

# Effectiveness Of Moodle Package On Achievement In Biology Among IX Standard Students

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## ARTICLE INFO

## ABSTRACT

The purpose of the investigation was to determine whether MOODLE-integrated teaching enhances achievement in Biology among IX Standard students. A pre-test–post-test equivalent group experimental design was adopted for the research. The study sample included 99 students, divided into an experimental group (49 students) and a control group (50 students). The experimental group was exposed to MOODLE-assisted Biology instruction, while the control group continued with the usual teaching method. An investigator-prepared and validated Achievement Test in Biology was used to measure students' performance. Statistical tools such as mean, standard deviation, and the t-test were applied to analyze the data. The findings indicated a significant improvement in the post-test scores of the experimental group compared to the control group. This demonstrates that MOODLE-assisted learning positively influences students' academic achievement in Biology.

**Keywords:** MOODLE-assisted learning, Biology teaching, Academic achievement, Learning Management System (LMS), Secondary school students, Experimental design, Technology-integrated instruction, Grade IX students

## Introduction

Technology has brought significant changes in modern education, particularly in biology teaching. The integration of Learning Management Systems (LMS) such as MOODLE (Modular Object-Oriented Dynamic Learning Environment) has created opportunities for more interactive and learner-centered instruction. Biology teaching often involves explaining complex structures, abstract processes, and detailed diagrams that require visual and practical understanding. MOODLE supports biology teaching through multimedia presentations, simulations, quizzes, assignments, and discussion forums, which can enhance students' engagement and understanding. Instant feedback and continuous assessment further support effective learning. Therefore, this study aims to investigate the effectiveness of MOODLE-assisted biology teaching on the achievement of Grade IX students.

## Need and Significance of the Study

Traditional lecture methods often fail to actively engage students in learning Biology. With increasing digitalization in education, it is essential to examine whether LMS platforms like MOODLE can enhance academic achievement. This study is significant as it provides empirical evidence on the effectiveness of MOODLE at the secondary school level, particularly in Biology.

## Title of the Study:

*“Effectiveness of Moodle package on achievement in biology among IX standard students”*

## Objectives of the Study

- To find out the level of achievement in Biology among IX standard students belonging to experimental group (MOODLE instruction) in the post test.
- To find out the significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students in terms of certain selected variables such as Gender & Tuition.

### Hypotheses of the Study

- H<sub>01</sub> – The achievement of IX standard students in biology belonging to experimental group (MOODLE instruction) is average in the post test.
- H<sub>02</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as male
- H<sub>03</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as female
- H<sub>04</sub> - There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who attend tuition
- H<sub>05</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who do not attend tuition

## Methodology

### Research Design

The study employed a **Pre-test Post-test Equivalent Group Experimental Design**.

The sample consisted of 99 IX grade students selected from a secondary school.

- Experimental Group: 49 students    Control Group: 50 students
- Equivalent groups were formed based on pre-test scores.

### Tool Used

A criterion reference Achievement Test in Biology was constructed and validated by the investigator. The test consisted of multiple-choice questions covering selected Biology units.

### Procedure

1. Pre-test was administered to both groups.
2. The Experimental group was taught using the Moodle package for 6 weeks.
3. The Control group received conventional classroom teaching.
4. Post-test was administered to both groups.

### Statistical Techniques Used

- Mean and Standard Deviation
- t-test

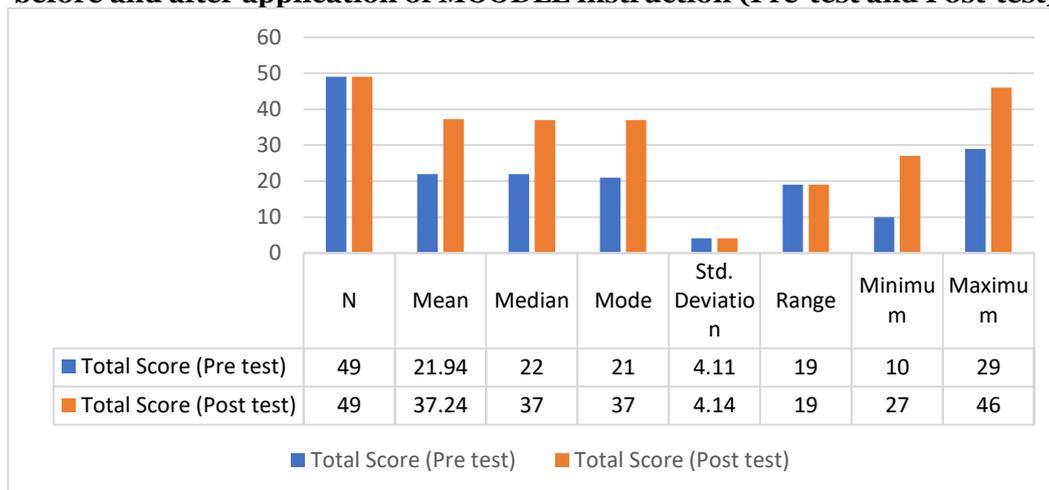
H<sub>01</sub> – The achievement of IX standard students in biology belonging to experimental group (MOODLE instruction) is average in the post test.

