

PROJECTTITLE&ID:THE BATTLE OF LEARNING

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Introduction:

In today's world, technology has transformed the way students learn. Online learning platforms offer students access to educational content anytime and anywhere. These platforms provide videos, interactive exercises, and self-paced learning tools, which make learning flexible and convenient. On the other hand, traditional classroom learning allows students to learn directly from teachers, ask questions in real time, and benefit from group discussions and guided instruction.

This project aims to explore which learning method — online learning through educational apps or direct teaching in schools — is more effective in helping students understand science concepts. The effectiveness will be measured by comparing students' test scores before and after learning, as well as their engagement and satisfaction with the learning process.

As both methods have their own strengths and weaknesses, this study will help identify the advantages of each approach. It will also provide insights into how technology can support education and whether combining both methods could lead to better learning outcomes. The findings of this project are important in today's education system where blended learning is becoming increasingly common.

This experiment focuses on one science topic and applies both learning methods under controlled conditions, ensuring a fair comparison. Through this research, we hope to better understand how students learn and how educators can support them effectively in both digital and classroom environments.

Selection of the Problem:

The problem selected for this science fair project is:

"Which learning method — online learning using educational apps or traditional classroom learning with a teacher — is more effective for helping students understand science concepts?"

This problem was chosen because education is rapidly evolving, especially with the increasing use of digital tools. Many students now have access to online resources, but there is still debate over how effective these tools are compared to traditional teaching methods. By investigating this problem, we aim to identify the strengths and weaknesses of both approaches and how they impact student learning, understanding, and engagement.

Background Information:

With the advancement of technology, online learning platforms such as Khan Academy, Coursera, and others have become widely available. These platforms allow students to learn at their own pace, revisit concepts as needed, and access a variety of learning materials like videos, quizzes, and interactive activities. They are particularly useful for students in remote areas or those needing additional learning support.

However, traditional classroom learning has been the foundation of education for centuries. In classrooms, students benefit from direct interaction with teachers, instant feedback, peer discussions, and structured lesson plans. Many educators believe that face-to-face teaching is essential for deeper understanding and motivation.

Both methods have their benefits and limitations:

Online learning offers flexibility but may lack personal interaction and immediate feedback.

Classroom learning offers guidance and interaction but may not cater to individual learning speeds.

Research in educational psychology shows that learning effectiveness depends on factors such as attention, motivation, feedback, and practice. This study aims to explore how these factors are influenced by the mode of learning.

Understanding the effectiveness of online versus classroom learning is especially important during times when schools face interruptions, such as during health crises or natural disasters. The findings from this experiment could help students, teachers, and educational institutions make informed decisions about integrating technology in learning.

This project focuses specifically on teaching a science topic, "The Human Digestive System," because science subjects often require conceptual understanding, diagrams, and step-by-step explanations. By comparing how students learn through these two methods, we can provide recommendations for improving educational strategies in science learning.

This research is timely, practical, and relevant for both students and educators in today's technology-driven world.

Objective:

The main objective of this project is to compare the effectiveness of online learning using educational apps and traditional classroom learning with a teacher in helping students understand science concepts.

The specific objectives are:

1. To measure and compare students' learning outcomes by evaluating their test scores before and after using each method.

2. To assess students' engagement, motivation, and satisfaction with both learning methods.

3. To identify the strengths and weaknesses of online learning and classroom learning.

4. To explore how technology can support or complement traditional teaching methods.

5. To provide recommendations on when and how each method can be used to enhance science education. This project aims to help students, teachers, and schools make informed decisions on how to effectively use both online and classroom learning approaches for better academic performance and deeper understanding.

Hypothesis:

Students learning in the classroom will perform better due to real-time interaction, feedback, and motivation from teachers.

Experimental Procedure:

Variables:

1. Independent Variable: The mode of learning (online vs classroom).
2. Dependent Variable: Students' performance (measured by test scores, retention, understanding, etc.).
3. Controlled Variables: Same topic, same learning duration, similar difficulty level, etc.

Materials:

Access to an online platform like Khan Academy.

Teacher or lesson plan for classroom learning.

Pre-test and post-test questions based on science topics.

Survey forms for feedback.

Timer to ensure equal learning time.

