

## **TRANSFORMING MARITIME EDUCATION FOR A DIGITAL INDUSTRY**

**Dr. Christiana Atanasova, Assist. Prof.**

*Nikola Vaptsarov Naval Academy*

**Abstract.** In recent years, the application of digital technologies in education has been increasing to improve the efficiency of the educational process. The goal is to increase the effectiveness of the educational process through modern technologies, which include not only technical means supporting the teaching and learning process but also pedagogical methods, concepts, and forms of training.

In this regard, that article aims to present an educational practice related to innovative methods based on digital solutions integrated into the educational process. Specifically, it focuses on the analysis of the AXSMarine digital solution, chosen for its significance and impact on maritime education. AXSMarine offers a wide range of maritime data and analytics, making it a valuable tool for students and professionals in the maritime industry. The article highlights its relevance in enhancing the educational experience and preparing students for successful careers in the maritime field.

*Keywords:* maritime transport; educational process; commercial management; digitalization

### **Introduction**

Universities are part of the top centers of competence, which means part of the strategic guidelines for intelligent development. If until now we were looking for options for how education could respond to rapidly developing high technologies, today we are already looking for opportunities to fit education into cloud technologies and the creation of artificial intelligence and supercomputers. At first glance, this is a challenge, but viewed from the position of the process of consistency and upgrading of knowledge, skills, and competencies in recent years, it can be defined as a systematic, logical, and consistent development. The prerequisites for such development were created in a theoretical aspect, but achievements were reported only in individual universities that lead the rankings in the rating schemes (Stopford 2009). Higher education, in its systematic nature, has always developed in the various fields of science and has made a change aimed at preparing specialists for different professional positions in industry and all related fields.

In a period of deep social changes, the interest in innovation and the development of human potential, even more, the student in the field of higher education to create innovations is especially intensified. From an educational point of view, the shifting of the value layers requires the search for new educational models, policies, and practices, which in essence are also pedagogical innovations to guarantee the development of competence for innovation in learners. Digital technologies change not only people's lives but also require different approaches and methods for education and training (Fedotova, et al. 2019, Narleva, Gancheva 2023). More and more is relied not only on computerized means but also on the creation of a new environment to achieve higher motivation of learners and build competencies to deal with ever-changing technologies (Dimitrakiyev, Conev 2020). For every teacher today, it is a big challenge how to capture the attention of students in the learning process, which also requires a change in the methodology, so it is always fascinating. According to some authors, knowledge is gained through own experience and the experience of the environment, and to acquire real knowledge it is necessary for the learner to actively participate in the experience; to reflect on it; possess and use analytical skills to arrive at generalizations; to have decision-making skills in solving problems using new knowledge, ideas, information gained from experience (Moss 2007). Today, the "Age of Digitalization" inevitably affects almost every area on the public agenda and offers new transformational processes leading to the necessary change (Rosillo 2020). The education sector is also subject to a serious digital transformation, including technological and technical. With each passing day, technologies offer newer and more perfect scalable solutions for accessing and exchanging information. Higher education, as an institution that guarantees sustainability in development, cannot be bypassed by technological innovation processes. Based on them, it is possible to use not only traditional scientific research methods but to introduce new ones that have more advantages and are not conditioned solely by reference-informational sources, providing information arrays that are limited and often archaic for their time.

### **Analysis**

Globalization processes reveal diverse and attractive opportunities for the organization of teaching activities and allow an unlimited exchange of knowledge. Most world authors consider the alternative form of education to be the most applicable. Its essence can generally be characterized by free access to unlimited arrays of information, which, according to the instructions of the teachers, the students can use and, accordingly, an unlimited amount of knowledge that they can obtain. All the mentioned problems can be solved by using digital platforms for cognitive learning with a continuous objective assessment of the individual development of each student. The innovation in the proposal

