

Impact of different Testing Methods on Learning & Long Term Memory Retention

- T V S Vishnu Vardhan (2023202021)
- P Kartheek (2023202030)
- K Sai Kiran (2023201067)
- N V V Hrishikesh (2023201012)

Introduction

Test is conducted

- To evaluate students grasp and retention of the concept.
- Check if a student is able to comprehend in depth.
- Identify strong and weak areas.
- Improve problem solving skills, critical thinking, and application of learnt concept.




Testing Effect

- The *testing effect* refers to the psychological phenomenon where taking tests or quizzes on material improves long-term retention more effectively than simply re-studying it.
- Research shows that regular testing not only reinforces knowledge but also reduces forgetting over time.
- This effect can be especially useful for students, as it enhances learning efficiency.
- Practicing retrieval through quizzes, flashcards, or even self-testing can harness this powerful tool for memory retention.

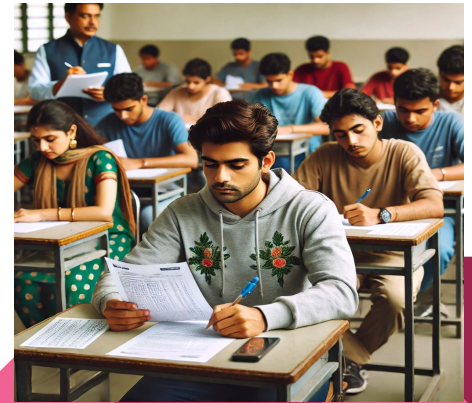


Testing Effect


- The testing effect occurs because actively retrieving information strengthens memory pathways, making it easier to access that information later.
 - Enhances neural connections associated with the learned material, reinforcing recall.
 - Desirable difficulty is a learning principle where challenging tasks that require effort enhance long-term retention and understanding of material.
 - Low-stakes, frequent tests help students by reducing anxiety around exams, encouraging regular review, and reinforcing learning through the testing effect.
- 

Different Methods of Testing


- **Objective Assessment**
 - Ex : Multiple Choice Questions (MCQs), Match the Following, True or False, etc.
- **Descriptive answer Based**
 - Ex: Essay Questions, Short and Long Answer Questions, Numerical type, etc.
- **Application oriented**
 - Ex : Assignments, Problem Sets, Projects, etc.




Effect of Testing Method

- If pattern of the test is disclosed, then the learning depends on the type of the test
 - Since multiple-choice tests emphasize recognition and recall, students focus on memorizing key facts, definitions, and concepts.
 - For a descriptive test, the emphasis will be on explaining a concept in a concise yet comprehensive manner, where the exact wording of individual sentences is not of primary importance.
 - In application type, concept will be learnt by doing some assignments, problem sets, and projects
 - Also, since many tests will be conducted in same pattern, the learning will be according to the pattern of the test
- 


Design of the Questions

- Multiple Choice Questions should contain competitive alternative options instead of plausible or impossible alternatives.
 - Descriptive type question should be designed in a way that encourages students to actively recall and apply key concepts by giving questions to explain, analyze, and compare concepts in their own words.
 - Application oriented tests should have assignments, challenging problem sets, and projects such that all the concepts will be covered
- 

Experiment Conditions

- Testing methods considered : The most common test patterns (MCQ, Descriptive and Application based)
 - Participants considered for the experiment : A Set of students from a class, who are given same lectures and provided with same materials on a particular subject on which the test will be conducted.
 - Hence,
 - Resources are same
 - Knowledge will be same, so no difference in students' level
 - All students are in same pace
 - But the test pattern will be different, and will be declared initially
- 

Pre-Experiment Phase

- A pretest is conducted to assess the skill level of the participants before the experiment begins.
 - This test typically includes a mix of question types to capture proficiency in the prerequisites of the subject.
 - Once the test is completed, the participants are divided into groups in such a way that the mean score of each group is approximately equal.
 - The reason for this process is to control for pre-existing differences in knowledge among participants.
 - This process is common feature of a quasi-experimental design
- 

Experiment - Phase I

- Three groups are formed initially
- Participants are explained their test pattern, and about the material that they get.
- In regular intervals, tests in the same pattern declared initially will be conducted.
- Once the test is completed, feedback will be given to analyse their performance.
- This approach helps in better preparation for upcoming tests, and changes the way of learning.



Experiment - Phase II

- At the end of a specified time period, a final test will be conducted to assess actual understanding of the concept.
- This test can be a one to one interaction, where there will be a set of questions, which will be used to assess the performance.
- Once this test is done, we can use the score of this test to compare the performance of each group.



Experiment - Phase III


- To check long term retention, similar type of test can be conducted with a delay of 1 month.
- Similarly once the participants completes the test, we can use the scores for checking long term retention.



Analysis

- Statistical Analysis
 - Mean, Median, Standard Deviation
- ANOVA - Analysis of Variance

Expected Results


- Hypothesis : Learning and retention will be highest in groups tested with application-based questions, followed by those tested with descriptive questions, and then objective questions
- 

Challenges

- Ensuring that students rely solely on the provided materials, without referring to external sources.
- For MCQs to be effective, the distractors (incorrect answer choices) must be plausible enough to encourage deep thinking and prevent students from easily guessing the correct answer.
- Grading descriptive questions and application oriented questions is difficult and time-consuming.



Improvements

- This study could be extended across diverse subjects and domains to validate whether similar results are achieved universally. Exploring variations across different fields may reveal broader insights into learning efficacy.
 - Incorporating varied teaching strategies could significantly enhance learning outcomes, as different approaches may align better with individual learning styles and subject matter.
 - Employing a unique mix of assessments—such as objective, descriptive, and application-based tests—within each group.
- 

Contribution

Team Member	Contribution
T V S Vishnu Vardhan	25
P Kartheek	25
K Sai Kiran	25
N V V Hrishikesh	25



Thank you!