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The current state of international experience in the use of high-tech transport simulators

Abstract. The article analyzes the international experience of using in the educational process the technological capabilities of simulators used to train future specialists in various types of transport activities (aviation, for training pilots; navigation on water and sea transport; on rail and road transport, for specialties related to operational activities). The application of foreign simulators is studied in detail: for pilot training, which ranges from simple desktop systems to procedural, full-flight motor simulators; for training in the shipping industry, which allows you to get practical control experience on simulators, close to real conditions, supplemented by simulation modeling, both computer and manned modeling of electrically controlled models of vessels in the pool; for training of railway transport and underground, which in the context of the 2TRAIN project are divided into five types: software-based interface; a system for practicing certain skills; with partial cab; with a full replica cab without motion system with a full copy of the driver's cab with motion system. It is concluded that the training of qualified transport specialists should be formed adequately to the training tasks, select the complete set of the training simulator not randomly, but in accordance with the types of professional activity and qualification characteristics, building the training methodology.

Keywords: high-tech simulators, educational process, skills formation, personnel training.

References

1. Decree of the President of the Russian Federation "On the development of artificial intelligence in the Russian Federation" dated 10. 10. 2019 No. 490/ Official Website of the President of Russia www.kremlin.ru: [portal]. [Electronic resource]. Available at: http: www. kremlin. ru/acts/bank/33514 (accessed on: 10.10.2019)

2. Mukhametzyanov I. S. Digital space in education: expectations, opportunities, risks, threats . Russia: trends and prospects of development. Yearbook. Issue 15. Materials of the XIX National scientific Conference with international participation Modernization of Russia: priorities, problems, solutions, ed. V. I. Gerasimov. Moscow: INION RAS, 2020, part 1, pp. 571–574.

3. Robert I. V. Axiological approach to the development of education in the digital paradigm. Pedagogical informatics, 2020, no. 2, pp. 106–142.

4. Robert I. V. Directions of development of informatization of domestic education in the period of digital information technologies. Electronic libraries. Thematic issue Mathematical education in school and university, 2020, vol. 23, no. 1-2, part 3, pp. 145–164.

5. Shikhnabieva T. Sh. Methodology of formalization and representation of knowledge in intellectual learning systems. Moscow: iuo RAO, 2017.

6. Tischer E., Nachtigall P., Široký J. (2020) The use of simulation modelling for determining the capacity of railway lines in the Czech conditions [Electronic resource]. Open Engineering, 2020, vol. 10, issue 1, pp. 224–231. DOI: https://doi.org/10.1515/eng-2020-0026 Available at: https://www.degruyter.com/view/journals/eng/10/1/article-p224.xml?language=en (accessed 10.12.2020).

7. Laukkanen S.,Lehto P., Lauronen J., Luimula M., Markopoulos E. (2019) Maritime Safety Education with VR Technology. Future internet. [Electronic resource]. Available at: https://www.researchgate.net/publication/336892334_future_internet_Evangelos_Markopoulos_Jenny_Lauronen_Mika_Luimula_Pihla_Lehto_and_Sami_ (accessed 10.12.2020).

8. Papa S., Lanzotti A., Di Gironimo G., Balsamo A. (2018) A new interactive railway virtual simulator for testing preventive safety. Computers in Railways, XVI, pp. 367–378. DOI: 10.2495/CR180331. Available at: https://www.researchgate.net/publication/328643873_a_new_interactive_railway_virtual_simulator_for_testing_preventive_safety.

9. Oberhauser M., Dreyer D., Braunstingl R., Koglbauer I. (2018). What's real about virtual reality flight simulation? Comparing the fidelity of a virtual reality with a conventional flight simulation environment [Electronic resource]. Aviation Psychology and Applied Human Factors, vol. 8 (1), pp. 22–34. Available at: https://doi.org/10.1027/2192-0923/a000134 (accessed 10.12.2020).

10. Trinon H. (2019) Immersive technologies for virtual reality – Case study : flight simulator for pilot training [Electronic resource]. Available at: http://hdl.handle.net/2268.2/6443 (accessed 10.12.2020).

11. Aslandere T., Dreyer D., Pankratz F., Schubotz R. (2014) Generic Virtual Reality Flight Simulator [Electronic resource]. Available at: https://www.researchgate.net/publication/312170014_A_Generic_Virtual_Reality_Flight_Simulator (accessed 10.12.2020).

12. Robert I. V. Prospects for the use of immersive educational technologies. Pedagogical informatics, 2020, no. 3. pp. 141-159.