consists in the cognitive training methods, which will use the capabilities of a teacher-managed virtual platform for students to gain knowledge and experience through the conscious processing of information from their environment (Conev, Dimitrakiev 2023; Tsonev 2021). Cognitive methods that can be successfully implemented in a controlled learning virtual platform, for example, are thinking in context, analogy, deduction and induction, decision-making models based on reasoning and evaluation, decision-making under uncertainty, and explicit and implicit decision-making. But the list does not end with that. During the learning process, competition should be created between students to naturally stimulate their desire for development and self-affirmation. Still, the theory is informed by practice, and practice learns not to allow weaknesses in the foundation of theory. Particularly significant in the context of the training process is AXSMarine, which provides an opportunity to harmonize the educational process with a smooth implementation of the trainee in practice. Cargo carried by sea is a complex process with many participants from different countries and continents (Gancheva, Dimitrakiev 2015). Using the digital platform, students have access to real-time market information (Sterev 2023, Dimitrakiev et al. 2023). Take iron ore carriages for illustration (see Fig.1). Slow Q3 turns out strongest quarter for Iron Ore in 2022. In August and September, global Iron Ore flows regressed by 3.6% and 4.3% year-over-year, respectively. With about 134.5m MT discharged worldwide in August and 123.9m MT in September, both values represented their lowest levels for each respective month over the past 5 years (AXSMarine reports, 2022).



**Figure 1.** Global seaborne iron ore flows, AXSMarine

Nevertheless, strong performance in July meant that, after totaling just under 392.4m MT, Q3 was the most prolific regarding quantities shipped so far in 2022 (AXSMarine reports, 2022). Students have the opportunity to check out a much more detailed breakdown of Iron Ore flows throughout these past three months including data about origin, destination, and fleet utilization.

One of the key factors fueling the growth of the market, apart from the increase in trade agreements, is the increase in demand for cargo transportation through ships. The outbreak of the coronavirus disease has severely affected the container market due to the complete lockdown in many countries and the temporary shutdown of production units of various businesses. The need to transport various pharmaceutical products to different parts of the world is increasing significantly. This, combined with increasing investment in drug development and manufacturing of various healthcare products, is intensifying the competitive environment in the industry. Moreover, the increasing adoption of IoT-connected devices by major shipping companies supports the collection of a large amount of data throughout the entire shipping process. These tools are used to reduce downtime and streamline various procedures, thereby improving operational efficiency in the maritime industry (Velinov, 2013; Biolcheva, Valchev 2023).

AXSDry Plus gives more insights at hand, such as the last three ports visited by each vessel, the last two voyages completed, and last three cargoes carried (see Fig.2).

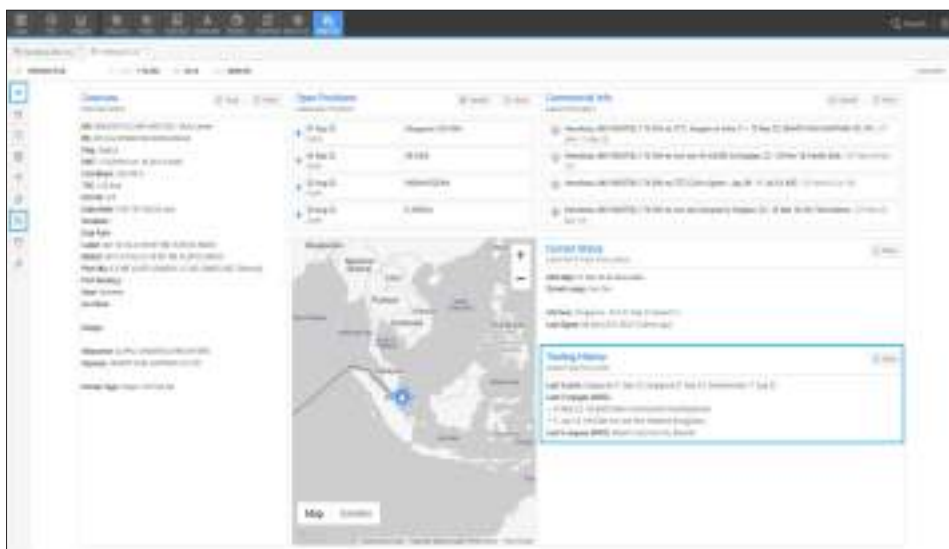


Figure 2. AXSDry Plus, AXSMarine



**Figure 3.** Coal analysis, AXSMarine

Each report includes detailed breakdowns by key exporters, and importers, year-over-year statistics, cargo quantities, and TonMile analyses (see Fig.3 and Fig.4). The platform provides a solution for dynamic freight search, cargo-to-ship, and ship-to-cargo matching, tendering, and trading.



