



Contribution ID: 312 Contribution code: S14-PEHPP-214

Type: **Poster presentation**

Introduction of the virtual lab in Physics class

Monday, 29 August 2022 18:00 (1h 30m)

Most physics professors would agree that laboratory experience is an important part of science education. Learning through experiments encourages students to bring scientific thinking to the processes of a strong, innovative, and logical path between concepts and phenomena. Virtual labs through computer simulation-based methods of studying physics happened to be one of the most powerful methods of experimentation in a lab recently during coronavirus. After the hands-on lab courses were replaced with their online lab counterparts numerous studies were conducted, to compare the two approaches and define their effectiveness.

First and foremost, the virtual labs provide a good alternative or supplement the traditional hands-on labs, while requiring significantly less amount of time and money for setting them up and maintenance. Furthermore, these types of labs ensure the students' safety when they are performing their experiments and negate the consequences in the case of missteps. On the other hand, learners who regularly complete their lab courses virtually lack the development of general intellectual skills that are extremely helpful in scientific activity. These abilities cover both fundamental abilities (such as estimating quantities, identifying errors, or using practical measuring procedures) and more complex (such as effectively describing experiments and flexibly adapting the resulting knowledge to different conditions. Furthermore, a scientist needs to have the experience of working in a team, which cannot be accomplished efficiently in virtual laboratories.

In this paper, we conclude that both, hands-on and virtual, labs can be used in combination. On some occasions, the student understands certain concepts and experiments with many real-life variables better through a simulation, though, the on hands approach is a better way at understanding basic concepts in physics. Finally, a good virtual lab guarantees the student's education when their presence in the real-life course is impossible.

Acknowledgements The corresponding author acknowledges the Research Committee of Aristotle University of Thessaloniki (RC-AUTH) for the financial support of the participation in BPU11.

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Session Classification: Poster session

Track Classification: Scientific Sections: S14 Physics Education, History and Philosophy of Physics