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LE -ISME EN FRANÇAIS MODERNE

ШАНОВНІ КОЛЕГИ!



Рада привітати колектив міжнародного журналу “Věda a perspektivy” із виходом № 4(35) (2024).

На сторінках репрезентованому вашій увазі номеру «Věda a perspektivy» ви познайомитеся із питаннями щодо: вивчення моделей цифрової інформаційно-комунікаційної системи підтримки наукових досліджень на основі застосування практик відкрита наука, що передбачають використання нових підходів підтримки; аналізу механізмів державного регулювання розвитку малого підприємництва в умовах глобалізаційних викликів; розробки методичних положень, що дозволяють вирішити

проблему забезпечення комплексної інтегральної оцінки ефективності екологічної модернізації виробництва під час прийняття управлінських рішень щодо інвестиційних альтернатив; формування потенціалу PC Building Simulator для візуалізації та проектування комп’ютерних систем та ін.

Бажаю міцного здоров’я, миру, щастя, натхнення розвивати ідеї новаторського руху освітян, що визначені проблемними аспектами європейської трансформації науки!

Разом створюємо синергію перемоги!

З повагою,

**директор Видавничої групи «Наукові перспективи»,
кандидат наук з державного управління, доцент,
Лауреат премії Президента України для молодих вчених,
Лауреат премії Верховної Ради України
молодим ученим**

Ірина ЖУКОВА



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Mariia Medvedieva

*Candidate of Pedagogical Sciences, Associate Professor,
Head of the Department Informatics and Information and
Communication Technologies of the
Pavlo Tychyna Uman State Pedagogical University,
Uman, Ukraine,
<https://orcid.org/0000-0001-9330-5185>*

Vladyslav Yamkovenko

*A 4th year student of the Faculty of Physics,
Mathematics and Informatics of the
Pavlo Tychyna Uman State Pedagogical University,
Uman, Ukraine,
<https://orcid.org/0009-0009-6327-4504>*

APPLICATION OF PC BUILDING SIMULATOR FOR VISUALIZATION AND DESIGN OF COMPUTER SYSTEMS

Abstract. Traditional teaching methods, such as lectures and textbooks, often fail to ensure that students learn about computer hardware and software. It is difficult for students to visualize the interaction of components, to practically assemble a system, and to troubleshoot possible malfunctions. This article explores the potential of PC Building Simulator as a tool to overcome these limitations. PC Building Simulator is a computer assembly simulator that offers an interactive environment for visualizing 3D models of components, installing them in a virtual case, and testing the assembled system.

The article also analyzes the advantages and disadvantages of using PC Building Simulator in the educational process.

The advantages of using the PC Building Simulator include interactivity (allows you to visualize components, assemble/disassemble the system and test it), practicality (provides a safe virtual space for practicing PC assembly skills), accessibility (works on different platforms (PC, PlayStation, VR glasses)), activation of educational and cognitive activities (makes learning more interesting and exciting).

The disadvantages of using the PC Building Simulator include cost (the simulator and some components may be paid for), difficulty of understanding (may be difficult for beginners to understand), lack of real-world experience (cannot completely replace working with real components).

The study concludes that the PC Building Simulator is a powerful complement to traditional teaching methods. To achieve maximum effectiveness, the simulator should be used: in combination with traditional teaching methods; taking into account the level of training and interests of students; providing access to training materials and support from teachers.

The introduction of the PC Building Simulator can help students better understand the principles of computer operation, learn how to assemble a computer correctly, overcome their fear of assembly, and increase their motivation to learn.

Keywords: PC Building Simulator, immersive technologies, organization of the educational process, students, augmented reality, virtual reality, mixed reality, visualization, design, computer systems, computer assembly training, computer hardware and software.

Formulation of the problem. Despite the fact that IT technologies are evolving rapidly, knowledge of computer architecture remains important and relevant for many areas of the IT industry. After all, knowledge of computer architecture helps to better understand the technologies behind modern computers, processors, and microcontrollers. Understanding how hardware works helps to optimize programs and develop more efficient software, etc. However, traditional teaching methods, such as lectures and textbooks, do not always provide students with the opportunity to visualize computer components and their interconnections, to practically assemble a computer system, to identify and correct errors in computer assembly, etc.

PC Building Simulator can solve this problem by providing students with an interactive environment for visualizing 3D models of computer components, selecting and installing components in a virtual case, and testing the assembled system on a virtual test bench.

Using the PC Building Simulator can help students better understand the principles of computer operation, learn how to properly assemble a computer system, eliminate their fear of assembling a computer, and increase their motivation and interest in learning computer systems.

