Chapter V

ANALYSIS AND INTERPRETATIONS OF THE DATA

The statistical analysis, discussion on results and interpretations of the data pertaining to the study have been analyzed and presented in this chapter. The study was designed to investigate the effects of multimedia courseware on the learning achievement of selected units in kinesiology of physical education major. The learning achievement on kinesiology was selected as dependent variables. The multimedia courseware was adopted to learn the content of selected unit in kinesiology for physical education major as independent variables.

To achieve this purpose, twenty men students studying in Dr. Sivanthi Aditanar College of Physical Education, Tiruchendur, Tamil Nadu, India, were selected randomly as subjects. Their age ranged from 22 to 25 years. They were assigned into a single experimental group. The experimental group was subjected to learn the selected units of kinesiology through multimedia courseware over the period of fifteen days.

The pre test was arranged before the experiment and then the post-test I was taken after nine days and post-test II was done after fifteen days on the learning achievement of all the subjects. The
data pertaining to this study were examined by using one way repeated measures analysis of variance (ANOVA) for the variables in order to determine the differences, if any, among the means of three tests. Whenever ‘F’ ratio was found to be significant, the Scheffe’s test was used as post-hoc test to determine which of the paired means differ significantly. Descriptive statistics was also used to analyze the attitude of students towards the multimedia courseware and using computer. The level of significance was fixed at 0.05 level of confidence for all the cases.

**Learning Achievement**

The one way repeated measures analysis of variance on the learning achievement of experimental group at three tests with different time period have been analyzed and presented in Table I.
The table value required for significance at 0.05 level with df 2 and 38 is 3.24.

From the table I, the mean values on the learning achievement at three tests with different time periods are 16.33, 34.48 and 41.68 respectively. The obtained F-ratio of 66.76 for paired means is less than the table value of 3.24 with df 2 and 38 required for significance at 0.05 level of confidence. The results of the study indicate that there was significant difference among the means of three tests at different time period. To find out which of the three paired means had a significant difference, the Scheffe’s post-hoc test was applied and the results are presented in Table II.
TABLE II

SCHEFFE’S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF LEARNING ACHIEVEMENT

<table>
<thead>
<tr>
<th>Adjusted Post Test Means</th>
<th>Mean Differences</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>Post test I</td>
<td>Post test II</td>
</tr>
<tr>
<td>16.33</td>
<td>34.48</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.15*</td>
<td>3.91</td>
</tr>
<tr>
<td>16.33</td>
<td>41.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25.35*</td>
<td>3.91</td>
</tr>
<tr>
<td>34.48</td>
<td>41.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.20*</td>
<td>3.91</td>
</tr>
</tbody>
</table>

*Significant at .05 level.

Table II shows that the mean differences on learning achievement scores between pre-test and post-test I, pre-test and post-test II, and post-test I and post-test II are 18.15, 25.35 and 7.20 respectively. The values are greater than the confidence interval value 3.91 which shows significant difference at 0.05 level of confidence.

It may be concluded from the results of the study that there is a significant difference in learning achievement scores between means of pre test and post test I, pre test and post test II, and post test I and post test II.

The mean values of the learning achievement on Kinesiology on height are graphically represented in the figure I.
FIGURE I: MEAN VALUES OF THREE TESTS AT DIFFERENT TIME PERIOD ON LEARNING ACHIEVEMENT IN KINESIOLOGY.
Attitude Measure

Mean and Standard Deviation are computed for the attitude towards computer and multimedia courseware and the results have been presented in table III.

TABLE III

THE SUMMARY OF MEAN AND STANDARD DEVIATION ON ATTITUDE OF EXPERIMENTAL GROUP TOWARDS COMPUTER AND MULTIMEDIA COURSEWARE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude towards Multimedia Courseware</td>
<td>45.32</td>
<td>± 3.76</td>
</tr>
<tr>
<td>Attitude towards Using Computer</td>
<td>44.51</td>
<td>± 4.11</td>
</tr>
</tbody>
</table>

From the table III, the mean value of experimental group on attitude towards multimedia courseware is 45.32 which is scored 90.64% of the total score. It is concluded that there was a positive attitude among selected subjects in using multimedia courseware as teaching and learning method and also it is noted that the multimedia courseware aided instruction proves to be effective to cater to the needs of a learner.

From the table III, the mean value of experimental group on attitude towards using computer is 44.51 which is scored 89.02%
of the total score. It is concluded that there was a positive attitude among selected subjects in using computer as teaching and learning aids.