**Figure 4.** Grain analysis, AXSMarine

The lecturers, in turn, also take part in the process by guiding the students in their learning and development, giving them challenges in the form of cases to

solve, giving them access to the necessary knowledge, and encouraging them to absorb this knowledge to solve the cases (Plomaritou, Papadopoulos 2018). By observing their actions, the lecturer can interactively and dynamically change the conditions of the case by simulating certain conditions and leading the students to solve the case (Chen, Ballou, 2021). In this way, the lecturer stimulates students to acquire new knowledge, such as technical analysis for decision-making in an uncertain environment (see Fig.5).



**Figure 5.** Education and training, AXSMarine

To provide a solution to ongoing negotiations, trade, and performance analytics, the commercial fleet operation instructor assigns students specific case studies to solve (Gancheva 2021, Lam, et.al, 2020). For example, it is claimed that depending on distance and speed, fuel savings can reach up to (3 – 5) % of the ship's total costs. But the actions of operating the ships with always reduced speeds are not optimization procedures, as is unfoundedly claimed in some of the literature sources. At higher speeds, the increased fuel costs and the additional income from the

reduction of the voyage duration are calculated (Plomaritou, Nikolaidis 2016, Ship operation and management, 2017). At lower speeds, fuel economy is realized, but additional costs are incurred from the delay. Learners must analyze the cash flows of the various options and make a win-win decision (Zárate, 2009, Visvikis, Panayides 2017). The algorithm provided by the digital platforms easily and quickly processes information in real-time mode, thereby facilitating this winning decision. The pedagogical appeal of the implementation of digital platforms in the learning process is its ability to promote increased critical thinking skills, a deep approach to learning, and the development of an adaptable knowledge base to be used in the professional sphere (Molodchik, Dimitrakiev 2018, Cooke, Kimball 2014). The innovativeness of this approach has several different essential aspects, but above all, it must be known that it affects and places learners in a new environment. This is the first and perhaps the most essential consideration for the success of such a project. On the one hand, the innovation consists in placing the learners in conditions radically different from the sterile academic environment. On the other hand, the technology itself is innovative as it is constantly evolving. Dealing with it inculcates in students both a taste for teamwork and responsibility for one's contributions and actions (Gramchev et al. 2023). Undoubtedly, innovations in education will allow us to intensify and improve the learning process at a pace unknown until now.

### **Conclusions**

The article has attempted to provide an analysis of existing information on the need for the use of digital technologies in modern education and training. From the implementation of digital platforms in the learning process, the following conclusions can be formulated:

- Traditional educational practices are supplemented;
- The deepening of knowledge in a certain area is facilitated;
- Critical thinking develops;
- The skills for independent work and teamwork are developed.

Of course, technology evolves and many of the cons can be turned into pros over time, such as:

- It is an invariable part of the modern world and it is our advantage to work with them;
- It allows students and lecturers to experiment more in practice and get feedback quickly;
- It can increase student engagement;
- There are infinite resources, making it a valuable environment for learning, research, and projects.

The importance of digital technologies in the learning process is:

- Digital technologies allow the use of images and graphics that facilitate the perception of the studied material;

- Complex information can be explained more easily;
- Lessons become more interesting, which increases student motivation;
- Digital technologies lead to an increase in digital skills.

Undoubtedly, as George Kouros points out: “Technology can never replace great teachers, but technology in the hands of great teachers is transformational”.