Analysis of recent research and publications. A number of scientific publications by domestic and foreign researchers are devoted to the use of VR and AR technologies in education. This problem has been studied by such scholars as S. Aleksov, A. Didyk, O. Slobodanyk, T. Hbranchak, L. Shkliar, J. Slupska, O Shkurenko, Y. Trach, N. Khmil, T. Halytska-Didukh, V. Tsiantzi, L. Titova, G. Tkachuk, O. Hrybiuk, Hsin-Kai Wu, Silvia Wen-Yu Lee, Hsin-Yi Chang, JyhChong Liang, Eric Klopfer, Kurt Squire, S. Yuen, G. Yaoyuneyong, E. Johnson, K. Lee, Yun Zhu, Hui Ye, Shukun Tang, S. Giasiranis and L. Sofos and others. However, the literature does not sufficiently describe the potential of PC Building



Simulator for visualization and design of computer systems and the advantages and disadvantages of its use in the educational process.

The purpose of the article: to explore the potential of the PC Building Simulator for visualizing and designing computer systems, as well as to analyze its advantages and disadvantages compared to traditional teaching methods.

Presenting main material. Computer hardware and software is one of the most important topics in the computer science curriculum. It allows students to understand how a computer works and learn how to assemble and repair it themselves.

Traditionally, this topic is taught through terminology using static teaching materials such as textbooks, presentations, and video tutorials. However, this approach is not always effective. Theoretical knowledge is difficult to learn without practical application.

When introducing the topic «Computer Hardware and Software» in the discipline «Computer Science» into the educational process, teachers use various methodological principles and learning tools that help students learn the terminology in depth and develop digital competencies. One of the most effective tools for teaching this topic is the PC Building Simulator application, which has a large arsenal of material and interactive activities that will contribute to the effective study of personal computer architecture in a school computer science course [1].

PC Building Simulator is a computer assembly simulator developed and published by The Irregular Corporation. The simulator was released in 2018 for Microsoft Windows, macOS, and Linux, and can also be downloaded on PlayStation, which allows the use of VR glasses. The game allows players to assemble their own PC from a wide range of components, including processors, motherboards, GPUs, memory, storage, and cooling systems.

Players can start with simple tasks, such as building a basic computer for a personal workstation or school, and move on to more complex ones, such as building a powerful gaming computer or a video editing workstation. The game also offers numerous tutorials to help students learn how to assemble a computer.

PC Building Simulator received positive reviews from critics who praised its realism and detail. The game was also a commercial success, selling more than 1 million copies.

PC Building Simulator has an easy-to-use menu (Fig. 1) that contains the following items:

- Career (career mode)
- IT Expansion (IT expansion)
- Workshops
- How to Build a PC
- Free Build



Fig. 1. The menu of the «PC Building Simulator» application

Career: the career mode in simulations involves a gameplay that focuses on completing tasks and moving the player through the game world (Fig. 2).

Players can manage their own computer assembly workshop. They receive different types of orders from virtual clients and perform tasks ranging from simple PC cleaning to complex situations when they detect a hardware malfunction. For each successfully completed order, the user receives money. With the help of funds, they can improve their workplace, buy new tools, expand the range of components, and upgrade the workshop. As the character progresses in the business, he can acquire new skills and opportunities (access to more complex tasks, new customers, or unlocking additional functions). The player is able to manage their stock and inventory and choose the best components for different tasks, taking into account the budget and customer requirements. Over time, you can improve your workshop, expand its area, attract more customers and grow your business.

The career mode adds elements of strategy and business management to the game, making it more dynamic and meaningful, as well as developing the financial literacy of students.



Fig. 2. Career progression in the PC Building Simulator application

IT Expansion: IT Expansion in PC Building Simulator is a new career mode that allows players to create and manage their own IT repair business. In this mode, players will accept repair requests from customers, diagnose and repair computers, and order new parts as needed. They will also have to manage their finances, hire employees, and develop their workshop. The IT expansion is a free update for PC Building Simulator, which was released on October 28, 2021.

Workshops: This feature allows the user to visit various workshops and maintenance centers where they can complete tasks and learn about various aspects of the game. By completing tasks in Workshops, the player can gain additional experience and improve their skills, which will facilitate more complex tasks in the future. Workshops add depth to the game by allowing the player to not only assemble computers, but also learn about a wide range of computer engineering and maintenance.

How to Build a PC: This is a great section for learning how to build a PC. It includes step-by-step instructions as well as tutorials. When you hover over and select computer components with the cursor, descriptive guides appear that illustrate the individual components of a particular PC component (Fig. 3). This section covers everything a user needs to know about building a computer, from selecting the right components to installing them in the case. It also provides troubleshooting tips if you encounter problems.

