MINISTRY OF EDUCATION

Virtual Lab
as a teaching learning tool for Computer Science

9 JANUARY, 2025
10:00 AM to 11:00 AM, Thursday

Resource Persons

Dr. Rajesh D.
Associate Professor
CIET, NCERT, New Delhi

Mr. Rahul Verma
Technical Consultant
CIET, NCERT, New Delhi

Watch it Live on NCERT Official YouTube Channel
https://www.youtube.com/@NCERTOFFICIAL

You can watch at:
DD Free Dish Channel
Dish TV Channel #2027-2033
PM eVidya Channel #6-12
Jio TV

For any further queries, mail to : diksha.training@ciet.nic.in or Call : 8800440559

DIKSHA

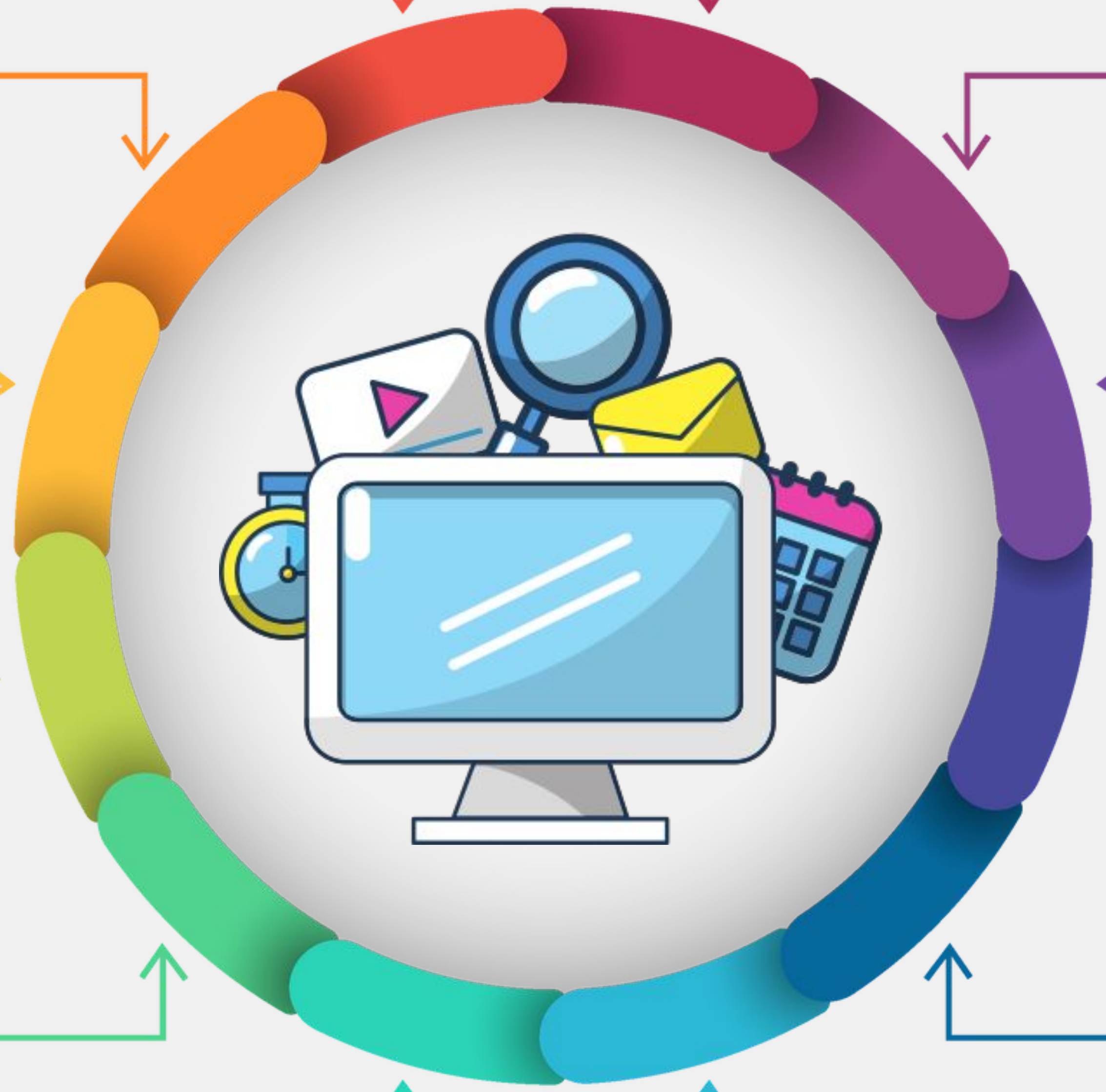
विद्ययाऽमृतमश्नुते
एन सी ई आर टी
NCERT

Central Institute of Educational Technology
A Constituent Unit of NCERT

Virtual Labs as a Teaching-Learning Tool for Computer Science

Relevance of Computer Science in Education

- Critical Thinking
- Problem-Solving
- Soft Skills
- Artificial Intelligence (AI)
- Machine Learning (ML)
- Data Science and Analysis
- Software Engineering
- Computational Thinking
- Design Thinking
- IoT
- Cryptography
- Robotics



