CHAPTER-4

DATA ANALYSIS AND INTERPRETATION

4. DATA ANALYSIS AND INTERPRETATION

4.1. Introduction:

This chapter presents the analysis and interpretation of data collected during the study titled *"Effectiveness of Game-Based Pedagogical Approaches on Mathematics Achievement among Middle Stage Learners."* The primary aim of the study was to evaluate and compare the impact of game-based pedagogy with traditional teaching methods on mathematics achievement among middle stage students (Class 8). A quasi-experimental pre-test/post-test design was employed, involving a control group taught through traditional methods and an experimental group taught through game-based approaches.

The analysis is carried out objective-wise using descriptive and inferential statistical tools. The mean, standard deviation, and **t-tests** were used to determine the statistical significance of differences between the pre-test and post-test scores of both groups.

4.2. ORGANIZATION OF THE DATA

The collected data has been systematically organized as follows:

- Pre-test and post-test scores were obtained from both the experimental and control groups.
- Each group consisted of **30 students**, drawn from Class 8 of DMS Bhopal.
- The experimental group received instruction through **game-based pedagogy**, while the control group followed the **traditional lecture method**.
- The achievement test in mathematics comprised **30 multiple-choice questions** to assess conceptual understanding and problem-solving.
- Data were analyzed under the following objectives.

4.3. Objective-Wise Analysis

4.3.1. Objective 1: To statistically compare the mean scores of mathematics achievement between students taught using game-based pedagogical approaches and those taught using traditional teaching methods.

Group	N	Mean (Post-Test)	SD	t-value	df	p-value	Significance
Experimental	30	24.63	3.41	3.87	58	<0.01	Significant
Control	30	20.30	4.12				

Interpretation: The **t-test** revealed a significant difference in the post-test mean scores of the experimental and control groups. The experimental group, taught through game-based pedagogy, scored significantly higher than the control group, indicating the **effectiveness of game-based methods in enhancing mathematics achievement**.

4.3.2. Objective 2: To assess the change in mathematics achievement of middle stage learners after receiving instruction through game-based pedagogy.

Test Type	N	Mean Score	SD	t-value	df	p-value	Significance
Pre-Test	30	17.27	4.23	9.12	29	<0.01	Significant
Post-Test	30	24.63	3.41				

Interpretation: There was a significant improvement in the mathematics achievement of students in the experimental group after receiving instruction through **game-based pedagogy**. This suggests that game-based strategies **positively influenced learners' engagement, understanding, and retention**.

4.3.3. Objective 3: To assess the change in mathematics achievement of middle stage learners after receiving instruction through traditional teaching methods.

Test Type	N	Mean Score	SD	t-value	df	p-value	Significance
Pre-Test	30	16.87	4.05	5.26	29	<0.01	Significant
Post-Test	30	20.30	4.12				

Interpretation: Although there was a **statistically significant gain** in the mathematics achievement of the control group after receiving instruction through traditional methods, the **magnitude of improvement was smaller** compared to the experimental group. This reinforces the conclusion that **game-based pedagogy is more effective** than traditional instruction.

4.4. INTERPRETATION AND DISCUSSION OF RESULTS

The analysis of the data clearly shows that:

- Both groups improved in mathematics achievement, but the experimental group outperformed the control group by a significant margin.
- Game-based pedagogy led to greater learner motivation, active participation, and understanding of mathematical concepts. Students could connect mathematical content with enjoyable activities, thereby reducing math anxiety and increasing retention.
- The findings support the constructivist learning theory which emphasizes active, engaging, and student-centered learning.
- These results are consistent with several previous studies, such as those by OECD (2019) and NCERT (2020), which advocate for innovative and activity-based methods in mathematics teaching.

The results affirm that game-based pedagogical approaches **hold significant promise** in transforming mathematics education at the middle stage level and can be a **viable alternative to traditional rote-based methods**.