VIRTUAL LABS

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VIRTUAL LABS

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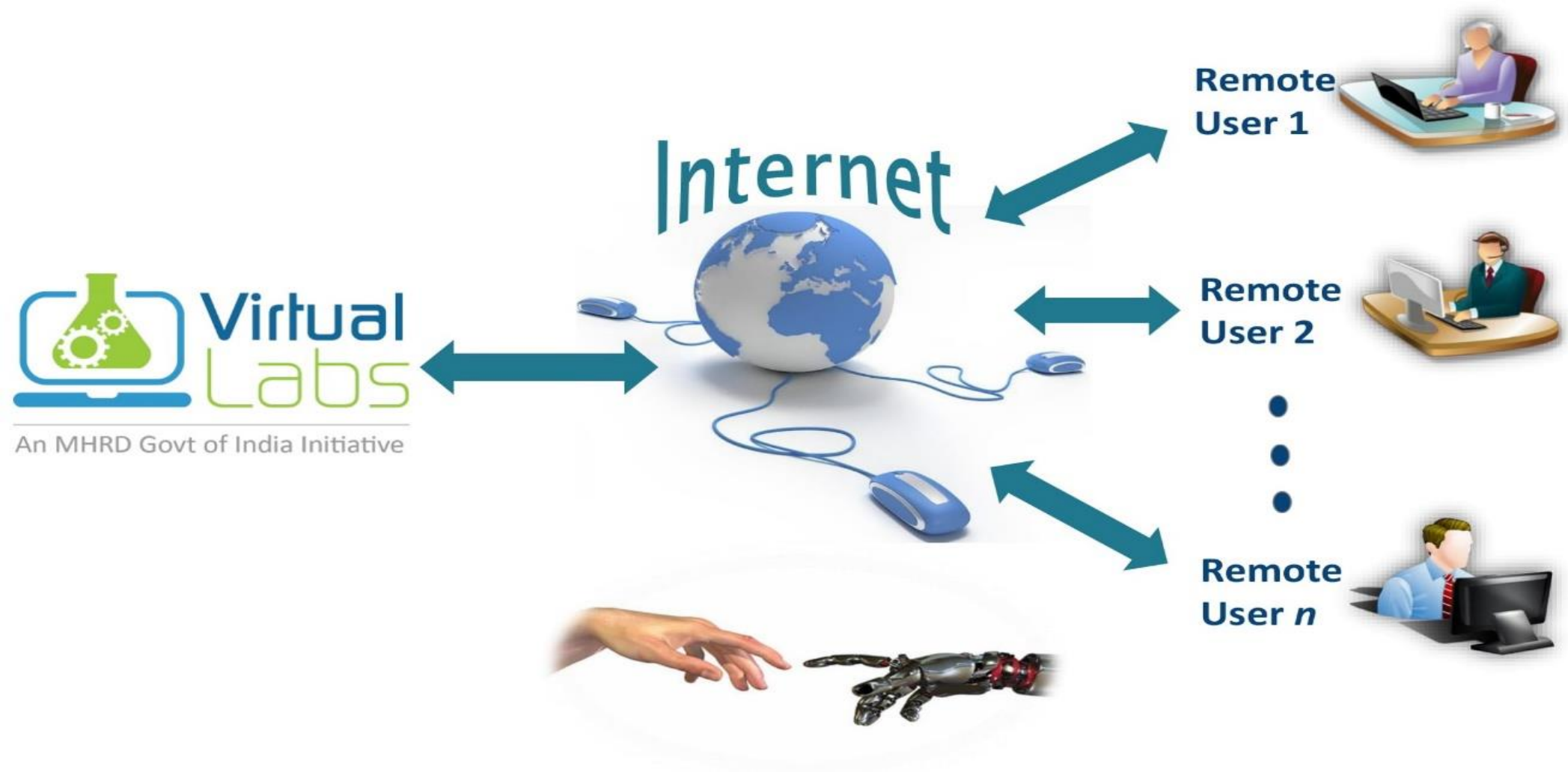
Definition

- Virtual labs[8] are simulated learning environments.
- Virtual Labs or Online Labs (OLABS) enabled schools to perform various experiments and activities without physical labs or limits.
- Virtual Labs[1] is an initiative of Ministry of Education (MoE), Government of India under the aegis of National Mission on Education through Information and Communication Technology (NMEICT).
- The project aims to provide remote access to Laboratories.
- Virtual lab software creates opportunities for alternative access to science education.

