Chapter III

METHODOLOGY

Research methodology involves the systematic procedure by which the researcher starts from the initial identification of the problem to its final conclusion. The role of the methodology is to carry out the research work in a scientific and valid manner.

The purpose of the study was to find out the role of multimedia in the development of coaching programmes for throwers (from shot putters). This chapter discusses the methodology used in the selection of subjects, selection of variables, selection of tests, orientation to the subjects, competence of the tester, reliability of the instruments, reliability of the data, awareness of computer and multimedia literacy, training programme, collection of data, administration of tests, experimental design and statistical techniques.

Selection of Subjects

To achieve the purpose of the study, Twenty four subjects were selected randomly from The Madurai Diraviyam Thayumanavar Hindu College, Tirunelveli, Tamilnadu, India. All the subjects were studying B.Sc., in Physical Education, Health Education, and Sports Sciences. Their age ranged from 17 to 21yrs. They had the subject Track and Field as theory and practical papers.
The selected subjects were randomly divided into two groups: Multimedia Assisted Instruction Group (MAIG) (n=12) and Traditional Instruction cum Control Group (TICG) (n=12). The Multimedia assisted group received teaching methods through computer programmes such as video shows, clippings, and so forth for shot put Throwing event, where as Traditional Instruction group received a lecture and demonstration covering the same instructional content and participant’s pre and post-test for skill and performance were taken. The experiment existed for the duration of ten weeks and the number of sessions per week was confined to three alternative days, in addition to the regular schedule of the curriculum.

### TABLE I

**PARTICIPANT’S CHARACTERISTICS BY GROUP**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Age (Yr)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIG</td>
<td>12</td>
<td>18.62 ± 0.96</td>
<td>169.2 ± 4.30</td>
<td>69.85 ± 6.20</td>
</tr>
<tr>
<td>TICG</td>
<td>12</td>
<td>19.06 ± 1.23</td>
<td>165.3 ± 3.11</td>
<td>65.23 ± 4.12</td>
</tr>
</tbody>
</table>

**Selection of Variables**

Computers have been used over two decades as an assisting tool for the given information by teachers and coaches at all levels of education and sports training. In many educational programmes computers have been used not only as an educational mean, but as an active part of the educational procedure.
The concept of multimedia includes the use of one or more means that they have text, images, graphics, digital video, and sounds. A multimedia programme to teach sport skills combines text, videos, pictures, and graphics. Its main features are the correct performance of a certain sport skill, information about rules and regulation, giving feedback to the student or the athlete. Films and videos of individual and team performances have long been used by athletes, coaches and sport scientists to analyze and improve performance in technical skills and team tactics.

The use of the conventional instruction can positively affect the learning of skills, when it is being used as a mean for the demonstration of the technique, but it is not superior to mental practice. The use of the conventional instruction is not practical for on-field research because of the heavy equipment and the lack of portability, furthermore the presence of an expert is necessary for the correction of skills executed by the athletes. In addition conventional instruction lacks the advantages of the mental captures of the correct technique of throws.

Keeping the above concept in mind, the following dependent and independent variables were selected for this study.
**Dependent Variables**

The following criterion variables were selected as dependent variables such as, throwing skill, throwing performance (Shot Put) and attitude towards multimedia assisted instruction.

**Independent Variables**

1. Multimedia Assisted Instruction
2. Traditional Instruction

**Selection of Tests**

As per the available literature the selected variables were tested by using the following standardized tests and they were presented in Table II.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Variables</th>
<th>Tests</th>
<th>Units of Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Throwing Skill</td>
<td>Expert rating</td>
<td>10 point scale</td>
</tr>
<tr>
<td>2</td>
<td>Performance</td>
<td>Regular Throwing Event</td>
<td>In seconds</td>
</tr>
<tr>
<td>3</td>
<td>Attitude</td>
<td>Attitude Scale</td>
<td>In points</td>
</tr>
</tbody>
</table>
Orientation to the Subjects

The investigator explained the purpose of the study to the subjects and their part in the study. For the collection of the data, the investigator explained the procedure of testing on selected dependent variables and gave instructions about the procedure to be adopted by them. Four sessions were spent to familiarize the subjects with the technique involved to execute the training of throwing skills. It helped them to perform training perfectly and to avoid injuries, further; the subjects were specially oriented, advised and controlled to avoid the special practice of any of the specific training programme till the end of the experimental period. The participants of all the groups were sufficiently motivated to perform their maximal level during the training and the testing periods.