Procedure:

1. Select two topics with similar difficulty levels

2. Choose a group of students and teach them with two different modes of learning (online and offline)
3. Give the group of candidates a pre-test on both the topics to assess their baseline understanding.
4. Teach two topics with different methods (online and offline) for a set period (for example, 1 hour).
5. Give the group of candidates a post-test on both the topics to see how much they learned.
6. Collect feedback on their learning experience, motivation, and confidence.
7. Analyze the results by comparing average scores and subjective responses.

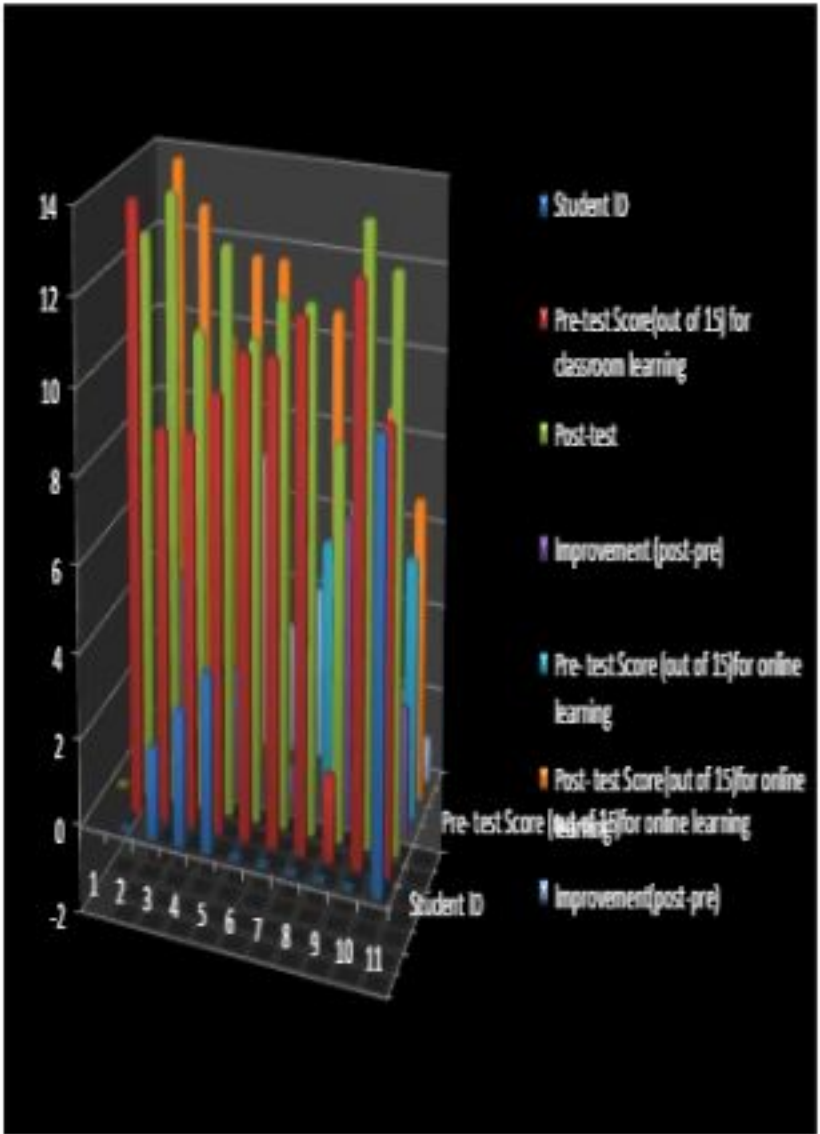
Data Analysis:

Details:

Group	Learning methods	Number of students	Duration of study	Topic Covered	Notes
A	Classroom	10	20mins	Microbes in Agriculture	Teacher-led chalk-talk; continuous Q&A and peer discussion; 20-min cap; pre/post 15-mark quiz; pace adjusted based on student feedback.
A	Online	10	20mins	Microbes in Industry	Video lesson played on a big screen via one smartphone; pause/rewind used and doubts taken any time after short 3–5-min segments; quick check questions between segments; relied on school Wi-Fi (offline copy kept as backup).

