



Effective Use Of Virtual Reality To Empower The Learner Of Basic Science



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MOTIVATION

- VR eases the process of learning basic science through gaming technology, which otherwise is a complex task for students as it requires lots of effort.
 - VR motivates students, smoothens the specially abled.
 - To achieve skill in various topic of basic science it requires performing experiments in laboratories. Therefore learning may be hampered due to inadequate laboratory equipments, lack of supervision, material and cost.
 - To create curiosity, excitement and exploration among school children in Science, Mathematics and Technology.
 - Safe prototype environment
- Many research [1,2,3,4,5,6,7,8,9,10] and university and organizations [<http://amrita.olabs.edu.in>, <http://cdac.olabs.edu.in>], to offer offline simulations and online laboratory experiments for learning basic Science.

OBJECTIVE

- The first objective proposes to give students the opportunity to focus on how an online experiment setup constituted using virtual reality
- The second objective proposes to learn basic science through a playful learning environment using Virtual Reality through simulation
- The third objective proposes to learn basic science through 3D graphics and virtual reality technologies.

MATERIALS AND METHOD

❖ In this method the Student PC has the VR facility with operating system Mac/Windows/Linux connected to the internet wired or wireless, will be able to access the real experiment.

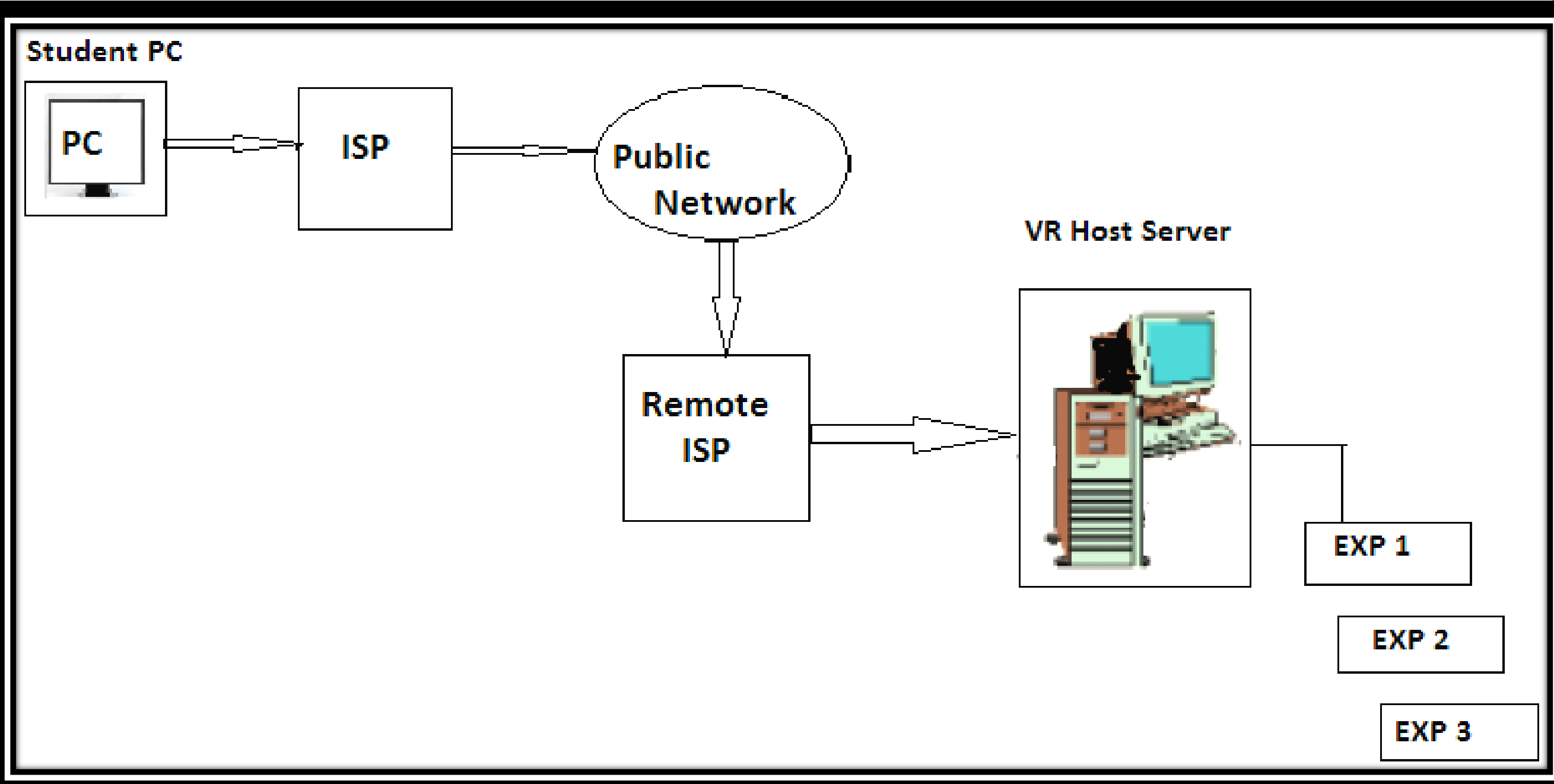


Figure 1: Online Experimental Setup constituted using Virtual Reality

The same 3D representation can be used in an off-line mode without using the internet in order to perform a simulation of the experiment.

Resources used for VRLab setup without needing to buy expensive hardware

Serial No.	Item	Description
1.	Head Mount Device	Google Cardboard with straps
2.	Smartphone	With Gyroscope
3.	PC	4 th Gen Intel i5/AMD FX-6350 or better Windows 7 or above
4.	Router or USB Tethering	A Wifi AC Router plugged to the PC. or phone optimized USB drivers for Tethering

❖ The **second objective** can be achieved using interactive and educational simulation-based softwares. Some of the online simulators are -

- 1) **Phet (Interactive Simulations)** designed to aid in higher-level education, such as mathematics, physics, chemistry and science.
- 2) **Virtlab** is a no-cost web-based simulation of a college or high school chemistry laboratory. It is a series of hands-on experiments and demonstrations that use this simulated chemistry laboratory to perform experiments.
- 3) **Labster** used internationally, is a fully interactive advanced lab simulations based on mathematical algorithms that support open-ended investigations with gamification elements.
