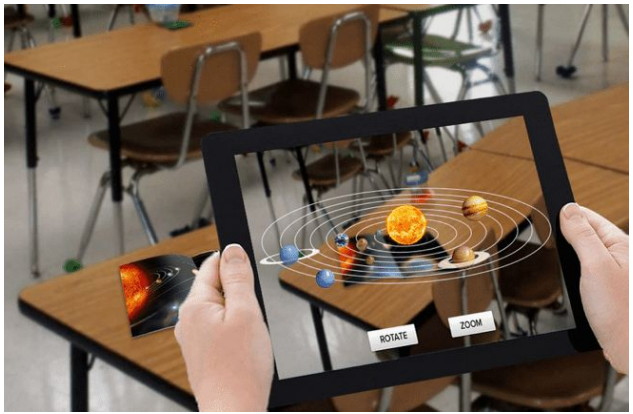
Immersive Technologies

Central Institute of Educational Technology
National council of Educational Research and Training

Virtual Reality (VR) Uses headsets to create completely computer-generated environments.



Augmented Reality (AR) Overlays digital information onto the real world, often through smartphone cameras or special glasses.

Mixed Reality (MR) Combines elements of both VR and AR, allowing digital and physical objects to interact.

360-degree videos: Immersive videos that allow viewers to look around in all directions.

Immersive Technology

Antonin Artaud (1938) - La realite virtuelle

Morton Helig (1962) - Sensorama

Jaron Lanier (1987) - Eye-phone

Tom Caudell (Researcher at Boeing) - Adding digital info on reality

Milgram and Kishno’s formulation

Recommendations of National Education Policy 2020

NEP 2020 Para 24.4. (d)

A digital repository of content including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality will be developed.

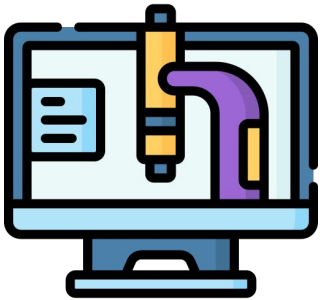
NEP 2020 Para 24.4. (f)

Existing e-learning platforms such as DIKSHA, SWAYAM and SWAYAMPRABHA will also be leveraged for creating virtual labs so that all students have equal access to quality practical and hands-on experiment-based learning experiences.

Policy Perspective

- Technology use and Integration
- Ensuring Equitable use of technology
- Extensive Use of technology in teaching and learning
- Content Creation, digital repository and Dissemination
- Blended mode of learning
- Addressing digital divide

Virtual Labs and Simulations



Virtual labs are online, computer-based simulations that let users perform experiments/activities digitally, replicating real-world lab settings.

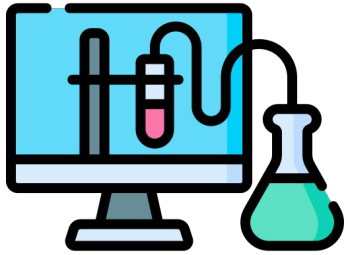
RELEVANCE- Practical application of concepts and the ability to conduct experiments in a virtual environment deepens learning.

Significance of Virtual Labs

Pedagogical Aspects	Middle Stages	Secondary Stages
Pedagogical Shifts	Transition from concrete to semi-abstract concepts. *Virtual labs help visualise basic scientific ideas and support exploratory learning.*	Transition to **more abstract and complex concepts**. *Virtual labs help simplify, model, and visualise higher-order scientific ideas*.
Cognitive & Emotional Development	Students develop curiosity and basic reasoning. *Virtual labs nurture observation, exploration, creativity, and confidence*	Students reach higher cognitive maturity. *Virtual labs foster abstract thinking, logical reasoning, creativity, scientific temper, and reflective thinking*.
Experiential & Hands-on Learning	*Provides safe, guided simulations for basic experiments, helping students understand foundational scientific processes*.	*Enables inquiry-based and investigative experiments, allowing variable manipulation, hypothesis testing, and deeper conceptual understanding.*
Science Process Skills	Focus on developing **observation, classification, measurement, and prediction** skills.	Strengthens **hypothesising, analysing, interpreting data, modelling, and evaluation** skills required for higher-level science.

Pedagogical Aspects	Middle Stages	Secondary Stages
Nature of Science Understanding	Introduces students to the idea that science involves **exploration, evidence, and simple experimentation**	Reinforces science as a **systematic, evidence-based discipline involving reasoning, validation, and scientific inquiry**.
STEAM Skill Development	Builds early STEAM habits such as **basic digital literacy, creativity, and guided problem-solving**.	Builds advanced STEAM skills—**critical thinking, digital experimentation, design, modelling, algorithmic thinking**
Scientific Temperament	Encourages curiosity, openness to new ideas, and willingness to explore.	Strengthens **objectivity, rationality, questioning attitude, and evidence-based decision-making**
Scientific Literacy	Develops fundamental understanding of scientific terms, processes, and safety norms	Enhances ability to **interpret data, understand scientific arguments, and apply scientific knowledge to real-life problems**
Bridging Equity Gaps	Provides equal access to foundational experiments for schools lacking physical labs.	Addresses disparities in access to advanced lab equipment and **prepares students for senior secondary practical work**.

Benefits of Virtual Labs



Access anytime anywhere: Students in remote locations get access to labs and enable anytime anywhere learning for all students.

Quality: Better quality of labs without being restricted to challenges of funding, procurement of materials and equipment.

Immersion: Visual aids to teach complex theoretical topics and concepts creates an immersive learning experience.

Safety: Ensures safety

Repeatability and flexibility: Time and space to repeat experiments and try new experiments without resource constraints.

Feedback loops: Faster feedback and learning loops where dependence on the teacher may be reduced.

Equitable: As a shared common resource virtual labs as a common infrastructure provide equitable access to a scarce resource and remove constraints that apply to physical access.

Key Features of DIKSHA Virtual Labs

- Curriculum aligned Simulation, Interactive environments for experiments.
- Simple and Responsive Interface.
- Rich Content: Simulation, Videos, Animation, self assessment, and 3D Models
- Free Access, scalable and regularly updated.
- Real-time Guidance

https://diksha.gov.in/