during movement and after movement.

Equipment and Materials:

The equipment and materials needed are stop watches, 3/4-inch marking tape, and yardsticks. Cut eleven 1-by 3/4-inch pieces of marking tape and tape them in the proper pattern to the floor. (See the pattern in Figure 2).
Fig. 2. FLOOR PATTERN FOR MODIFIED BASS TEST FOR DYNAMIC BALANCE
Directions:

Standing with the right foot on the starting mark, the performer leaps to the first tape mark with the left foot and tries to hold a steady position on the ball of his left foot for as many seconds as possible up to a maximum of 5 seconds, and his foot must completely cover the tape so that it can not be seen.

Scoring:

The score for each mark successfully landed on is five points and in addition, one point is awarded for each second the balance is held up to 5 seconds per mark. Thus, a performer may earn a maximum of ten points per marker or a total of 100 points for the test.

Penalties:

The penalties for this test may be classified into landing errors and balance errors.

Landing Errors:

The performer forfeits five points for improper landing if he commits any of the following errors: (a) failing to stop upon landing from the leap, or (b) touching the heel or any other part of the body to the floor other than the ball of the supporting foot upon landing, or (c) failing to completely cover the marker with the ball of the foot. The performer is allowed
to reposition himself for the 5-second balance on the ball of the foot after making a landing error.

**Balance Errors:**

If the performer commits any of the balance errors given below prior to the completion of the 5 seconds, he forfeits the remaining points at the rate of one point per second:
(a) touching any part of the body to the floor other than the ball of the supporting foot or (b) moving the foot while in the balance position. When the performer loses his balance, he must step back on the proper marker and then leap to the next marker.

**Additional Pointers:**

(a) The seconds of each balance attempt should be counted aloud for the performer. (b) The landing score and the balance score should be recorded for each marker.

**Figure of 8 Duck Test for Coordination**

**Coordination Factor:**

This factor refers to the ability of the subject to perform a number of complex motor movements simultaneously.

This test is proposed to measure the ability of the subject to alter his body position while moving forward rapidly. Two uprights are placed 10 feet apart with the cross bar adjusted
to the height of the subject's waist. The subject starts at the right of one of the uprights. On the signal "Go", he runs under the cross bar, goes around the far upright, back under the cross bar again, and around the near upright. In other words, the subject runs around the uprights in a figure of 8 fashion, ducking under the cross bar each time. This completes one cycle. The subject's score is the length of time required to complete four cycles. The timing is recorded to the nearest tenth of a second. (See the Diagram in Figure 3).

The scores pertaining to timings show a negative trend. In order to maintain the positive trend, as it is in other tests, the scores for coordination was converted into positive score by dividing the total distance by the time taken.

Example:

Time in Seconds = 17 seconds.
Total Distance = 40 feet.
Converted Score = 40/17 = 2.35 feet/second.

Six-second Dash for Speed

Objective:

Although this event has been used as a measure of running endurance, it would seem to be appropriate as a test of speed, at least for older students. Except for the extremely fast high school or college students, the distance covered would
Fig. 3: FIGURE OF EIGHT DUCK TEST FOR COORDINATION
rarely be over 50 yards, and endurance should not be a factor.

**Test Equipment and Materials:**

Stop watch, whistle, running space of at least 70 yards to allow for a gradual stop, and approximately fourteen markers placed at 2-yard intervals from 34 to 60 yards. (The experimenter had marked the area in terms of metres).

**Directions:**

The subjects start from a standing position with both the feet behind the end line. The starter uses the preparatory commands of "get set" and "go". On the command "go" the subjects run in a straight line as fast as possible until the whistle is blown at the end of 6 seconds. The subject does not have to come to a sudden stop at the sound of the whistle, he merely begins to slow down at his own rate. Two trials are given five minutes apart.

**Scoring:**

A spotter is assigned to each runner and is positioned about 40 metres from the starting line. At the sound of the whistle the spotter immediately runs to the place where the runner was at the time the whistle was blown. This point is measured from the nearest marker (or line, if lines are drawn across the running lane). The scores is recorded to the nearest metre and the best of two trials is used. **(See the Diagram in Figure 4).**
Fig. 4: SIX-SECOND DASH FOR SPEED.
Mental Rehearsal Programme

The investigator having gone through available scientific studies given in different books by Harris and Harris (1984), Syer and Connolly (1989), Gawain (1982), Orlick (1980), Magill (1989), Oxendine (1984), Nideffer (1985) and also from many research studies and Cassettes (Ravizza, 1982), devised the programme in her own way to suit her subjects participating in the study. She practiced the technique herself first for expert opinion and tried it on other athletes before employing it finally on the subjects. Even before the final programme was given thorough observation was made on a few students \((N = 20)\) regarding the mental rehearsal aspect. During that time different types of music like fast, slow, with some comments etc., were given during the mental rehearsal and it was felt that a very light music was the best among the above at this level, because they were finding it a little difficult to concentrate on what was being told when a fast music was played and also were finding it difficult to concentrate on the task given to them.