- 4) **LabInApp** is a 3D, interactive virtual laboratory tool that focuses on a heuristic approach of understanding science. This enables students and teachers to perform science experiments on computers or mobile devices, and eliminates the physical barriers of an actual laboratory.

❖ The **third objective** proposes to develop some concept of Mathematics like Pythagoras theorem, the virtual learning environment in Computer based platform using various VR developers like Unity 3D.

UNITY 3D : Unity is one of the most ubiquitous of tools being used today for VR development. At its heart, it's a game engine. It has a direct VR mode to preview your work in an HMD (Head Mounted Display) which can really boost productivity by designing for VR within a virtual environment. Unity is quickly becoming the default tool for VR development due to its ease of use and ability to quickly prototype VR applications with it. One has to be familiar with C# for development in Unity 3D.

Some other VR tools are:

UNREAL ENGINE (UE4) , 3DS MAX & MAYA, BLENDER, SKETCHUP, WebVR Tools, THREE.JS, REACT VR, JANUSVR

DISCUSSION

- As there are many abstract concepts in basic science, students not being able to visualize the concepts and thus become burden to understand them.
- It becomes need of the hour to change this perception about basic science, in order to progress through some new technologies.
- The aim of this study which explores virtual reality setup and tools to be used as one of the technologies to contribute towards learning of basic science through visualization.

CONCLUSIONS

VR promises to be very beneficial if applied in learning basic science. This paper may be proposed to motivate the students, the use of virtual reality to visualize the learning of basic science.

If the student is not clear in learning through visualizing through simulation (offline) and online lab, the student can reuse the experiment until the concept is clear.

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REFERENCES

- [1] Athanasios Tsakiris, Ioannis Filippidis, Nikos Grammalidis, Dimitrios Tzovaras and Michael G. Strintzis, Remote experiment laboratories using virtual Reality technologies: the VRLab project, 2005
- [2] Cengiz TÜYSÜZ, The Effect of the Virtual Laboratory on Students' Achievement and Attitude in Chemistry International Online Journal of Educational Sciences, 2010, 2 (1), 37-53
- [3] Dongfeng Liua,b,c, Priscila Valdiviezo-Díaza, Guido Riofrioa, Yi-Meng Sunb, Rodrigo Barbaa, Integration of Virtual Labs into Science E-learning, doi: 10.1016/j.procs.2015.12.224
- [4] Olusola, O. Rotimi, C.O., Attitudes of Students towards the Study of Physics in College of Education Ikere American International Journal of Contemporary Research, Vol. 2 No. 12; 2012
- [5] Moses O. Onyesolu, Virtual Reality Laboratories: An Ideal Solution to the Problems Facing Laboratory Setup and Management, WCECS 2009 (Vol 1)
- [6] <https://www.labster.com>, (Available online)
- [7] www.labinapp.com/, (Available online)