

# Introduction of the virtual lab in Physics class

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## ABSTRACT

Virtual laboratories are interactive, digital recreations of activities that are frequently carried out in real-world laboratory settings. At a laboratory level, scientists explore the agreement of the experimental data with the underlying theories. This interventional practice in the laboratory is part of scientific tradition and a particular feature of the internal logic of laboratory science. They are a key component of institutional initiatives to provide access to lab-based courses for more and various student populations as well as initiatives to create backup plans in the event of natural disasters or other disruptions to campus operations.

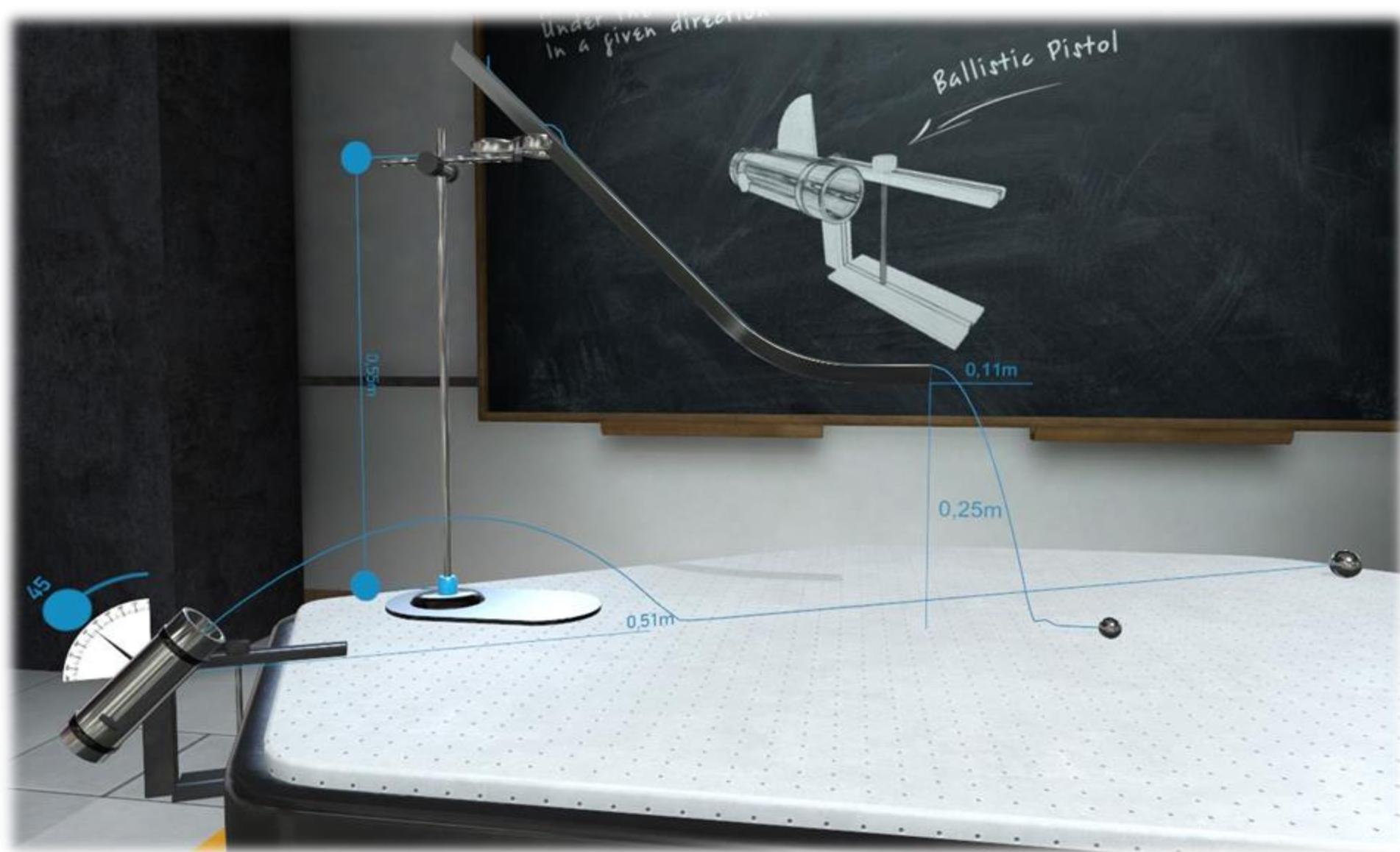


Figure 1: Virtual 3D laboratory

## OBJECTIVES

- ✓ This work proposes the introduction of virtual labs to the members of the education system as an alternative or a supplement to real labs.
- ✓ To provide the student with the chance to implement new technologies in his workflow and experiment safely with real-life situations.