Virtual Labs



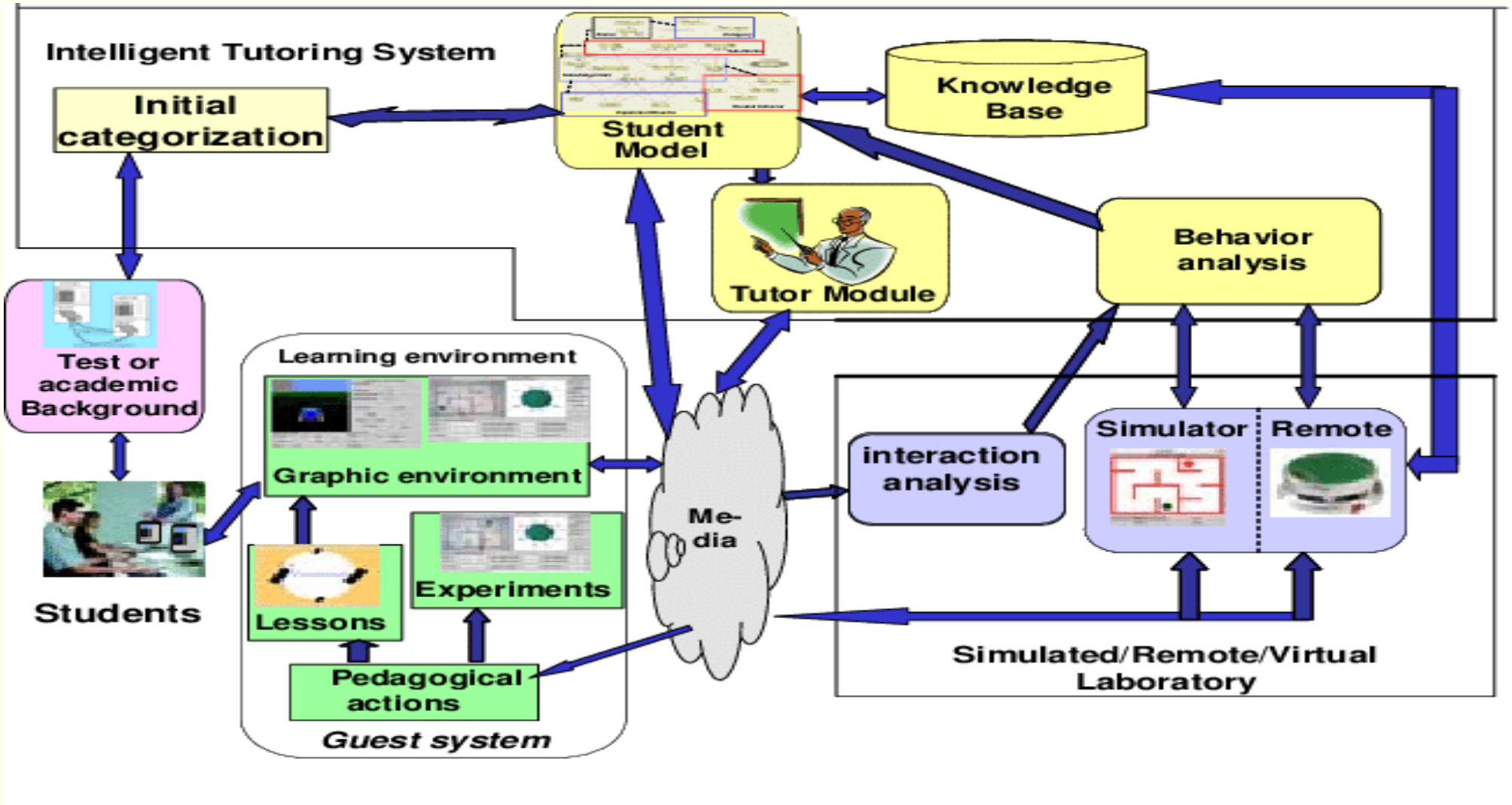
Introduction

- Virtual Labs have been designed to provide remote access to labs in various disciplines of Science and Engineering.
- Virtual Labs enable the students to learn at their own pace and enthuse them to conduct experiments.
- Virtual Labs also provide a complete learning management system.
- Virtual Labs can be used to complement physical labs.
- The project is coordinated by IIT Delhi and there are a total of 11 participating institutes in the consortium. IIT Delhi, IIT Bombay, IIT Kanpur, IIT Kharagpur, IIT Roorkee, IIT Guwahati, IIT Kharagpur, IIIT Hyderabad), Amrita Vishwa Vidyapeetham Coimbatore, Dayalbagh Educational Institute Agra, NITK Surathkal, and College of Engineering Pune are the institutions participating in the project.

Introduction

- Virtual Labs do not require any additional infrastructural setup for conducting experiments at user premises.
- One computer terminal with broadband Internet connectivity is all that is needed to perform the experiments remotely.
- Virtual labs[9] are enable both teachers and students to achieve the educational process' goals.
- Virtual labs have saved a lot of time and effort.
- Also they removed many obstacles that were faced by both student and teacher to conduct experiments.
- As they facilitated the conducting of experiments outside the real labs.

Architecture of Virtual Lab[10]



Need of Virtual Labs

- Challenge #1: Limited lab access
- Challenge #2: Limited time in the lab
- Challenge #3: Low student motivation and engagement
- Challenge #4: Teaching complex topics
- Challenge #5: Making mistakes in high risk environments
- Challenge #6: Ethics
- Challenge #7: Unprepared students and knowledge gaps

Beneficiaries of Virtual labs

- All students and Faculty Members of Science and Engineering Colleges who do not have access to good lab-facilities and/or instruments.
- Access to quality simulation-based labs as a complementary facility to those colleges that already have labs.
- A complete Learning Management System around these labs.
- Teacher-training and skill-set augmentation through workshops and on-site training.
- High-school students, whose inquisitiveness will be triggered, possibly motivating them to take up higher-studies. Researchers in different institutes who can collaborate and share resources.