Experimentation: The Backbone of Learning and Innovation in Computer Science

Bridging Theory and Practicals

Skill Development

Builds Resilience

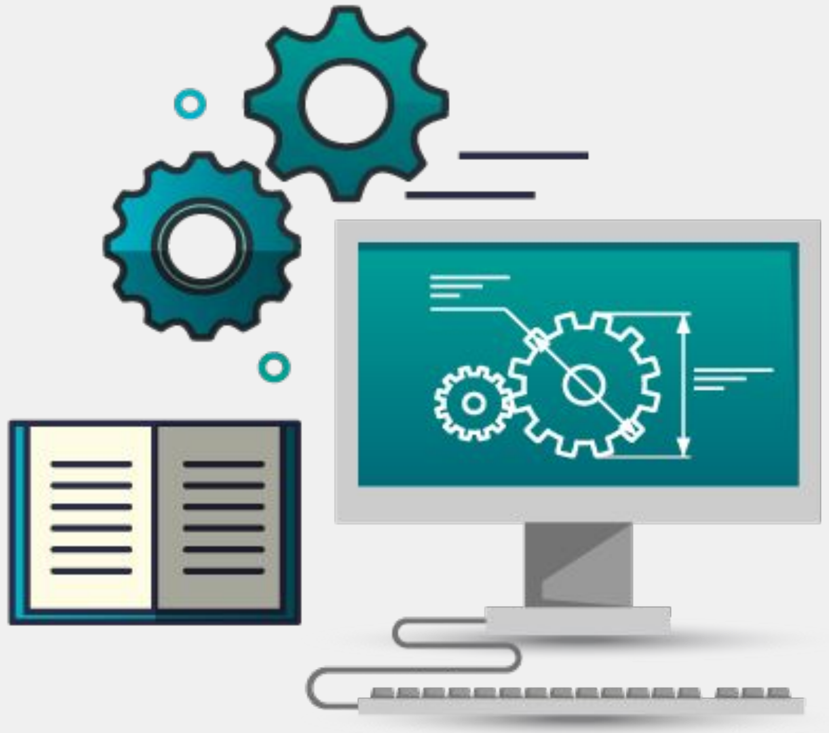
Understanding complex concepts

Immediate Feedback