**Table 1– Descriptive analysis of the achievement of IX standard students in Biology before and after application of MOODLE instruction (Pre-test and Post-test).**

Description	Total Score (Pre-test)	Total Score (Post test)
N	49	49
Mean	21.94	37.24
Median	22.00	37.00
Mode	21	37
Std. Deviation	4.11	4.14
Range	19	19
Minimum	10	27
Maximum	29	46
Sum	1075	1825

The table shows a clear improvement in the achievement of the experimental group from pre-test to post-test. The median increased from 22 to 37. The mean score also rose from 22.00 (SD = 4.11) in the pre-test to 37.24 (SD = 4.14) in the post-test. Although the range remained the same (19), the highest and lowest scores were considerably higher in the post-test. In all the cases, the achievement of IX standard students in experimental group in post-test is higher than the pre-test. It is proved from the above table that the achievement in biology of IX standard students in the experimental group (MOODLE instruction) is high.

**Figure 1 Showing Descriptive analysis of the achievement of IX standard students in Biology before and after application of MOODLE instruction (Pre-test and Post-test)**



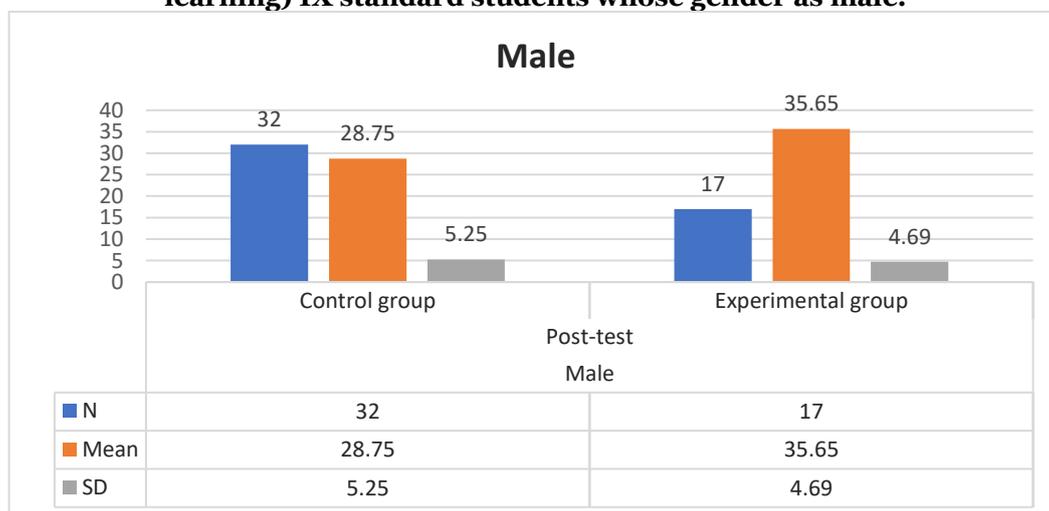
H<sub>02</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as male.

**Table 2 - Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as male.**

Sub Variable	Test	Group	N	Mean	SD	't' Value	df	Level of Significance
Male	Post-test	Control group	32	28.75	5.25	4.699	2 for df of 47 at 0.05 level	Significant
		Experimental group	17	35.65	4.69			

The obtained *t* value (4.699) is higher than the critical value (2) at the 0.05 level of significance, indicating a significant difference between male students in the experimental and control groups in the post-test. Therefore, the null hypothesis is rejected. The experimental group (M = 35.65, SD = 4.69) scored higher than the control group (M = 28.75, SD = 5.25). This shows that MOODLE-assisted instruction had a positive and significant effect on the achievement in Biology among male IX standard students. It is further drawn from the above findings that MOODLE instruction has had a good effect on the achievement in biology of IX standard students whose gender as male.

