

## THEORETICAL AND METHODOLOGICAL ASPECTS OF USING INFORMATION AND COGNITIVE TECHNOLOGIES IN THE TRAINING OF TRANSPORT SPECIALISTS

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DOI: 10.32342/2522-4115-2024-1-27-20

**Keywords:** *Information technologies, cognitive technologies, digital technologies, transport specialty students, educational process in higher education institutions, cognitive models, cognitive learning, cognitive teaching.*

*The article addresses how to improve the professional training of specialists in the transport industry using information and cognitive technologies.*

*The **article aims** to study and explain the problems, opportunities, and prospects of implementing and using information and cognitive technologies in the educational environment, as well as the specifics of their implementation for teaching and learning in educational and professional programs for the transport specialists' training.*

*The following **methods** of semantic and comparative analysis, classification, generalization, and systematization, as well as competency-based, technological, and creative development **approaches** were used in the research.*

*It has been found that cognitive technologies in the context of teaching and learning involve the use of methods and tools, which are based on understanding and activating cognitive processes such as thinking, memory, and attention. In cognitive learning, the educational process focuses not on absorbing information but on understanding the internal connections of the studied subjects, which encourages students to engage in dialogical, exploratory thinking, and increases mental activity concentration. By complementing information technologies with cognitive ones, which take into account the individual and general cognitive students' abilities, it is possible not only to encourage professional training but also to enhance the overall cognitive efficiency of future specialists. For educators, these technologies facilitate the use of ICT as cognitive tools for transitioning from traditional teacher-centred methods to constructivist student-centred approaches.*

*It has been established that information-cognitive technologies combine methods and algorithms based on insights into the cognition processes, learning, communication, and information processing, grounded in the achievements of neuroscience, digital and information technologies, and the mathematical modelling of consciousness. In the educational process, they are designed to support students in setting and solving creative tasks that are difficult to formalize, as well as to reveal and effectively operate their cognitive potential.*

*In the professional training of students, certain information-cognitive technologies can be applied both with and without the use of computer systems. These include technologies for developing critical thinking, creatively developmental technologies, project technologies, foresight methodologies, problem-based learning technologies, mastery learning technologies, mental activity activation technologies, case studies, gaming technologies, visualization and data representation technologies, and learning through practice.*

*Additionally, the use of multimedia technologies, scribing, virtual and augmented reality, project technologies based on networking, gamification, interactive technologies, primarily group work technologies, open, distance, and blended learning technologies, and also the Internet of Things, Blockchain, Big Data, expert systems, SMART technologies, and artificial intelligence significantly enhances the quality of training students in proficiency transport area.*

*It has been **concluded** that information and cognitive technologies provide interactive, personalized, and practically oriented learning, contribute to the development of student's critical thinking, and for future transport specialists can optimize logistics processes, automate diagnostics, repair, and operation of vehicles, in addition, increase the specialist's adaptability to the complex conditions of the modern and future professional environment.*

## References

Ausubel, D.P. The use of advance organizers in the learning and retention of meaningful verbal material. *Journal of Educational Psychology*, 1960, no 51, pp. 267–272.

Buzan, T., Buzan, B. (1994). *The mind map book: how to use radiant thinking to maximize your brain's untapped potential*. London, Penguin Book Ltd, 322 p.

Bykov, V.Yu. (2019). Digital transformation of society and development of the computing and technological platform of Ukrainian Education and Science. *Materialy naukovo-praktychnoi konferentsii "Informatsiino-tyfrovoyi osvittii prostir Ukrayiny: transformatsiini protsesy i perspektyvy rozvytku"* [Proc. Scien. and Pract. Conf. "Information and digital educational space of Ukraine: transformational processes and development prospects"]. Kyiv, pp. 20–26. (In Ukrainian).

Carroll, J. (2023). Knowledge velocity. Available at: <https://jimcarroll.com/2022/12/23-trends-for-2023-8-knowledge-velocity/> (Accessed 10 March 2024).

Chuvasov, M. Formuvannya hotovnosti maibutnikh uchyteliv do vykorystannia informatsiino-kohnitynykh tekhnolohii yak faktor rozvytku yikh profesionalizmu ta maisternosti [Forming the readiness of future teachers to use information and cognitive technologies as a factor of their professionalism and skills development]. *Bulletin of the Cherkasy Bohdan Khmelnytsky National University. Series "Pedagogical Sciences"*, 2020, no. 3, pp. 164–169. doi: 10.31651/2524-2660-2020-3-164–168 (In Ukrainian).

Desiatko, A., Khorolska, N., Chubaievskyi, V. Cognitive technology for the formation of competencies of students in the study of natural science subjects. *Electronic Professional Scientific Journal «Cybersecurity: Education, Science, Technique»*, 2024, vol. 3, no. 23, pp. 237–245. doi: 10.28925/2663-4023.2024.23.237245 (In Ukrainian).