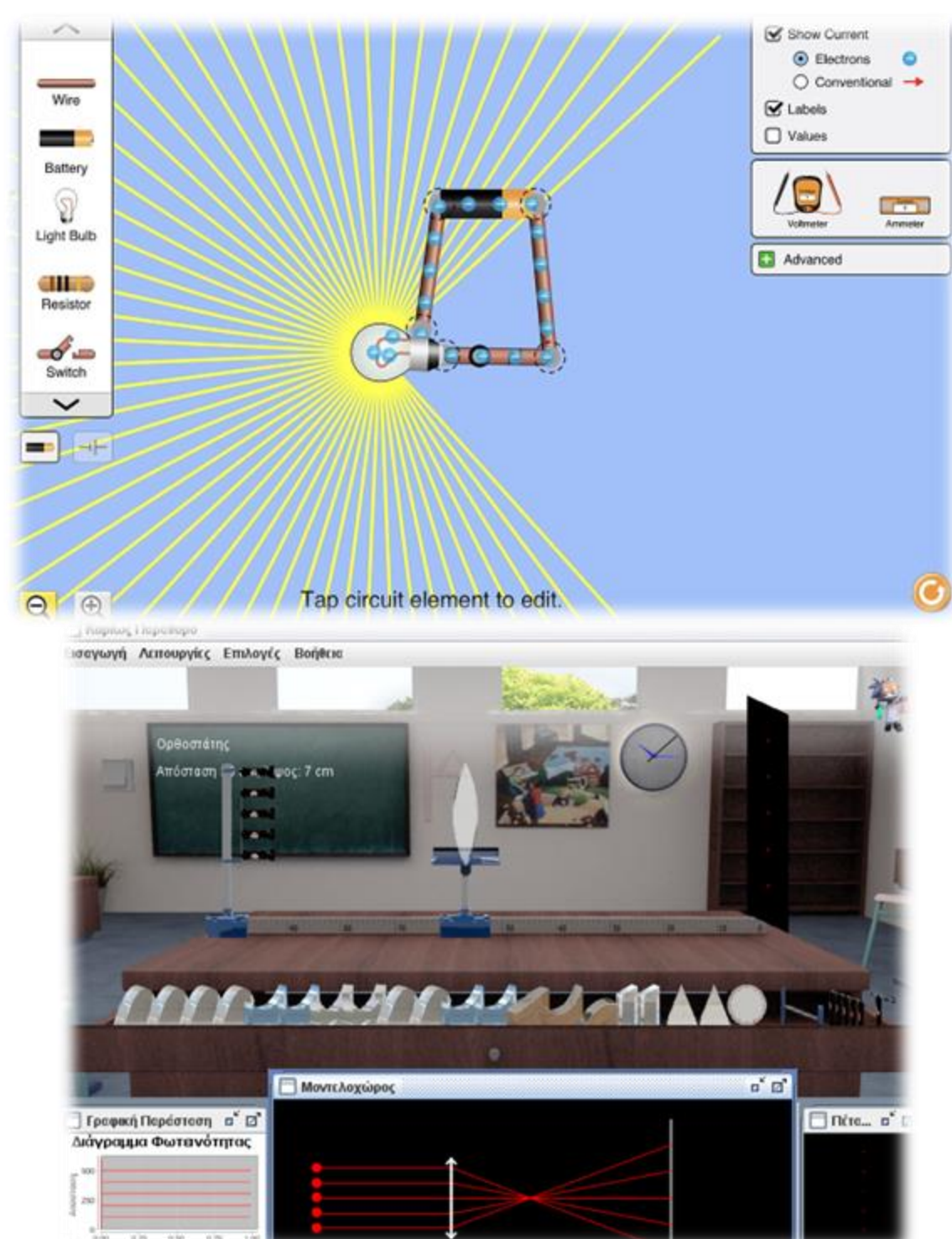


Figure 2: Computer simulated experiments

## TEACHING ACTIVITIES

Introducing such innovative ways of teaching needs delicate attention to the way that they will be introduced to physics professors. They will attend informative seminars so that they become competent to teach through virtual lab courses.

Furthermore, with the collaboration of the IT and physics departments, proper material-technical infrastructures will be deployed for the students to have access to it.

Finally, the students will conduct a series of experiments guided by their teachers in both labs and they will discuss their experience and they could combine these two methods



Figure 3: A typical physics lab representation

## CONCLUSIONS

Combining both physical and virtual laboratories is feasible. The student can conduct numerous experiments without any constraints on place or time, in contrast to the constraints of real labs. However, the hands-on approach is a superior way to comprehend fundamental physics principles. On occasion, the student understands specific concepts and experiments with numerous real-life variables using a simulation. Finally, when a student's attendance in a real-life course is impractical, a solid virtual lab ensures their education.

## REFERENCES

- Joseph Badillo, Gina Londino-Smolar, Philippos Savvides, EDUCAUSE Learning Initiative (2020)
- Anastasios Molohidis, Ioannis Lefkos, Athanasios Taramopoulos, Euripides Hatzikraniotis, Dimitrios Psillos, Web-based Virtual Labs (2015)

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