13. YavrucukI lkay, Kubali Eser, Tarimci Onur (2016) A Low Cost Flight Simulator Using Virtual Reality Tools [Electronic resource]. IEEE Aerospace and Electronic Systems, 2016, vol. 26, pp. 10–14. DOI: 10.1109/MAES.2011.5763338. Available at: https://www.researchgate.net/publication/252060342_A_Low_Cost_Flight_Simulator_Using_Virtual_Reality_Tools (accessed 10.12.2020)

14. Newell A., Rosenbloom P. S. (1980) Mechanisms of skill acquisition and the law of practice. Department of Computer Science, Carnegie-Mellon University Pittsburgh, Pennsylvania 15213, to be published in Anderson, J. R. (Ed), Cognitive Skills and their Acquisition, HQlsdale, NJ: Eribaum, in press. [Electronic resource]. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.910.5264&rep=rep1&type=pdf (accessed 10.12.2020).

15. Sharma M. K. (2020) Augmented Reality Navigation. International Journal of Engineering Research and technology, vol. 9 (06), pp. 670–675. [Electronic resource]. DOI: 10.17577/IJERTV9IS060441 Available at: https://www.researchgate.net/publication/342383348_Augmented_Reality_Navigation (accessed 10.12.2020).

16. Christie R. (2001) The Effectiveness of Driver Training as a Road Safety Measure: A review of the literature. Prepared for RACV, 2001. [Electronic resource]. Available at: https://www.racv.com.au/content/dam/racv/images/public-policy/reports/2016%20- %20The %20effectiveness%20of%20driver %20training.pdf (accessed 10.12.2020).

17. Lukas U., Vahl M., Mesing B. (2014) Maritime Applications of Augmented Reality – Experiences and Challenges. In: Shumaker R., Lackey S. (eds) Virtual, Augmented and Mixed Reality. Applications of Virtual and Augmented Reality. VAMR 2014. Lecture Notes in Computer Science, vol. 8526, Springer, Cham. [Electronic resource]. Available at: https://doi.org/10.1007/978-3-319-07464-1_43 (accessed 10.12.2020).

18. Markopoulos E., Luimula M. (2020) Immersive safe oceans technology: developing virtual onboard training episodes for maritime safety. Future Internet, 2020, vol. 12, p. 80. DOI: 10.3390/fi12050080. [Electronic resource]. Available at: https://www.researchgate.net/publication/340984119_Immersive_Safe_Oceans_Technology_Developing_Virtual_Onboard_Training_Episodes_for_Maritime_Safety (accessed 10.12.2020).

19. Vasilijević A., Borović B., Vukić Z. (2017) Augmented Reality in Marine Applications. Brodogradnja, 2017, no. 2, pp. 136–142. [Electronic resource].Available at: https://www.researchgate.net/publication/286882399_Augmented_Reality_in_Marine_Applications (accessed 10.12.2020).

20. Digital ships project supporting business finland to drive faster export success by improving insight on trends. Frost & Sullivan, Team Finland Market Opportunities [Electronic resource]. Available at: https://www.businessfinland.fi/49e303/globalassets/finnish-customers/02-build-your-network/digitalization/smart-mobility/future-watch_digital-ships-report.pdf (accessed 10.12.2020).

21. Naweed A. (2013) Simulator integration in the rail industry: the Robocop problem. Proceedings of the Institution of Mechanical Engineers. Journal of Rail and Rapid Transit, part F, 2013, no. 227 (5), pp. 407–418. [Electronic resource]. Available at: https://journals.sagepub.com/doi/abs/10.1177/0954409713488365 (accessed 10.12.2020).

22. Scmitz M., Maag C. (Eds.) (2008). Benchmarking report on computer-based railway training in Europe. 2TRAIN Project report. [Electronic resource]. Available at: https://www.cdcargo.cz/documents/10179/827499/2TRAIN_Benchmarking_Report_on_computer-based_Railway_Training_in_Europe. pdf/ffedface-d1d1-4369-bdea-721e472ac015 (accessed 10.12.2020).

23. Simulator for professional training of locomotive operators and maintenance personnel. Google Patents. Application RU2015114910/11А. Inventor: А. М. Базюк, В. В. Висков, А. В. Гурьянов, А. Е. Шухин. [Electronic resource]. Available at: https://patents.google.com/patent/RU2596042C1/en (accessed 10.12.2020).

24. Petrenko V. (2016) Simulation of railway vehicle dynamics in universal mechanism software. International Scientific Conference Transbaltica, Vilnius, Lithuania. Procedia Engineering, 2016, vol. 134, pp. 23–29. [Electronic resource]. Available at: https://www.sciencedirect.com/science/article/pii/S1877705816000369 (accessed 10.12.2020).

25. D'Ariano A., Corman F., Fujiyama T., Meng L., Pellegrini P. Simulation and optimization for railway operations management. Journal of Advanced Transportation, vol. 2018, article ID 4896748. [Electronic resource]. Available at: https://www.hindawi.com/journals/jat/2018/4896748/ (accessed 10.12.2020).

26. Hindawi, Meng, Lingyun, Cui, Yong, Martin, Ullrich, Liang, Jiajian. Simulation Tool for Railway Planning and Operations. Journal of Advanced Transportation, 2018. [Electronic resource]. Available at: https://www.railwaygazette.com/news/training-signallers-through-simulation/31008.article (accessed 10.12.2020).

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