



USE OF AUGMENTED REALITY IN SCHOOL'S PHYSICS COURSE

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The development of computer-based informational technologies makes it possible to improve school education by introducing augmented reality technology to support the learning system and to attract pupils in active learning. The use of augmented reality technology is especially important in the study of physics, during the reproduction of physical phenomena in the condition that students are in the classroom [1].

Augmented reality (AR) is a technology that combines digital data with real world using computer devices like tablets, smartphones, and AR-glasses. The technology uses the environment as a base and adds digital elements to it, making it more user-friendly throughout the school's physics course.

Ukrainian education has not yet experienced widespread use of augmented reality, which is relatively new approach. This technology has several key advantages, including the ability to conduct complex experiments in a safe environment, studying phenomena in the virtual world, which enables more detailed study of it, and the modeling of microprocessors that occur during the experiment. Despite its advantages, there are some disadvantages that must be considered in the implementation of augmented reality in education. The most significant of these is the current lack of training for teachers as the use of the technology requires combining printed materials with digital elements, in other words, creating an author's lesson with a theoretical explanation (perhaps accompanied by video fragment) and elements of augmented reality. From this we can explore the second disadvantage – the presence of AR-technology supporting apps on tablets or smartphones [2,3].

The school's physics course's use of augmented reality cannot be completely transferred to the virtual world; the application should have a mixed character. The combination of video fragments of real experiments in specifically equipped laboratories and digital laboratory rooms to recreate previously shown experiments is the most accessible and effective way of studying physics.

The education market sees an increase in the number of interactive models and animations for physical experiments and phenomena every year. Both fully virtual laboratories and AR-applications are created [4]. Applications such as «Physics 3D Virtual Experiments» and «Spark Learning» create a three-dimensional laboratory model for experiments. The application designed by the Ministry of Education and Science of Ukraine, AR Book, receives more attention in Ukraine. The application is currently able to reproduce and observe physical phenomena and experiments from different fields such as optics, mechanics, kinematics, dynamics, electrodynamics, thermodynamics, and molecular physics, with reference to the tutorial page, which is activated when directed to it. There are also other applications for middle school course: «cg-physics AR», «Physics Lab AR», «e-Pathshala AR», as well as narrowly focused applications such as «Electricity AR», developed at the Department of



Crystal Physics of the Faculty of Physics of V. N. Karazin Kharkiv National University, for research and self-measurement (fig.1).

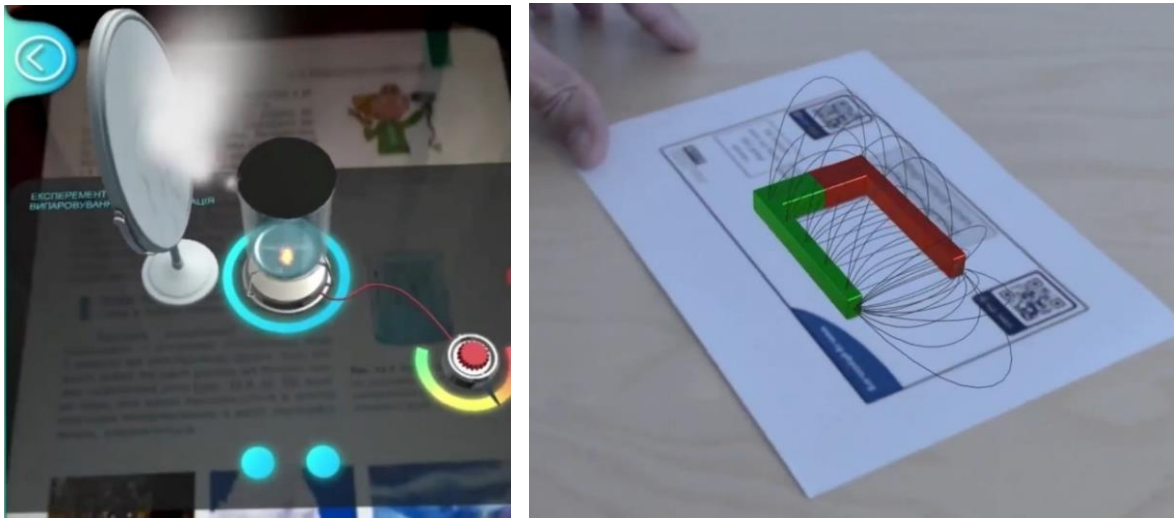


Figure 1 – AR-technology examples for AR Book (left) and «Electricity AR» (right)

Augmented reality technologies are increasingly included in educational programs that cannot be fully understood without visual representation. Particularly in physics the use of AR-technology allows not only combine paper calculations with computer verification, but also independently investigate known phenomena and experiments or to hold them. It was found that the use of augmented reality in education combines virtual and real experience, contributes to increasing the interest and attention of pupils to the school course [5]. Therefore, the use of AR-technology in the school's physics course may interest students in learning physics and improving their understanding of the subject.

References

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