**Figure 2 Showing Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as male.**



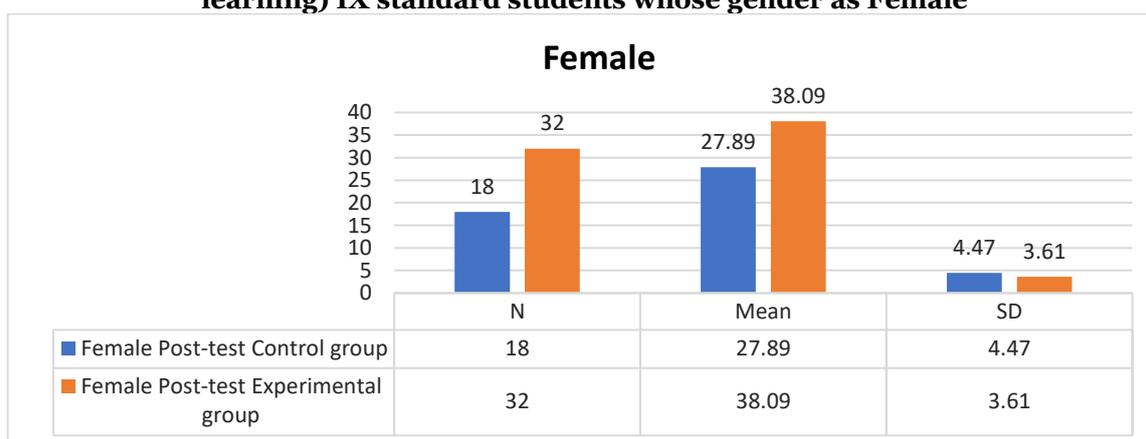
H<sub>03</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as female.

**Table 3. - Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as female.**

Sub Variable	Test	Group	N	Mean	SD	't' Value	df	Level of Significance
Female	Post-test	Control group	18	27.89	4.47	8.282	2 for df of 48 at 0.05 level	Significant
		Experimental group	32	38.09	3.61			

The calculated *t* value (8.282) exceeds the critical value (2) at the 0.05 level of significance, indicating a significant difference between female students in the experimental and control groups in the post-test. Therefore, the null hypothesis is rejected. The experimental group (M = 38.09, SD = 3.61) scored higher than the control group (M = 27.89, SD = 4.47). This indicates that MOODLE-assisted instruction had a positive and significant effect on the achievement in Biology among female IX standard students. It is further drawn from the above findings that MOODLE instruction has had a good effect on the achievement in biology of IX standard students whose gender as female.

**Figure 3 Showing Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as Female**



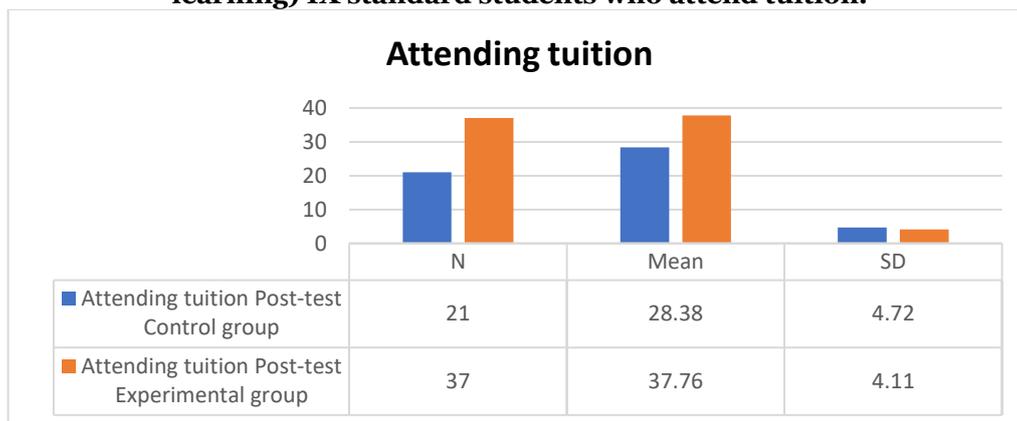
H<sub>04</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who attend tuition.

**Table 4. - Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who attend tuition.**

Sub Variable	Test	Group	N	Mean	SD	't' Value	df	Level of Significance
Attending tuition	Post-test	Control group	21	28.38	4.72	7.617	2 for df of 56 at 0.05 level	Significant
		Experimental group	37	37.76	4.11			

The obtained *t* value (7.617) is greater than the critical value (2) at the 0.05 level of significance, indicating a significant difference between the experimental and control groups among IX standard students who attend tuition. Therefore, the null hypothesis is rejected. The experimental group (M = 37.76, SD = 4.11) scored higher than the control group (M = 27.67, SD = 4.72). This shows that MOODLE-assisted instruction had a positive and significant effect on the achievement in Biology among students who attend tuition.