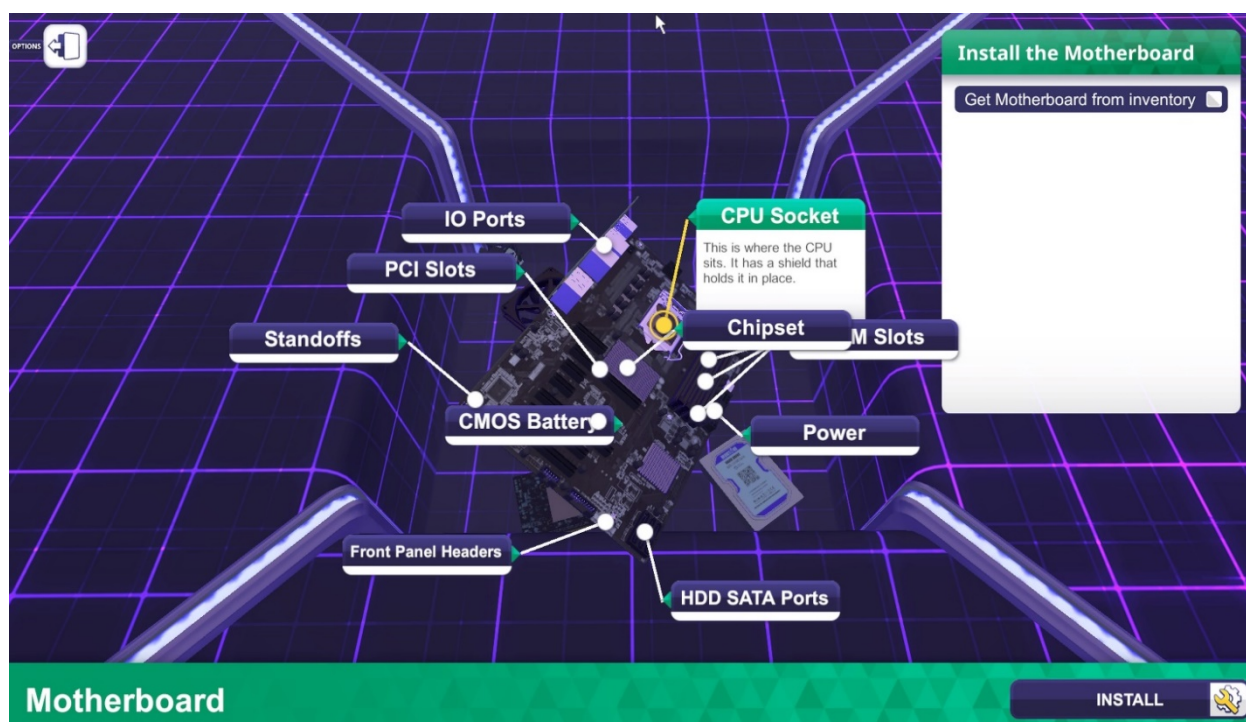


Fig. 3. Description of computer components in PC Building Simulator

Free Build: a «sandbox mode» that allows players to build their own PC without any restrictions. In this mode, the player has access to all the components in their inventory, tools, and upgrades. He can also overclock his computer and push it to its limits. The mode has no restrictions on parts or budget, the user can build the PC of their dreams, try different combinations of components to see what works best. Free Build is a great way to experiment with different components and configurations, to learn how to build a computer from scratch [10].

All in all, PC Building Simulator offers an immersive interactive experience for those who are not only interested in computer modernization and repair, but also want to learn the hardware component of a PC, allowing them to experiment with different configurations and technical solutions.

The use of a PC assembly simulator to teach the topic «Computer Hardware and Software» is an effective and interesting method for students (Fig. 4). The simulator allows you to teach the practical aspects of assembling and maintaining computers in a virtual environment, providing students with practical skills that can be easily transferred to the real hardware world.



Fig. 4. Assembling the system unit in the «PC Building Simulator»

The app also allows students to simulate different scenarios and interact with different components, making it an effective tool for learning hardware and software and expanding their understanding of how computers work. Teachers can monitor the learning process, correct mistakes, and provide personalized help if needed.

The use of a computer simulator helps to improve the quality of education for students in the field of computer hardware and software by providing real-world practical experience and the opportunity for a deeper understanding of the subject. This approach can be used in addition to traditional teaching methods or for self-study and provides students with a unique and interesting learning experience.

Conclusions. Thus, having analyzed the potential of PC Building Simulator for visualization and design of computer systems, as well as having considered its advantages and disadvantages compared to traditional teaching methods, we have come to the following conclusions.

The advantages of using the PC Building Simulator include interactivity, practicality of use, accessibility, and activation of educational and cognitive activities.

Interactivity means that the simulator makes it possible to visualize 3D models of computer components, assemble and disassemble a computer system, and test it on a virtual stand.

The practicality of the application allows students to gain hands-on experience in assembling and maintaining computers without risking damage to real components.

The simulator is available on a variety of platforms, including PC, PlayStation, and VR glasses.

Also, the simulator makes the learning process more interesting and exciting, which can increase the motivation of students.

The disadvantages of using the PC Building Simulator include cost, difficulty of understanding, and lack of real-world experience. Namely, the simulator and some of its components are paid, it can be difficult for beginners to understand, and the simulator cannot completely replace practical experience with real components.

So, PC Building Simulator is a powerful tool that can be used to visualize, design, and test computer systems. It can be an effective complement to traditional teaching methods, but it cannot completely replace them.

In view of the above, it is worth using PC Building Simulator in combination with traditional teaching methods, providing students with access to educational materials and support from teachers, and taking into account the level of training and interests of students when choosing tasks.

Using the PC Building Simulator can help students better understand the principles of computer operation, learn how to properly assemble a computer system, eliminate the fear of assembling a computer, and increase motivation and interest in learning computer systems.

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