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1. INTRODUCTION

Life Science is a subject based on **observation, experimentation, measurement, and verification**. Students understand biological concepts best when they **handle specimens, use instruments, collect data, and draw conclusions themselves**.

The **Laboratory Method** provides a structured environment where students engage in **hands-on activities**, making learning **concrete, realistic, and scientific**. It shifts teaching from telling to **experiencing**, helping students learn the way real scientists work.

2. MEANING

The Laboratory Method is a **student-centered approach** in which learning takes place through:

- **Experiments**
- **Specimen study**
- **Microscopic observation**
- **Dissections (where permitted)**
- **Data collection and analysis**

Students perform activities **individually or in groups** in a laboratory setting, while the teacher acts as a **supervisor, facilitator, and safety guide**.

It follows the approach:

 **“Learning by doing.”**

3. KEY CHARACTERISTICS

- Conducted in a **scientific laboratory** or practical setup
 - Involves **apparatus, instruments, specimens, and materials**
 - Students actively **perform procedures**
 - Encourages **recording, measuring, and interpreting**
 - Focus on **scientific skills and techniques**
 - Teacher provides **guidance—not ready-made answers**
 - Emphasizes **accuracy, safety, and systematic procedure**
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☑ 4. OBJECTIVES OF THE LABORATORY METHOD IN LIFE SCIENCE

- To develop **practical skills** (microscopy, measurement, handling tools)
 - To reinforce theoretical concepts through **direct experience**
 - To develop **observation, analytical, and reasoning abilities**
 - To train students in the **scientific method**
 - To instill **scientific attitudes**: curiosity, honesty, precision
 - To make learning **interesting, realistic, and memorable**
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☑ 5. STEPS IN THE LABORATORY METHOD

STEP 1: ORIENTATION

- Teacher introduces the topic and objective of the practical.
 - Safety instructions and lab rules are explained.
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STEP 2: PLANNING AND HYPOTHESIS

- Students understand the aim.
 - Predict possible outcomes.
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STEP 3: EXPERIMENTATION / PRACTICAL WORK

- Students perform the activity step-by-step.
 - Use instruments, observe specimens, record data.
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STEP 4: OBSERVATION AND DATA RECORDING

- Students' note:
 - changes,
 - measurements,
 - drawings,
 - tables, etc.
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STEP 5: ANALYSIS

- Students compare results and interpret findings.
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STEP 6: CONCLUSION

- Students write what they have learned or proved.
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STEP 7: REPORTING & DISCUSSION

- Teacher reviews lab records and discusses errors, applications, and extensions.

6. ADVANTAGES

- Makes learning **concrete, real, and experiential**
- Improves **scientific skills** and **confidence**
- Encourages **active participation**
- Knowledge gained is **long-lasting**
- Develops **teamwork**, patience, and accuracy
- Relates theory to real life
- Prepares students for higher scientific studies

7. LIMITATIONS

- Requires **equipment, space, materials, and cost**
- Time-consuming
- Needs trained teachers and proper supervision
- Not suitable for very large classes
- Some topics cannot be easily experimented on (e.g., long-term evolution)

8. WAYS TO IMPROVE LABORATORY TEACHING

- Use **small groups** to ensure participation
- Provide **clear written instructions**
- Maintain proper **safety and hygiene**
- Use **low-cost and local materials** wherever possible
- Combine lab work with **class discussion and fieldwork**
- Encourage students to **draw, photograph, and document results**



CLASSROOM EXAMPLE

TOPIC: Observation of Onion Epidermal Cells Under a Microscope (CLASS 9)

1. AIM

To observe the **structure of plant cells** using onion peel under a microscope.

2. MATERIALS REQUIRED

- Onion bulb
 - Forceps/needle
 - Glass slide and cover slip
 - Microscope
 - Safranin/methylene blue stain
 - Dropper
 - Blotting paper
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3. PROCEDURE

1. Remove a thin transparent peel from the inner side of the onion.
2. Place it on a glass slide.
3. Add a drop of stain (safranin/methylene blue).
4. Gently place the cover slip without air bubbles.
5. Observe under low and then high power of the microscope.

Students perform these steps themselves while the teacher supervises.

4. OBSERVATION

Students see:

- Rectangular brick-like cells
- Cell wall
- Nucleus (stained)
- Cytoplasm
- Vacuole

They draw a labeled diagram in their practical notebook.

5. CONCLUSION

Students conclude:

☞ **Plant cells have a definite shape, a cell wall, and visible internal structures.**

This reinforces the concept of **cell structure** taught in theory.

6. EVALUATION

Teacher checks:

- Practical skills
- Diagram accuracy
- Observation notes
- Ability to explain findings

Homework:

- Compare plant and animal cells in a table.
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7. EXTENSION

Students may observe:

- Hydrilla leaf cells showing cytoplasmic streaming
 - Cheek cells (where permitted) for comparison
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CONCLUSION

The Laboratory Method is a powerful approach in Life Science because it:

- Transforms students into active **explorers and experimenters**
- Strengthens conceptual understanding through **hands-on experience**
- Builds foundational skills required for scientific learning

When used regularly and systematically, it develops **scientific thinking, practical competence, and lifelong interest in biology.**