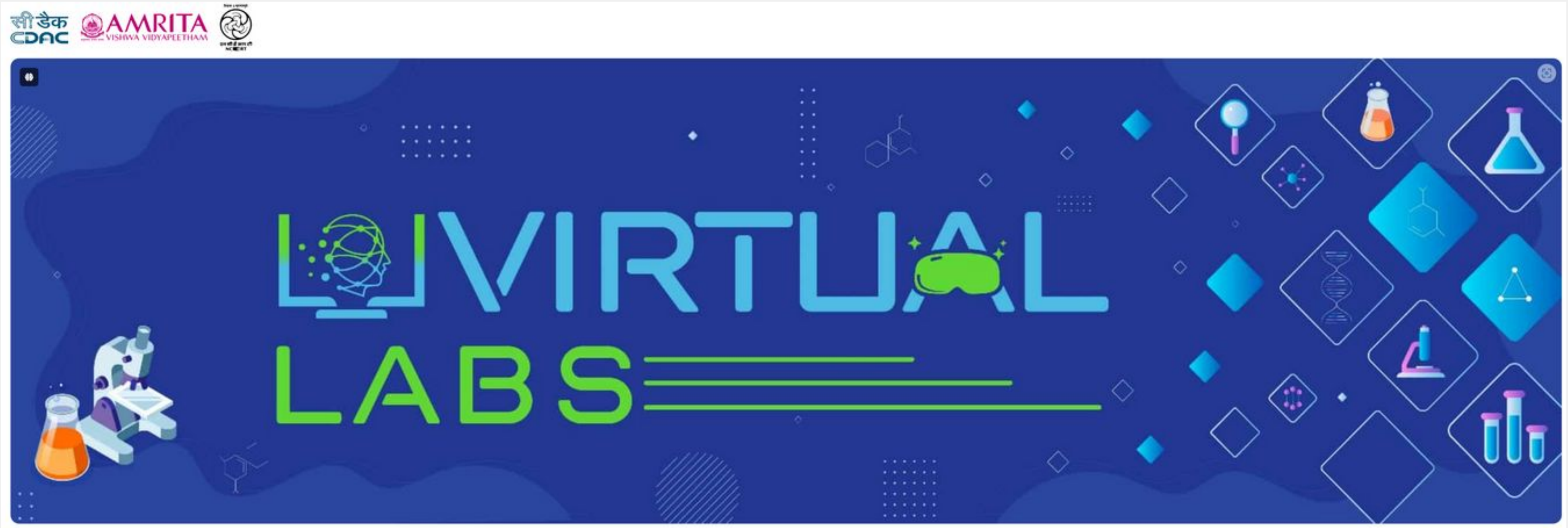
Encourage Innovation

Virtual Labs for Computer Science

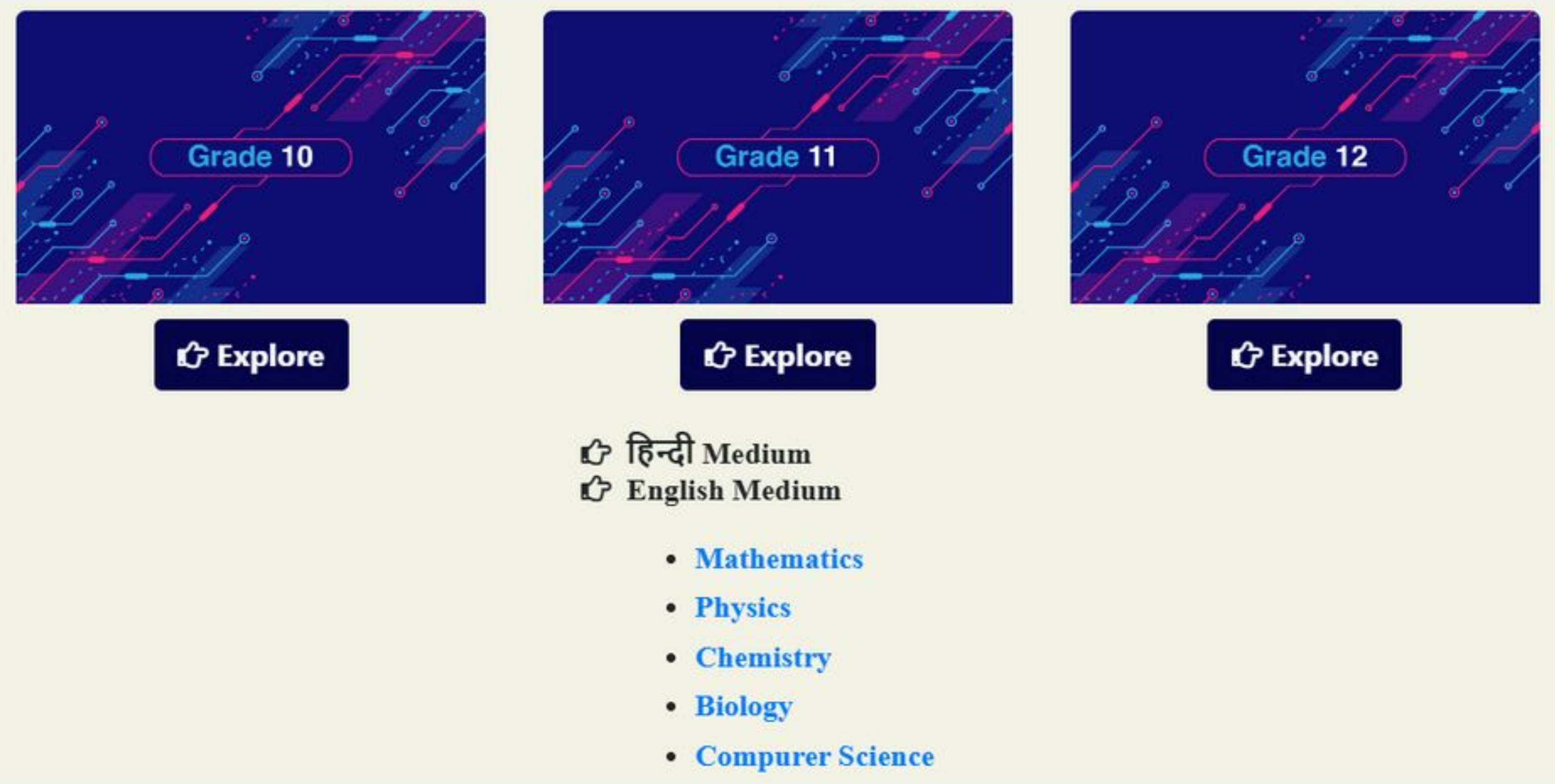
Virtual labs are interactive, digital simulations of activities that typically take place in physical laboratory settings.