Even the students' opinion was taken by the experimenter. This was done keeping in view that many times during the performance other factors also made an impact on their performance such as other's watching, teammates shouting, commenting and the like. Hence to make them habituated to these conditions
it was tried. But they expressed that if those instructions were
given to them as the other instructions were being given they
could imagine about it better and try to bring back their concen-
tration rather than hearing through a cassette.

Based on all these observations the technique used
by the experimenter was instruction by verbalization method
with a background music (which was recorded and played when
instruction was given).

Initially all the subjects were given certain instruction
which were common to all the four variables. Thereafter, they
were given instructions specific to each variable. They were
also explained that the mental rehearsal was the process of
imagining themselves performing specific movements or skills,
that mental rehearsal should be enjoyable and that when they
were relaxed and engaged in visual thinking they were open
to negative as well as positive thoughts and feelings. They
were urged to try their best to take out the negative thoughts
and bring the mental pictures of the skill in a positive way.

**Introductory Exercise (applies for all the tasks)**

Here is an undemanding exercise to help you visualize
with all your senses. Lie down as comfortably as possible and
close your eyes. Take a moment to relax. Take a few deep
breathe...... (pause for 10 seconds). Now start yourself imaging one after another sensory experiences narrated by me.

A pleasant morning/evening. The sun is rising/setting. The atmosphere where you are standing is quite soothing and it invigorates you. The fragrance of flower, different plants, smell of the earth, the smell of your team mates attire and your own, everything you are able to feel and experience. This is bringing a change in your emotion or mood.

But you have come to mentally rehearse the skill learned by you just a day back and wish to improve upon it because to practice them physically there are some obstacles but you can very well do it in your mind and improve upon it.

While you are performing your friends are watching you, some are encouraging you, some commenting upon your performance, many other distractions are there like the noise of some students, somewhere a lauder music, from near by the sweat smell of your friends or the smell of the socks, and all those are distracting your attention from the performance task...... But try to overcome them keeping in mind that you have to cope-up with all these to achieve better performance. Pay attention to bodily responses and sensations such as inhaling, exhaling and the feeling of your body becoming warmer, heavier, and more relaxed with each breath.
Now – you are ready to perform the task mentally. (The mental rehearsal was given to them in comfortable lying posture which is illustrated in Figure 5 and 6).

Mental Rehearsal Programme for Accuracy Task

* In your mind’s eye, put yourself to the skill of accuracy.... you can see the markings on the wall.... look to that.... you can see three circles ... Red, Green and Blue....

* Already you have performed this skill and are aware about it....

* You are standing at a distance of 65 feet away parallel to the circle behind the restraining line....

* Now imagine holding of the ball .... feel the ball .... yes, your grip is becoming firm over the ball .... All your concentration is on the wall .... you can feel the arm getting heavier .... legs getting tensed as you have to take one step and throw .... but be careful see that you do not cross the line....

* At the moment whole of your concentration is for the circles in front of you .... If your ball hits the red circle you get 3 points, green -2 points and blue - 1 point.

* Now release the ball with all your skilled movement and required amount of energy for the ball to travel a distance
Fig. 5: MENTAL REHEARSAL TRAINING
Fig. 6: MENTAL REHEARSAL TRAINING
of 65 feet. Yes.... you have done it but it hit to only 1 point score, does not matter - you have 10 chances at your disposal.

Get ready again .... imagine the sequences and start doing it for nine (9) times more. Keeping in mind that you should improve and reach to your target of maximum points.... but if you miss it, don't worry.... we have 10 sessions to practice... and you can improve. With my count start doing it and record the score yourself. 2.... (pause for 5 seconds), 3...., 4...., 5...., 6...., 7...., 8...., 9...., and 10. (See Illustration in Figure 7).

Now slowly open your eyes and relax, like this way with a gap of 2-3 minutes, 4 repetitions were given.