All of the students were showed positive attitude towards multimedia courseware and using computer as teaching and learning aids. More than 85% of the participants were satisfied with the content, the academic approach proposed and the interactive support, which is flexible and contains a self-test. The students found the CD-ROM to be a more efficient means of retaining information than classic lectures as for the evaluation of the knowledge acquired on kinesiology.

**Discussion on Findings**

The results of the study indicate that there was significant difference among the means of three tests at different time period and also there was a significant difference in learning achievement scores between means of pre test and post test I, pre test and post test II, and post test I and post test II. Significant improvement on learning achievement was found in post test I and post test II. However, the subjects were scored highest marks only in the post test II.
Descriptive statistics results indicate that the subjects showed positive attitude toward multimedia courseware and using computer as teaching and learning aids. Aims of the package were clear to participants, the contents were logically organized and clear, the key concepts were easy to identify, the contents were pitched to an appropriate level, and the package was interactive and encouraged participants to reflect on their learning.

Although multimedia based computer education has been used to augment education in many areas, there are few studies support the findings of the present study.

**Vichitvejpaisal et al (2001)** said that the use of software may be as good as the conventional learning method can be an alternative tool. The computer-assisted instruction program seems to enhance the learning process.

**Haschke et al (2003)** developed a multimedia program, a non-linear system which supplements the traditional linear way of learning (e.g. with a text book). Non-linear systems allow the direct use of information in a free sequence. **Kinney et al (1997)** findings suggest that using a CAI simulation program may be as effective as and more efficient than traditional methods of instruction.
Artus et al (1999) adopted a Computer-Assisted Personalized Approach (CAPA) and it was showed significant improvement in student examination performance with regular homework assignments with CAPA being an effective and efficient substitute for hand-graded homework.

Reiss (1999) point out that the use of computer-based multimedia technology is generally increasing in medicine. Especially the use of interactive multimedia technology seems promising to improve training and education and increase accessibility of highly specific material.

Azer et al (2005) assessed student learning before and after use of the multimedia CD-ROM. The incorporation of a multimedia CD-ROM into the first-year medical course has the potential to improve student understanding of the main concepts in a variety of body systems.

Prinz et al (2005) conducted a study to find out the effect of 3D animations on the understanding of cataract and glaucoma surgery among medical students. The use of 3D animations leads to a better understanding of difficult surgical topics among medical students.
Toth-Cohen (1995) examined the learning outcomes of a computer-assisted instruction (CAI) in applied anatomy and kinesiology. A CAI program in applied anatomy and kinesiology can be an effective supplemental resource for occupational therapy students and can offer a learning experience that student value and perceive as helpful.

Peter (2002) compared the accuracy of human and computer-based methods of predicting the 2003 Rugby Union World Cup. The study provided evidence that computer-based methods are more successful at predicting the outcomes of international rugby union matches than the average human, but is not as successful as human experts. Santer et al (1995) stated that the multimedia textbook constitutes an educationally sound alternative instructional method and have a promising future in medical education.

Bukowski (2002) suggested that computerized self-study techniques may be a viable alternative to traditional cadaver laboratory and instruction in human gross anatomy courses. Kim et al (2003) compared self-learning outcomes using the software and the printed materials. Text-based learning seems to be a convenient educational method because it can be used at any time in any place. However, with more time and facilities available,
CD-ROMs may be as effective as traditional learning methods and can be an alternative tool.

It is inferred from the above literatures and from the results of the present study that systematically designed multimedia courseware develops the learning achievement of the students on the selected units in kinesiology. Hence, it is concluded from the results of the study that systematically and scientifically designed courseware may be given due recognition and be implemented properly in the teaching of all the disciplines in order to achieve maximum performance. From the results of the present investigation, it is also concluded that significant difference exists between pre and post test in developing learning achievement.

**Discussion on Hypothesis**

In the beginning of the study, it was hypothesized that the multimedia courseware module of teaching in the selected units of Kinesiology would have better effect on learning achievements of the subjects. The results of the study showed that there was a significant improvement on learning achievement of experimental group. Hence, the investigator’s first hypothesis was accepted.

In the second hypothesis, it was mentioned that there would be significant difference among the pre-test, post-test I and
post-test II on achievement of selected units in Kinesiology. The results of the study showed that there was a significant improvement on learning achievement of experimental group. Hence, the investigator’s second hypothesis was accepted.