

NEW TOOLS IN THE PRACTICAL TRAINING OF TECHNICAL UNIVERSITY STUDENTS

Summary

This research explores the implementation of digital tools in delivering practical and laboratory classes at a technical university, specifically among master's students specializing in computer science. The study reveals that remote and blended learning formats, supported by remote laboratories, simulation software, and cloud services, offer a flexible and effective approach to acquiring practical skills in programming and related disciplines. While students identified challenges such as difficulties in hands-on skill acquisition and self-management of study time, the overall experience was positive due to innovative pedagogical practices. The findings suggest that the effectiveness of remote education varies depending on the scientific discipline and emphasize the potential of immersive learning technologies for future application in engineering education.

Introduction. The impetuous spread of distance learning, which is taking place in parallel with the rapid development of information and communication technologies, was initially perceived as an expansion of human opportunities to receive high-quality education, being in the most remote parts of the globe. Today, despite a number of disadvantages of distance learning (Vynoslavska, 2015; Kalinicheva et al., 2020) and the harmful effects of ICT on human brains (Carr, 2020; Top 10 Negative Effects, 2021), the distance education continues its introduction into the educational process of universities, in particular technical ones (Vynoslavska, 2023; Melnychenko & Zheliaskova, 2021).

The goal is to highlight the peculiarities of the application of new tools to the delivering the

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practical and laboratory classes in technical university.

Research methods – interview, survey, writing essays by students on the peculiarities of the organization and technologies of delivering laboratory classes in professional disciplines, content analysis of the information provided by students.

The reliability and probability of the research results was ensured by the implementation of a systematic approach to the problem, using methods adequate to the goals and objectives of the research, representativeness of the sample, and quantitative and qualitative analysis of the data obtained.

The sample. The study was conducted among master's students of engineering specialties within the framework of their study of the academic discipline "Pedagogy of Higher School". Students of

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the Institute of Applied System Analysis and the Faculty of Biomedical Engineering (specialty 122 Computer Science) took part in the study.

The total number of respondents was 64 students, among whom, taking into account the specifics of the technical university, 87.5% were male and 13.5% were female.

Results and Discussion. Before starting the analysis of the data obtained, it should be noted that the conducted research aroused considerable interest among the students who participated in it. And that's why they tried to reflect in their essays all the positive aspects of the use of new tools by their teachers in the delivering practical and laboratory classes as much detail as possible. At the same time, students also pointed out some shortcomings.

Students who took part in writing essays noted that since the majority of professional disciplines in the specialty "Computer Science" are related to programming, the transition to distance education was exceptionally simple and, unlike the traditional format, less formalized and relieved of paper reporting. Respondents noted that teachers of professional disciplines creatively apply the advanced information technologies to deliver laboratory work in a remote format, in particular such as:

work in remote and online laboratories that allow students to conduct experiments remotely using real equipment controlled via the Internet (indicated by 80% of respondents);

Use of specialized software for simulating real experiments (indicated by 40% of respondents);

The use of computer simulation, the task of which is to simulate the remote control of any process or equipment (indicated by 28% of respondents);

Use of cloud services (indicated by 4% of respondents).

Among the positive features of learning in a remote format, students noted:

The possibility of asynchronous carry out of laboratory work (52%);

In case of questions, to communicate with the teacher through a chat in Google Class or in Telegram (24%);

To use chats or mail to exchange ideas, cooperation and teamwork (32%).

Among the shortcomings, students named difficulties in:

Gaining to practical skills (40%);

Limited opportunities to take into account the individual characteristics of students (28%);

Students' unpreparedness for independent planning and allocation of their own time under conditions of remote learning (48%). Similar results were obtained by the author in previous studies (Vynoslavska, 2015; Kalinicheva et al., 2020).

However, despite the shortcomings noted by the students, remote laboratory work in the field of computer science turned out to be not only a successful, but also an effective format, ensuring flexibility and accessibility of learning thanks to the teachers' creative approach to the applimentation of advanced information technologies.

In general, it can be stated that when studying disciplines related to computer programs and computer modeling, when it is not necessary to come to the laboratory and to assemble an electrical circuit diagram, when everything is done in a virtual environment, the training format does not play a significant role, because in this case practical skills of working with programs are formed in any format.

Conclusions. The expediency of using remote or mixed learning at the technical university is determined by the specifics of the scientific field in which students are educated. Remote delivering of laboratory classes in the field of computer science is an effective format that ensures flexibility and accessibility of learning thanks to the creative use of the advanced information technologies by teachers.

The author sees prospects for further research in studying the expediency of implementing the immersive learning in the training of students in various engineering specialties.

References

1. Винославська О. В. (2015). Вплив ІКТ на самоорганізацію і саморозвиток особистості. *Вища школа : Науково-практичне видання*, №2(127), 87–98.



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2. Калінічева Г.І. (наук. ред.), Бродецький О.Є., Винославська О.В. та ін. (2020). *Вища освіта України в контексті цивілізаційних змін та викликів: стан, проблеми, перспективи розвитку* : [кол. моногр.]. Київ: Фенікс, 2020. 400 с. <http://www.tsatu.edu.ua/vmf/wp-content/uploads/sites/17/20-077-block.pdf>
3. Carr N. (2020). *The Shallows: What the Internet Is Doing to Our Brains*. – W. Norton & Company; Updated edition. – 295 p.
4. Melnychenko, A. & Zheliaskova, T. (2021). Transformation of Educational Process in Covid-19 Pandemic: a Case of Igor Sikorsky Kyiv Polytechnic Institute. *Advanced Education*, Issue 18, p. 4-10. <https://doi.org/10.20535/2410-8286.237575>
5. Top 10 Negative Effects of Internet on Students. Retrieved January 17, 2023 from <https://www.stepbystep.com/top-10-negative-effects-of-internet-on-students-97334/>
6. Vynoslavka, Olena. (2023). Psychology of information and communication technologies users as a new research area. *Organizational Psychology. Economic Psychology*. №2-3(29), 6-14. <https://doi.org/10.31108/2.2023.2.29.1>