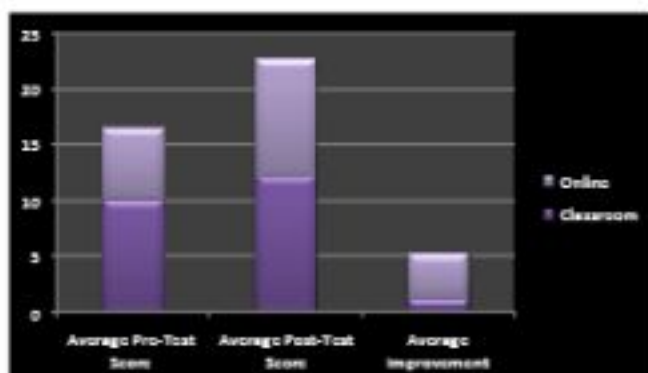
Pre-test and post test scores :-

Student ID	Pre-test Score(out of 15) for classroom learning	Post-test Score(out of 15) for classroom learning	Improvement (post-pre)	Pre- test Score (out of 15)for online learning	Post-test Score(out of 15)for online learning	Improvement(post-pre)
1. 11121	14	13	-1	8	14	+6
2.11113	9	14	+5	6	13	+7
3.11139	9	11	+2	6	10	+4
4.11116	10	13	+3	5	12	+7
5. 11115	11	11	0	9	12	+3
6. 11112	11	12	+1	6	10	+4
7. 11127	12	12	0	6	11	+5
8. 11123	2	9	+7	7	8	+1
9. 11111	13	14	+1	6	9	+2
10.11139	10	13	+3	6	7	+1



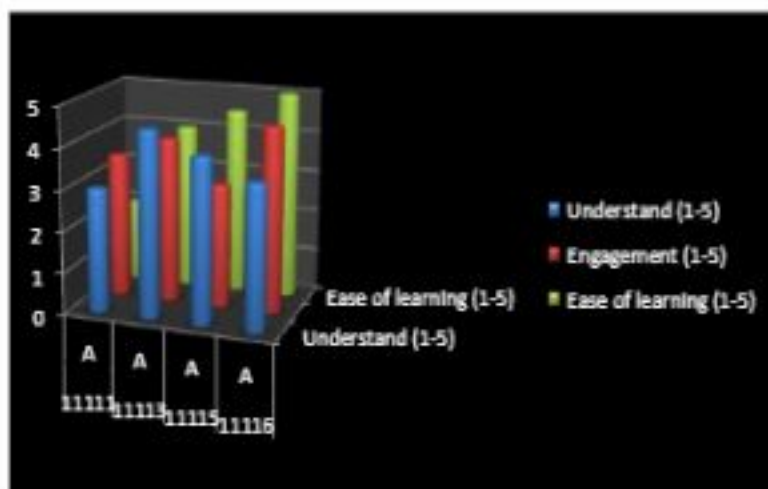
Average Scores:

Mode of learning	Average Pre-Test Score	Average Post-Test Score	Average Improvement
Classroom	10.1	12.2	1.2
Online	6.5	10.6	4.1



Student Feedback:

Student ID	Group	Understand (1-5)	Engagement (1-5)	Ease of learning (1-5)	Comments
11111	A	3	3.5	2	Offline and Online both were on the same scale for me but I would prefer offline learning for motivations from peer groups
11113	A	4.5	4	4	I found online learning more easier to understand as I could study in my own pace through this mode
11115	A	4	3	4.5	I found online learning to be more comfortable and understandable
11116	A	3.5	4.5	5	I found online better as I prefer learning with visuals



Summary of observations:

Parameter	Online learning	Classroom
Average improvement	4.1	1.2
Interaction & questions	Questions can be asked anytime; can be paused/replayed for clearing.	Live two-way discussion; doubts clarified immediately with examples.
Engagement	Big screen visuals keep attention; pause/rewind helps focus.	High attention with teacher prompts and peer participation.
Accessibility	<i>Easy to run with one smartphone to a big screen; no battery/data needed during session; main risk is Wi-Fi connectivity (loading/stream drops).</i>	No devices needed; board/materials available; depends on room/time availability.
Self-paced learning	Semi self-paced—pause/rewind when needed; overall pace set by facilitator.	Fixed pace, adjusted by teacher based on student feedback.
Motivation	<i>Moderate/variable—goes up with short segments, pause-and-discuss, quick checks (polls/hand-raise); drops if it's long passive viewing or Wi-Fi stalls.</i>	High due to teacher presence, peer energy, and instant feedback; hands-on examples keep students driven.







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Risk and Safety:

Get consent from students and guardians.

Avoid bias by random assignment.

Keep tests fair and objective.

Bibliography:

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