**Figure 4 Showing Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who attend tuition.**



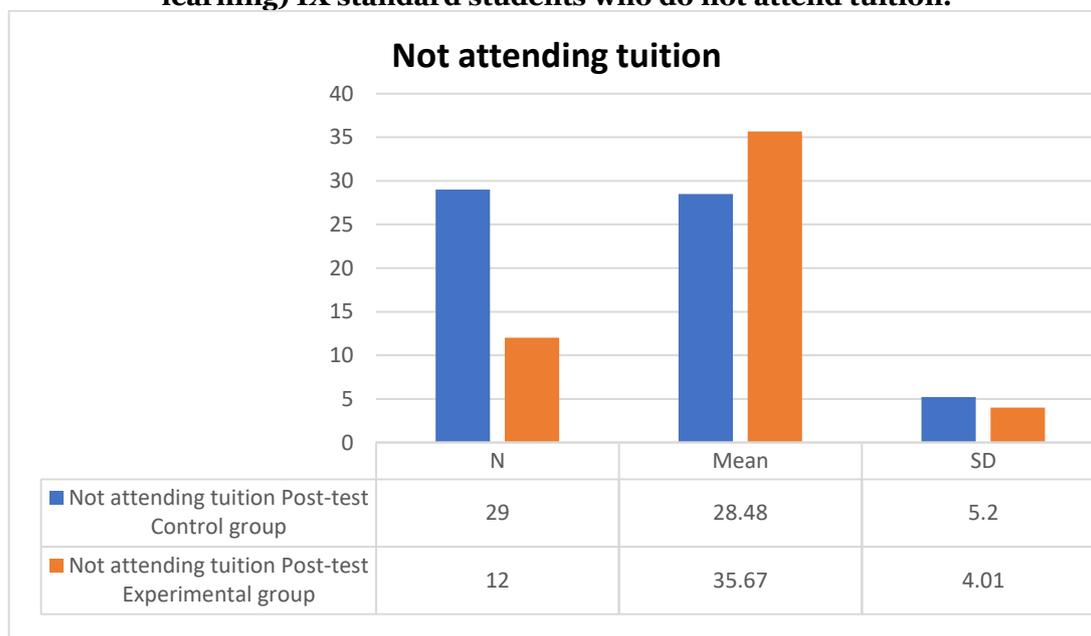
H<sub>05</sub> – There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who do not attend tuition.

**Table 5 - Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who do not attend tuition.**

Sub Variable	Test	Group	N	Mean	SD	t Value	df	Level of Significance
Not attending tuition	Post-test	Control group	29	28.48	5.20	4.767	2.021 for df of 39 at 0.05 level	Significant
		Experimental group	12	35.67	4.01			

The *t* value (4.767) is greater than the critical value (2.021) at the 0.05 level, showing a significant difference between the experimental and control groups among IX standard students who do not attend tuition. Therefore, the null hypothesis is rejected. The experimental group (M = 35.67, SD = 4.01) outperformed the control group (M = 28.48, SD = 5.20), indicating that MOODLE-assisted instruction positively and significantly improved Biology achievement for students who do not attend tuition.

**Figure 5 Showing Significance of difference in the mean achievement in the post-test scores in Biology between experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who do not attend tuition.**



### Findings of the Study

- The achievement in biology of IX standard students in the experimental group (MOODLE instruction) is **high**.
- There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as male - hypothesis is **rejected**
- There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students whose gender as female - hypothesis is **rejected**
- There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who attend tuition - hypothesis is **rejected**
- There is no significant difference between in the post test scores in Biology between the experimental group (MOODLE instruction) and control group (traditional learning) IX standard students who do not attend tuition - hypothesis is **rejected**

### Educational Implications

MOODLE can be effectively integrated into secondary school Biology teaching. Teachers should be trained in LMS-based instruction. Schools should encourage blended learning approaches. Digital resources can supplement traditional classroom teaching.

### Conclusion

The study concludes that MOODLE assisted learning is more effective than conventional teaching methods in improving achievement in Biology among IX grade students. The integration of MOODLE creates an interactive and learner-centered environment that enhances understanding and retention of biological concepts.

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