Ivanova, H.I., Lavrentieva, O.O. Eivas, L.F., Zenkovych, I.O., Uchitel, A.D. (2020). The students' brainwork intensification via the computer visualization of study materials. *Proc. Scien. and Pract. Conf. "7th Workshop on Cloud Technologies in Education (CTE 2019)"*, vol. 7, pp. 185–209. doi: 10.55056/cte.346

Kohnityvna hrafika [Cognitive graphics]. (2024). *Entsyklopediia praktychnoi psykholohii* [Encyclopedia of practical psychology]. Available at: <http://psychologis.com.ua/kognitivnaya-grafika.htm> (Accessed 10 March 2024). (In Ukrainian).

Kovalchuk, V., Androsenko, A., Boiko, A., Tomash, V., Derevyanchuk, O. Development of pedagogical skills of future teachers of labor education and technology by means of digital technologies. *International Journal of Computer Science and Network Security*, 2022, no. 22 (9), pp. 551–560. doi: 10.22937/IJCSNS.2022.22.9.71

Krasiuk, I., Udriš, I. The concept of information and cognitive environment as a methodological basis of the future teachers' professional training in the conditions of the higher educational institution's activities. *Bulletin of Alfred Nobel University. Series: Pedagogy and Psychology*, 2022, no. 2(24), pp. 151–158. doi: 10.32342/2522-4115-2022-2-24-16 (In Ukrainian).

Krupskyi, O., Redko, V. (2017). The Influence of the employee's cognitive working style on the emotional labor outcomes in tourism firms. *Bulletin of Taras Shevchenko National University of Kyiv. Economics*, no. 6(195), pp. 11–18. doi: 10.17721/1728-2667.2017/195-6/2

Lavrentieva, O., Shabanov, S. (2023). Information and cognitive technologies as a modern educational trend and social innovation. *Proc. Scien. and Pract. Conf. "Theory and Practice of the Expert's Professional Formation in the Innovative Sociocultural Area"*. Dnipro, Alfred Nobel University Publ., pp. 211–219.

Mhlongo, S., Mbatha, K., Ramatsetse, B., Dlamini, R. Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Systematic Review and Meta-Analysis*, 2023, vol. 9, issue 6, E-16348. doi: 10.1016/j.heliyon.2023.e16348

Nesterova, N. Informatsiino-kohnityvni tekhnolohii v systemi vyshchoi osvity suspilstva znan [Information and cognitive technologies in the higher education system of the knowledge society]. *Higher Education of Ukraine*, 2015, no. 1, pp. 40–45. (In Ukrainian).

Novak, J.D., Canas, A.J. Theoretical origins of concept maps, how to construct them, and uses in education. *Reflecting Education*, 2007, vol. 3, no. 1, pp. 29–42.

Pavlenko, O., Lavrentieva, O., Velykodnyi, D., Filatov, S. (2020). The procedures of logistic transport systems simulation in the Petri Nets environment. *Proc. Scien. and Pract. Conf. "ICT in Education, Research and Industrial Applications. Integration, Harmonization and Knowledge Transfer"*, vol. 2732, pp. 854–866. Available at: <http://ceur-ws.org/Vol-2732/20200854.pdf> (Accessed 10 March 2024).

Rouse, M. (Ed.). (2018). Cognitive Technology. *Techopedia*. Available at: <https://www.techopedia.com/definition/32482/cognitive-technology> (Accessed 10 March 2024).

Skitsko, O., Skladannyi, P., Shyrshov, R., Humeniuk, M., Vorokhob, M. Threats and risks of the use of artificial intelligence. *Electronic Professional Scientific Journal «Cybersecurity: Education, Science, Technique»*, 2023, vol. 2, no. 22, pp. 6–18. doi: 10.28925/2663-4023.2023.22.618 (In Ukrainian).

Skulmowski, A., Xu, K.M. Understanding cognitive load in digital and online learning: a new perspective on extraneous cognitive load. *Educational Psychology Review*, 2022, vol. 34, pp. 171–196. doi: 10.1007/s10648-021-09624-7

Stafyeyeva, L., Bogodistov, Y. (2024). Blockchain-powered micro-credentials in higher education institutions: prospect manipulation. *Proc. Scien. and Pract. Conf. "Theory and Practice of the Expert's Professional Formation in the Innovative Sociocultural Area"*. Dnipro, Alfred Nobel University Publ., pp. 200–204.

Talkhabi, M., Nouri, A. Foundations of cognitive education: Issues and opportunities. *Procedia – Social and Behavioral Sciences*, 2012, vol. 32, pp. 385–390. doi: 10.1016/j.sbspro.2012.01.058

Vorobiova, V.V., Krupskyi, O.P., Stasiuk, Y. The role of digital technologies in modern trade: A study of global trends and prospects for Ukraine. *Economic Journal Odessa Polytechnic University*, 2023, no. 2(24). doi: 10.15276/EJ.02.2023.5

Wang, S., Hsu, H., Reeves, T.C., Coster, D.C. Professional development to enhance teachers' practices in using information and communication technologies (ICTs) as cognitive tools: Lessons learned from a design-based research study. *Computers & Education*, 2014, vol. 79, pp. 101–115. doi: 10.1016/j.compedu.2014.07.006

Одержано 18.03.2024.