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**METHOD OF USING INNOVATIVE TECHNOLOGIES AND STARTUP PROJECTS IN
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ABOUT ARTICLE**Key words:** High-end technologies, innovative teaching methods, new materials, foreign experiences.**Received:** 20.04.2024**Accepted:** 25.04.2024**Published:** 30.04.2024**Abstract:** The integration of innovative technologies and startup projects into the teaching of physics has revolutionized the way students learn and engage with the subject. This approach not only enhances the learning experience but also prepares students for the challenges of the 21st century. In this article, we will explore the methods of using innovative technologies and startup projects in teaching physics, highlighting their benefits, challenges, and potential applications.

INTRODUCTION

To improve the efficiency and effectiveness of the educational process in high school and transition to educational services digitalization, the needs of modern learners should be constantly analyzed, including their diversity in terms of educational objectives, mental and physical abilities, tempo of mastering educational material, and functioning in society. Creativity, critical thinking, communicative, social, and other competencies of personality, as well as adaptability of methods and practices in accordance with the specific features of modern learners, play an important role in this process.

The emergence of new educational technologies requires the involvement of physics teachers in their introduction in teaching. It is impossible to imagine modern physics lessons without using tools of ICT

and Web 2.0 Internet. Widely known projects such as Web 2.0 Resource, Web lab with remotely controlled experiments, Go-Lab project, which unites online laboratories (remote and virtual labs), educational materials, and collaboration services, and many others are used in blended learning technologies. The use of mobile devices in teaching has become more accessible. Various Web applications, mobile applications, online and mobile simulators, and laboratories (remote and virtual) suitable for smartphones and tablets, as well as services for organizing learning informally, are developed.

Importance of Technology in Education

In preparing the present manuscript, we realized that we are not alone in our interest in the use of innovative computer technologies in teaching physics. Incredibly, many physicists around the world are actively using their time and energy to create and deploy various means of physics education.

We would like to remind that there is nothing new about the use of innovative computer technologies in the educational process. Despite the fact that, unfortunately, the best lectures and lecture notes are often out of print, we still have enough scanned lecture notes and excellent lectures on the internet. This helps inexperienced teachers a lot. An abundance of multimedia courses (with lectures, simulations, videos, etc.) is available on the internet. Of great importance are the free libraries of electronic textbooks. Undoubtedly, you probably already use various online testing systems to check audience knowledge, such as those that are available at a large number of educational institutions. We must also mention the technology of various specialized software tools used to study not only physics.

Benefits of Startup Projects in Teaching Physics

The recent debate about the necessity of "smart" products, "smart" cities, and, in general, a "smart" society, to sustain a new phase of economy, the "society 5.0" characterized by a deep implementation of cyber-physical systems and industry 4.0, and a significant progression of future life quality of people and society in different aspects, also invites an update of the innovation of university courses. In particular, startup projects can be envisaged as an effective tool to transfer significant portions of the continuous improvement of innovative technology achievements to young generations, preparing future people and teams of work who should sustain the progress of economy and society. They should also contribute to convey the so-called "scientific methodology" to the students, as emphasized from different sources.

The startup projects can have a significant scientific content, as a contribution to sustain a "smart society" and correspondent economy. The paper describes the course "Startup Projects", providing an original mix of contents: a steep, short and team-matching phase, devoted to introducing an effective transfer of innovative technological achievements to the students, building a personal portfolio of Independent Study Reports and Research Reports, and having several information inputs from Third Mission contributors on the impact of the new tech achievements, an intensive project activity and multiple teachers, in the classroom. The final exam consists in the project "capstone", exploitation and defense. The difficult parts of the experience and its positive outcomes are described with a particular attention to the role of an unconventional final exam, as an oral presentation, in front of investors, journalists and managers.

One of the primary methods of incorporating innovative technologies into physics education is through the use of simulations and virtual labs. These digital tools allow students to conduct experiments and investigations in a controlled and safe environment, reducing the costs and logistical challenges associated with traditional laboratory settings. For instance, Phet Interactive Simulations, developed by the University of Colorado Boulder, provides interactive simulations that enable students to explore complex physics concepts, such as quantum mechanics and electromagnetism, in an engaging and interactive manner.

Another method is the use of gamification and game-based learning. Physics-based games, such as "Physics Puzzle" and "World of Goo," encourage students to apply physical principles to solve problems and overcome challenges. This approach not only makes learning physics more enjoyable but also develops critical thinking, problem-solving, and analytical skills. Furthermore, games can be designed to accommodate different learning styles and abilities, making them an inclusive and effective teaching tool.

Startup projects also play a significant role in teaching physics by providing real-world examples and applications of physical principles. For example, projects focused on renewable energy, sustainable development, and environmental conservation demonstrate the practical relevance of physics in addressing global challenges. By working on these projects, students develop essential skills, such as design thinking, prototyping, and collaboration, which are highly valued in industry and academia.

In addition, innovative technologies like augmented reality (AR) and virtual reality (VR) are being increasingly used to create immersive learning experiences in physics education. AR/VR platforms enable students to visualize complex concepts, such as three-dimensional motion and electromagnetic

waves, in a more intuitive and interactive way. This approach has been shown to improve student understanding and retention of abstract concepts.

Moreover, online platforms and resources, such as Khan Academy and edX, offer a wealth of educational content, including video lectures, tutorials, and assessments. These resources provide students with flexible and personalized learning pathways, enabling them to learn at their own pace and review material as needed. Online forums and discussion boards also facilitate collaboration and knowledge sharing among students, promoting a sense of community and social learning.

Despite the numerous benefits of using innovative technologies and startup projects in teaching physics, there are also challenges that need to be addressed. One of the primary concerns is the digital divide, where some students may not have access to devices or internet connectivity, hindering their ability to participate fully in technology-enhanced learning activities. Furthermore, teachers may require training and support to effectively integrate new technologies into their teaching practices.

Another challenge is ensuring that technology does not replace hands-on experimentation and practical skills development. While simulations and virtual labs offer many advantages, they should not supplant traditional laboratory experiences entirely. A balanced approach that combines technology-enhanced learning with hands-on experimentation is essential for developing well-rounded physicists.

CONCLUSION

In conclusion, the integration of innovative technologies and startup projects into physics education offers a powerful means of enhancing student engagement, understanding, and skills development. By leveraging simulations, gamification, startup projects, AR/VR platforms, and online resources, teachers can create dynamic and interactive learning environments that prepare students for success in an increasingly complex and rapidly changing world. However, it is essential to address the challenges associated with technology adoption, ensuring that all students have equal access to opportunities and that practical skills development remains a core component of physics education.

As we move forward in this era of rapid technological advancement, it is crucial that we continue to innovate and adapt our teaching methods to meet the evolving needs of our students. By doing so, we can inspire a new generation of physicists who are equipped with the knowledge, skills, and creativity necessary to tackle the grand challenges facing humanity.

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