Accessing Virtual Labs on Diksha Platform



URL: https://diksha.gov.in/virtuallabs.html



Computer Science

Understanding

Familiarity with programming language

Visualization

Visualization of concepts using Algorithms and Flowcharts

Real-world Application

Ability to solve problems is the most significant component of computer science

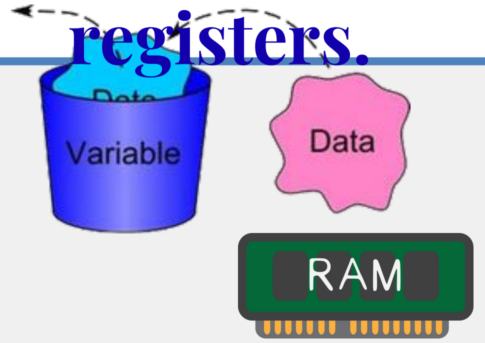
The Significance of Virtual Labs in Computer Science Education

Step-by-Step Code Execution

Provide an interactive environment to understand programming concepts step by step.

Visualizing Variables and Memory

Visual representations of memory allocation, showing how variables are stored in memory or registers.



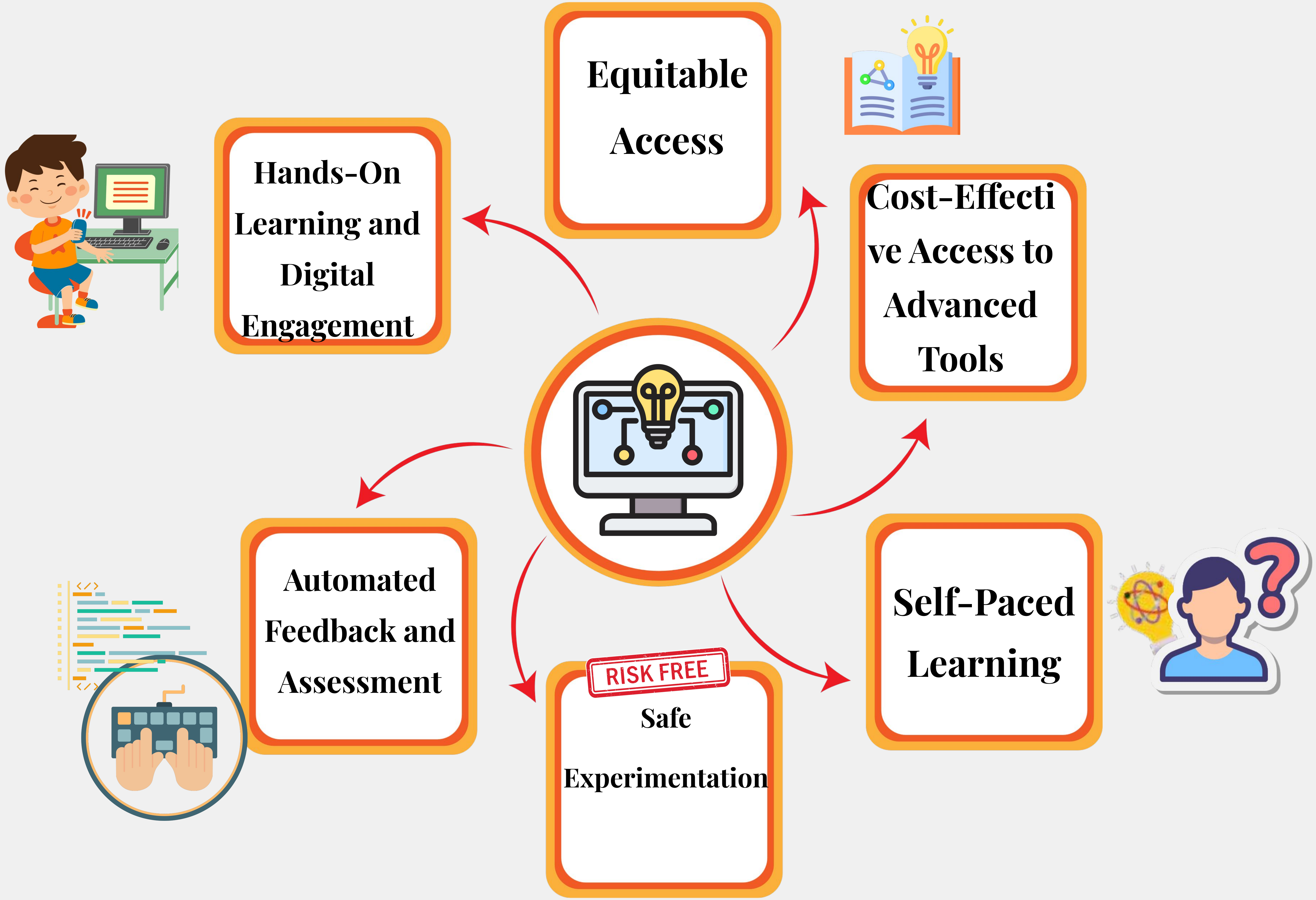
Simulating Hardware Interaction

Simulate lower-level aspects of computation, such as how the CPU processes instructions, how memory is allocated at a hardware level !

Interactive Debugging

Examine the code in real-time. spotting and fixing bugs directly in the development environment

Learning by Doing: Experiential Learning



VIRTUAL LAB SESSIONS

PRE-LAB

Develop familiarity with the necessary instructions, background information, and execution guidelines to prepare the students.

PERFORMANCE -LAB

Allows students to conduct experiments, analyze code, and explore execution process through interactive digital simulations in sandbox environment