Competency of the Tester

All the measurement in this study was taken by the investigator with the assistance of students from the Department of Physical Education, Health Education and Sports, The Madurai Diraviyam Thayumanavar Hindu College, Tirunelveli, Tamilnadu, India. To ensure that the investigator and his assistance were well versed with the techniques of conducting tests, they had a number of practice sessions in the correct testing procedure.
Reliability of Instruments

Instruments used for this study were availed from the Department of Physical Education, Health Education and Sports, The Madurai Diraviyam Thayumanavar Hindu College, Tirunelveli, Tamilnadu, India. The instruments were purchased from reliable and standardized companies and were considered accurate enough to serve the purpose of the study.

Reliability of the Data

Test and retest method was followed in order to establish the reliability of the data by using ten subjects at random. All the dependent variables selected in the present study were tested twice by the same personnel under similar conditions. The reliability was established by using the Intra-class co-efficient of correlation. The score is 0.92, which is greater than the tabulated r-value of 0.77 with at .05 level of significance. Since the obtained 'R' values were much higher than the required value, the data were accepted as reliable in terms of instrument, tester and the subjects.

Attitude Scale

The attitude scale developed by *Loyd and Gressard, (1984)* was used to measure the student’s attitude towards using the computer and computer assisted instruction and it was administered after the subjects completed the Computer assisted instruction. Frequency counts were computed for the data collected by the use of the
questionnaire on a five point Likert scale, based on the Loyd Gressard Computer Attitude Scale. Mean scores of the respondents on each item of Likert scale were then calculated. The statements on the Likert scale were scored as follows: ‘Strongly Agree’=5 points, ‘Agree’=4 points, ‘Undecided’=3 points, ‘Disagree’=2 points, ‘Strongly Disagree’=1 point. A mean score of above the 3 was interpreted to denote a positive attitude, a mean score of the 3 denoted a neutral attitude and a mean score of below the 3 denoted a negative attitude. The total score of the attitude scale was 215 and it was then converted to 100.

**Awareness of Computer and Multimedia Literacy**

Prior to the formal study sessions, the subjects were made to get the awareness of computer and multimedia literacy, so that they can handle the computer with ease during their training periods. The orientation about computers was given to the students. They were asked to learn the basic fundamentals of operating computers. They were taught how to use the computers for their study. The operational systems include how to open the files, close the files, switching over to next page/programmes and so forth. They got familiarized with computers within four days. They had the capacity to individually handle the computers on the fourth day.
Training Programme

The training programme was imparted at the Department of Physical Education, Health Education and Sports, The Madurai Diraviyam Thayumanavar Hindu College, Tirunelveli, Tamilnadu, India. First they were familiarized with each exercise which they had to undergo with the help of an expert. It was a ten week progressive training programme for the three experimental groups. Pretest and post test data were collected from experimental groups.

The students were taught through Multimedia Assisted Instruction (MAI) for a period of three days (Monday, Wednesday and Friday) up to ten weeks at the rate of half an hour per day in the evening. The students were taught individually by using computers. Throwing techniques were covered in the period of investigation. The students were asked to make self practice with the help of the multimedia assisted instruction. All the stages in the sequence were arranged in a sequential order. The students were not allowed to use the handbook at home.

Group I (Multimedia Assisted Instruction Group)

Group I consisted of twelve subjects, who underwent computer assisted training, half an hour and self-practice with the supervision of experts or coaches, an hour for a period of ten weeks, with three alternative days, per week. They were never allowed to avail any
special teaching/coaching other than their regular practice in the curriculum.

**Group II (Traditional Instruction Group)**

Group II consisted of twelve subjects, who underwent traditional instruction half an hour with the help of experts including the instructor, who was a qualified person with Diploma in Coaching (N.I.S) in Track and field and self-practice an hour for a period of ten weeks, with three alternative days, per week. They were never allowed to avail any special teaching/coaching other than their regular practice in the curriculum.

The duration of training session in all days was ranging from one hour to one and half hours approximately which included warming up and limbering down. All the subjects involved in this study were carefully monitored throughout the training programme to be away from injuries. They were questioned about their health status throughout the training programme. None of them reported with any injuries. However, muscle soreness appeared in the earlier period of the training programme and was reduced in due course. The participants were trained for three days a week (alternate days).

**Collection of Data**

The pre and post tests data were collected on selected criterion variables prior to and immediately after the training programme from the selected subjects from the Department of Physical Education,
Health Education and Sports, The Madurai Diraviyam Thayumanavar Hindu College, Tirunelveli, Tamilnadu, India during the academic year 2010-11. The tests were administered in the evening sessions. The data on selected variables were collected and tested by standardized tools.

**Administration of Tests**

1. **Skill execution and Throwing performance**

**Purpose**

To find out the skill of throwing technique of the subjects.