- Different engineering colleges who can benefit from the content and related teaching resources.

Benefits of Virtual Labs[8]

- As a visual aid to teach complex concepts
- To refresh students' knowledge before teaching new material
- As a pre-lab exercise
- To provide lab work to courses with no existing lab component
- To facilitate online learning
- As a post-lab exercise

Weaknesses to use virtual labs[9]

- They require computer devices with high specifications.
- They require professional programmers with strong skills in different programming languages.
- They also require a team of experts in the scientific material, teachers, and experts in psychology.
- One of the negative effects of Virtual Labs is that it reduces the direct interaction between different parties involved in virtual labs.

Available Virtual Labs[2][3]:

S.No .	Name of the Department	Name of the Virtual Lab	Description of the Virtual Lab	Web link of the Virtual Lab
1.	Multi Disciplinary	Vlabs	Virtual Labs for Multi Disciplinary.It is an initiative of Ministry of Education (MoE), Government of India under the aegis of National Mission on Education through Information and Communication Technology (NMEICT).	https://www.vlab.co.in
2.	Biology	Biology Simulations	Biology Simulations.	https://www.biologysimulations.com/
3.	Physics	HTML5 Physics Simulations	Manipulate systems and experiment with climate change, motion, forces, gravity, momentum, energy, and rotation.	http://physics.bu.edu/~duffy/HTML5/index.html
4.	Multi Disciplinary	LabXchange	Curates and creates world-class digital labs, delivered on a free, online platform that lets you integrate your learning and research experiences.	https://www.labxchange.org/explore
5.	Chemistry	Chemix	Chemix is an online editor for drawing science lab diagrams.	https://chemix.org/

Conclusion

- The virtual labs are one of the most important applications of e-learning.
- As it provides a virtual learning and teaching environment that aims to develop practical skills of the students.
- And since they are available through the Internet, the student can conduct many experiments without being restricted to a specific location or specific times as It is the case when using real laboratories.

References

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