Mental Rehearsal Programme for Balance Task

You are going to take mental rehearsal on a new skill from today onwards, for which you have performed the skill recently. Let me make you aware of the movement. (A chart was drawn and was shown to them with the markings and movements to be performed. This skill was performed on the floor bare-footed.

Imagine yourself getting ready for the balance task.... Think yourself as a gymnast and try to balance as well as you can.... you can feel the smoothness of the floor under your feet.... Now with my instruction start moving....
* Stand with the right foot on the starting mark ....
try to balance .... feel your leg muscles getting tensed, body
shaking, do control it....

* Take a leap to the first tape mark where 1 is written
with the left foot and hold a steady position on the ball of
the foot, see that the tape mark is not seen and comes under
the ball of your foot and maintain this for a maximum of 5
seconds.... for which I am giving the count 1...., 2...., 3....,
4...., 5....

* For a perfect landing you get 5 points and for main-
taining for 5 seconds 5 points .... so try your’ best to achieve
maximum.

* Then leap to the next tape mark successfully with
your right foot, again take care as before and maintain for
5 seconds 1...., 2...., 3...., 4...., 5....

* This way continue upto the 10th marking point (same
instruction continued but in between certain statements were
included like Don't worry, if you are not able to balance, come
back, try again, bring back the balance etc. and this also was
given for 4 repetitions with 2-3 minutes gap in between the
repetitions). (Illustration in Figure 8).
Fig. 8: MODIFIED BASS TEST FOR DYNAMIC BALANCE
Mental Rehearsal Programme for Co-ordination Task

From today, for 10 sessions one more skill of different nature will be practiced by you. Regarding the movement you are aware. You have to start from the right of one of the uprights. Here, in this let us see how fast you are able to alter your body position, you are aware about the timings you had performed, so now try to improve upon it. Remembers, you have to perform 4 cycles and for that I will be giving the count.

O.K. get ready in your mind .... Take the position on the right of one of the uprights .... your body getting tensed, leg muscles stiff.... you are waiting for the signal .... see that you do it with minimum time .... who have completed it in 20 seconds .... try for 18 seconds and so on.

Now .... "go" .... run under the cross bar .... go around the far upright .... come back under the cross bar and go around the upright .... yes one cycle is over .... continue the 2nd one.... good .... it is the figure of 8 fashion you are running, in between your head, back and the like is touching the cross bar, leg is slipping, you are finding it difficult .... but continue, you can do it.... 3rd cycle .... and then the final one. Ah! you have bettered your score. (Illustrated in Figure 9).
Fig. 9: FIGURE OF 8 DUCK TEST FOR COORDINATION
This is also given for four repetitions with 2-3 minutes gap in between each repetition.

**Mental Rehearsal Programme for Speed Task**

This is the last skill which you will be doing. You know very well what you have to do. Imagine yourself to become a great sprinter, imagine how the great sprinters like Carl Lewis, Ben Johnson or P.T. Usha run with the fastest speed. .... with in 10/11 seconds they cover a distance of 100 metres... so why not you cover a minimum of 40 metres in 6 seconds? O.K. try it out.

You can see the spotter standing where the lines are marked. Get ready, warm up mentally. Imagine yourself in standing position behind the end line when you hear the command "get set" and start running in a straight line when you here the command "go". *(Illustrated in Figure 10).*

Boys .... "get set" .... you can see the spotters, feel about the other runners with you but don't pay attention to anything, wait to hear the command to move and only think to cover maximum distance. Nothing else than that ....

"go" .... start moving faster, faster .... as fast as you can .... 1 second .... 2 seconds 3.... 4.... 5.... 6.... (whistle is blown) slow down ..... don't worry if you could not do better .... one more chance will be given to you .... relax and get ready for it.
Fig. 10: SIX-SECOND DASH FOR SPEED
In this also four repetitions are given with a gap of 2-3 minutes after each repetition.

When all these tasks continued with the time advancing there were some changes in the statement like .... already you had done it yesterday/going on doing it from last 2/3/4/5/6 days and the like, and again you will be performing it today. See that you do it better and correct the mistakes. Yes, you might be feeling tired but you have to achieve better performance and for that you have to practice, practice and practice as it is said that practice makes a man perfect. Of course, here perfection is not needed but achievement. Mostly it was given in a very casual way and they were also asking many questions between the gaps of the training programme which were clarified by the investigator.