**Equipment needed**

Shot put, stop board, rim and measuring tapes

**Procedure**

In this test, the experts were placed in such a way that they can see throwing technique of each subject one by one as well as the throwing performance by the subject. Then the subjects were asked to do putting of shot with full speed and the experts were asked to rate their skill subjectively, under several headings. This was done for pre and post test. Three trials were given.

**Scoring**

A total of 10 points were given by the experts under five different categories. The average of three experts was taken.
The performance of the subjects was measured best out of three trials in nearest centimeter and it was converted in to standard score with reference to the combined events scoring table (Outdoor) published by IAAF during 2012.

**Experimental Design**

This study was conducted to determine the possible cause and effect relationship of multimedia computer assisted and traditional instructions. A pre and post test randomized design was employed for this investigation. This study consisted of two groups, Group-I \( (n=12) \) underwent multimedia assisted instruction and Group-II \( (n=12) \) underwent traditional instruction cum control group. All the subjects were tested prior to and immediately after the experimentation on skill and performance. The students’ attitude was tested after the completion of training period.

**Statistical Technique**

No attempt was made to equate the groups in any manner. Hence, to make adjustments for difference in the initial means and test the adjusted post test means for significant differences, the analysis of covariance (ANCOVA) was used (Broota, 1989). All the above statistical analysis tests were computed at 0.05 level of significance \( (P<0.05) \).
**Justifications for Using One-Way ANCOVA**

One-way univariate analysis of covariance (ANCOVA) was used to determine how each dependent variable was influenced by independent variables while controlling for a covariate (pre-test) (Hari, Anderson, Tatham, and Black., 1998). Analysis of covariance adjusts the mean of each dependent variable to what they would be if all groups started out equally on the covariate. In this study, pre test scores of selected variables have been shown to correlate with the post test scores, thus they were considered as appropriate covariates.

**Assumptions for ANCOVA**

A preliminary analysis was conducted to determine whether the prerequisite assumptions of ANCOVA were met before preceding the univariate analysis. Thus, the assumption of equality of variance (homogeneity) and the homogeneity of regression slopes were examined.

Levene’s test of equality of error variances on selected variables was calculated and presented in table III.
TABLE III
LEVENE’S TEST OF EQUALITY OF ERROR VARIANCES ON SELECTED VARIABLES AMONG GROUPS

<table>
<thead>
<tr>
<th>Variables</th>
<th>F- Ratio</th>
<th>df 1</th>
<th>df 2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>1.309</td>
<td>1</td>
<td>22</td>
<td>0.265</td>
</tr>
<tr>
<td>Performance</td>
<td>0.001</td>
<td>1</td>
<td>22</td>
<td>0.970</td>
</tr>
</tbody>
</table>

(The table value required for 0.05 level of significance with df 1 & 22 is 4.30).

Homogeneity of variances is a term that is used to indicate that the groups have the similar variances. Thus, in Levene’s test of equality of error variances table, the obtained F-values of the selected dependent variables were lesser than the critical value of 0.05, indicates that the variance of each group was not significantly different from one another.

Therefore, the homogeneity of variance of comparing the two groups regardless of the ability level for each of the dependent variables indicated that homogeneity of variance has been met for all the two dependent variables. Hence, it was concluded that the assumption of homogeneity of variance has been met for computing univariate ANCOVA.

The test of significance of the regression of post test (dependent variable) on pre test (covariate) were analyzed and presented in table IV.
TABLE IV
TESTING THE SIGNIFICANCE OF THE REGRESSION OF POST TEST ON PRE TEST OF SELECTED VARIABLES

<table>
<thead>
<tr>
<th>Variables</th>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>Regression</td>
<td>4.15</td>
<td>1</td>
<td>4.15</td>
<td>10.93*</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>8.349</td>
<td>22</td>
<td>0.380</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>Regression</td>
<td>321.00</td>
<td>1</td>
<td>321.00</td>
<td>14.18*</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>497.96</td>
<td>22</td>
<td>26.63</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .05 level of confidence. (The table value required for 0.05 level of significance with df 1, 22 is 4.30)

From the table, it was observed that regression based method (ANCOVA) predicts the post test scores significantly well from the pre test scores on all the dependent variables. It shows that the pre and post test scores of selected dependent variables were significantly associated. As in regression, it is important that the association between the outcome and the covariate is linear.

After determining the assumptions for computing ANCOVA have been met with the pre data analysis, the univariate ANCOVA statistical output was examined. Then, providing the ANCOVA result was statistically significant, the univariate results were examined for each dependent variable. The results of the descriptive analysis, paired sample ‘t’ test, univariate tests, the pair wise comparisons among the three dependent variables are reported in chapter four.