POST-LAB

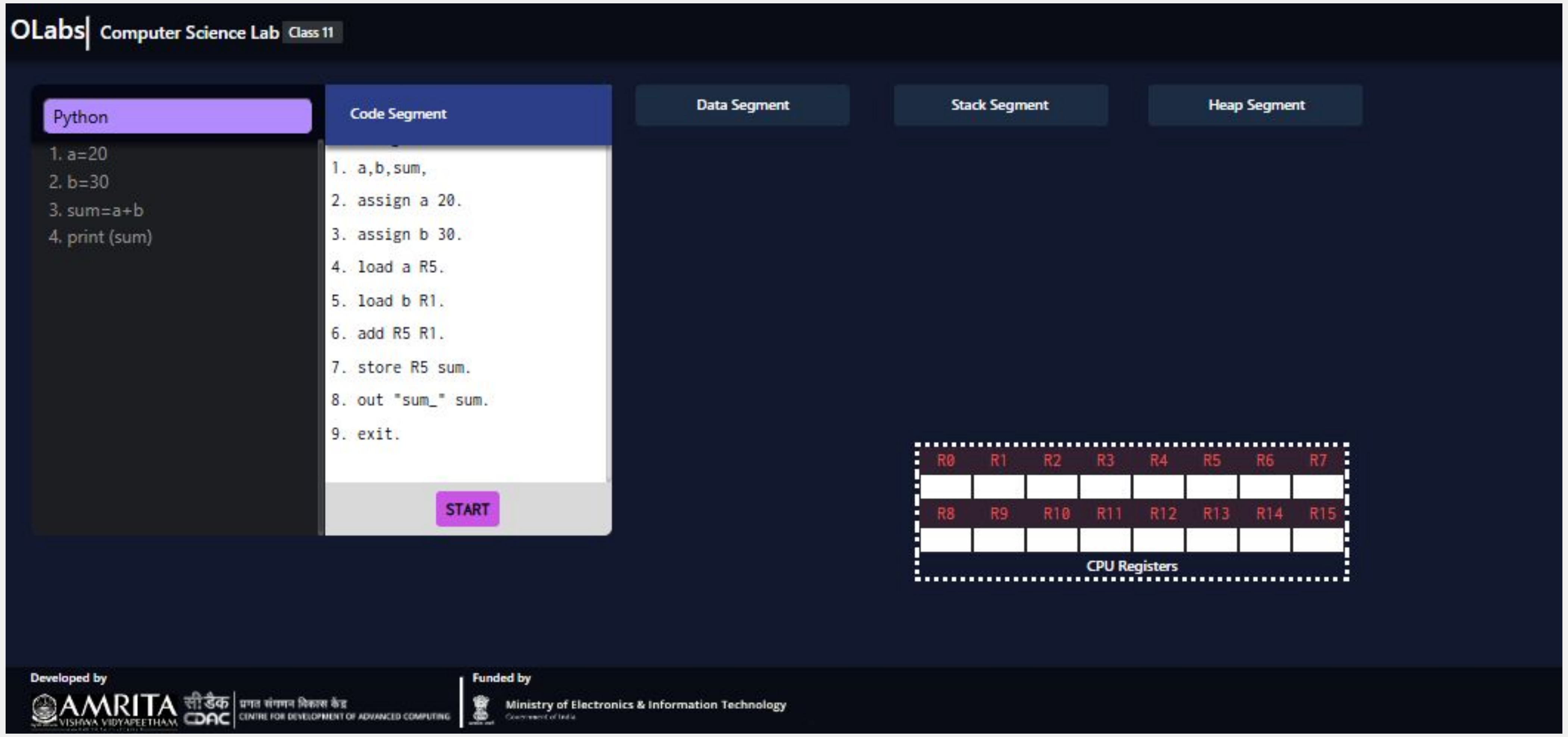
Involves reviewing output, analyzing results and discussing findings to reinforce learning and draw conclusions from the executed code.

Virtual Lab Experiment

Class XI (Computer Science Lab Manual)

Lab Activity: Add Two Numbers

Aim: -To understand the working of addition of two numbers in python and visualising the output through virtual labs



Assessment with Virtual Simulations

DIAGNOSTIC

IDENTIFY MISCONCEPTION

Virtual lab diagnostic can pinpoint specific areas where students struggle, allowing teachers to address misconception

PERSONALISED FEEDBACK

Diagnostic assessment in virtual labs can provide tailored feedback to students, guiding them towards mastery

DATA DRIVEN INTERVENTION

Insights from virtual lab diagnostic can inform targeted interventions and personalized learning plans

FORMATIVE

INTERACTIVITY

Virtual simulations allow students to actively execute the code, providing real-time feedback and opportunities for experimentation.

DATA COLLECTION

Virtual labs can capture detailed performance data, enabling teachers to track student progress and identify areas for improvement.

ADAPTIVE FEEDBACK

Simulations can adapt to student actions, providing personalized guidance and scaffolding to support learning.

The Role of Teachers in Virtual Lab Assessment

1. Guiding and Facilitating Learning
2. Blending Virtual and Physical Lab Activities
3. Monitoring and Assessing Progress
4. Supporting Self-Paced Learning
5. Developing Assessment Strategies