Observations:

It was observed that when they were given the instructions and were at peak of their performance thought, they were quite aroused and their hand moved upward with throwing action for accuracy, in case of balance their feet movement was there, whereas in case of co-ordination and speed their legs were moving and fists tightened. Of course the investigator had asked them to try their best to move in their mind but these were all spontaneous movements which gave an impression
that they were really involved mentally during the instructions given. Even the subjects expressed their happiness over this training programme that they felt there was an improvement in their concentration ability and perceiving ability. Even many subjects belonging to the age group of 16-18 years came and enquired can this way be employed to learn their class subjects and is it possible to improve upon concentration in subject matters? Even many when they felt they missed or could not do better they expressed their unhappiness and many times there used to be a smile on their face as they did their best or won among their friends.

A questionnaire on imagery (Pre/post training) by Martens (1982) which is given in the appendix, was also used.

They were asked to mentally depict about their performance while the rehearsal was given. But final score of depiction of their performance was noted just before the post-test.

Reliability of Data

The reliability of data was ensured by establishing Instrument Reliability, Tester Competency and Reliability of Tests and Questionnaire.

Instrument Reliability

The steel tape used for measurement of marking the
area of tests was non-elastic but flexible (supplied by Freemans, India).

The stopwatches used for balance, coordination and speed were tested and synchronised for their accuracy in giving time upto 1/10th of a second.

**Tester Competency**

All the tests were taken by the research scholar herself with the help of other competent testers of Lakshmibai National College of Physical Education, Trivandrum (Kerala) India.

To establish the tester competency, five subjects were chosen at random and tests were taken on them in all the variables by the research scholar and the experts under identical conditions. The reliability co-efficients of tests among them are presented in Table 1.
TABLE 1

RELIABILITY COEFFICIENTS OF CORRELATION FOR TESTER

RELIABILITY IN DIFFERENT TASKS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variables</th>
<th>Co-efficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>AAHPER's Soft Ball Throw for Accuracy.</td>
<td>.90</td>
</tr>
<tr>
<td>2.</td>
<td>Modified Bass Dynamic Test for Balance.</td>
<td>.81</td>
</tr>
<tr>
<td>3.</td>
<td>Figure of 8 Duck Test for Coordination</td>
<td>.87</td>
</tr>
<tr>
<td>4.</td>
<td>6-second Dash for Speed</td>
<td>.85</td>
</tr>
</tbody>
</table>

Since very high correlation were obtained for the variables, the competency of the testers to administer the test was accepted.

Reliability of Tests and Questionnaire

The tests and questionnaire used for different tasks and mental rehearsal programme were the standard tests and questionnaire in use for testing purposes. Hence, the reliability of the tests and questionnaire was irrefutable.
Administration of the Task

The tasks selected placed a demand on the over all gross motor abilities of the individuals and although the subjects were habituated to playing sports and games, the tasks chosen were quite new to them.

Before the pre-test the subjects were given a demonstration of the tasks and they were also given a few chances to practice them to acquaint themselves and get a clear picture of performing them.

Before the training programme started an Imagery Questionnaire (Martens, 1982) was given to the subjects to rate their imagination ability for the task they were going to undertake for training. (This questionnaire measures how vividly one saw the image, heard the sound, felt their body movements and the emotions during that situation. They were asked to imagine all these situations when they were practicing alone, while playing in a contest and while watching a team mate. However, all these scores were calculated together as the test was given only to appraise the validity of mental rehearsal programme.

After they filled the Imagery Questionnaire the mental rehearsal training was given. After the training just before the final test was taken, once again the post-training Imagery
Questionnaire was given to be filled and then the subjects were asked to depict their performance based on mental rehearsal programme and the scores were noted. Thereafter, the post test in the particular task was administered. The same procedure was followed for all the variables.

**Statistical Procedure/Techniques Used for Analysis of Data**

For the purpose of comparing the effects of mental rehearsal and mental depiction with performance task involving accuracy, balance, coordination and speed at different age level, pre and post training Imagery Questionnaire in different variables at different age level, analysis of variance was made as an overall test of significance of the difference between means. Whenever the analysis of variance resulted in a significant 'F' ratio, post-hoc test for comparison was applied to find out which of the differences of paired means was significant.

The hypothesis were tested for significance at .05 level of confidence.

To compare the effect of mental rehearsal training between both the age groups in each variable, the difference of score from initial to final score in each variable was taken for both age groups separately and 't' test was used to compare the difference in means.