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### **REFERENCES**

- AXSMARINE REPORTS – AXSDry modules, AXSInsights reports, Trade Flows
- BIOLCHEVA P., VALCHEV E., 2003, Safety through Artificial Intelligence in the Maritime Industry. *Strategies for policy in science & education-Strategii na Obrazovatelnata i Nauchnata Politika*, vol. 31, no. 3, pp. 270 – 280. <https://doi.org/10.53656/str2023-3-3-saf>.
- CHEN, H.; BALLOU, P. *Art and Science of Ship Voyage Optimization: A Critical Review*. Available from: [https://www.researchgate.net/publication/349289736\\_Art\\_and\\_Science\\_of\\_Ship\\_Voyage\\_Optimization\\_A\\_Critical\\_Review](https://www.researchgate.net/publication/349289736_Art_and_Science_of_Ship_Voyage_Optimization_A_Critical_Review) (accessed Apr 29 2021).
- CONEV, I.; DIMITRAKIEV D., 2023. Use of modern technologies at Naval Academy Varna. *Proceedings of the International Association of Maritime Universities (IAMU) Conference, Helsinki, Finland 18 – 21st of October 2023*. ISSN: 2706-6762 (Electronic)
- DIMITRAKIEV, D.; CONEV, I. Advanced COLREGS teaching in Bulgarian Naval Academy via online e-learning and simulators. *Industrial Growth Conference 2020, PUBLISHING COMPLEX – UNWE*. ISSN 2738-7267.
- DIMITRAKIEV, D.; MILEV, D.; GUNES E., 2023. The risk analysis of chemical tankers passing through the Turkish straits between 2010 – 2022. *Strategies for policy in science & education-Strategii na Obrazovatelnata i Nauchnata Politika*, vol. 31, no. 3s. <https://doi.org/10.53656/str2023-3s-3-the>.
- PLOMARITOU, E.; PAPADOPOULOS, A., 2018. *Shipbroking and Chartering Practice*, 8th Edition. ISBN 9781315689609 .
- FEDOTOVA, I.; KRYVORUCHKO, O.; SHYNKARENKO, V.; SOTNYCHENKO, L.; DIMITRAKIEVA, S., 2019. Using the elements from a fuzzy sets theory in the process of diagnosing the loyalty of consumers of motor transport services. *Eastern-European Journal of*



- Enterprise Technologies*, pp. 39 – 49. <https://doi.org/10.15587/1729-4061.2019.169079>.
- GANCHEVA, Y., 2021. Some problems related to the exploitation of automated container terminals. *Pedagogika-Pedagogy*, vol. 93, no. 7s, <https://doi.org/10.53656/ped21-7s.10cont>.
- GRAMCHEV, B.; DIMITRAKIEVA, S.; LESIDRENSKA, S., 2023. *Main Characteristics in Measuring Team Communication as a Means of Improving Team Performance*, IEEE, 2023 18th Conference on Electrical Machines, Drives and Power Systems (ELMA).
- ROSILLO, H. G. T., 2020. New challenges for the industry after the pandemic. *Industrial Growth Conference*. Publishing complex – UNWE. ISSN 2738-7267.
- INSTITUTE OF CHARTERED SHIPBROKERS, *Ship operation and management*, London, United Kingdom, ISBN 978-1-908833-64-8.
- COOKE, J.; KIMBALL, J. D. 2014. *Voyage Charters*, Fourth Edition, Informa Law from Routledge, eISBN 978-1-31579-502-7.
- LAM, J.S.L.; GOH, P.G.; PU, S. 2020. *Impact of Disruptive Technologies on Maritime Trade and Maritime Industry*. Nanyang Technological University and National University of Singapore.
- MOLODCHIK, A.; DIMITRAKIEV, D., 2018. Digital Platforms as Factor Transforming Management Models in Businesses and Industries. *International Conference Information Technologies in Business and Industry, 2018 IOP Publishing IOP Conf. Series: Journal of Physics: Conf. Series*, vol.1015, no. 4. doi:10.1088/1742-6596/1015/4/042040.
- MOSS, G.; KUBACKI, K.; HERSH, M. & GUNN, R., 2007. Knowledge management in higher education: A comparison of individualistic and collectivist cultures. *European Journal of Education*, vol. 42, no. 3, pp. 377 – 394. <https://doi.org/10.1111/j.1465-3435.2007.00314.x>.
- NARLEVA, K.; GANCHEVA, Y., 2023, *The Role of Maritime Education in Digitalization*. *Pedagogika-Pedagogy*, vol. 6s, pp. 132 – 141. <https://doi.org/10.53656/ped2023-6s.12>.
- PLOMARITOU, E., NIKOLAIDIS, E., 2016. Commercial Risks Arising from Chartering Vessels. *Journal of Shipping and Ocean Engineering*, vol. 6, pp. 261 – 268. doi 10.17265/2159-5879/2016.05.001.
- STEREV, N., 2023. Pre-Incubation Toolkits for Academic Entrepreneurship Fostering: Bulgarian Case. *Strategies for policy in science & education-Strategii na Obrazovatelnata i Nauchnata Politika*, vol. 31, no. 3s, pp. 90 – 103. <https://doi.org/10.53656/str2023-3s-7-pre>.
- STOPFORD M., 2009, *Maritime Economics*, Third edition, London.
- TSONEV, I., 2021. Utilizing Simulator-Based Training in Nikola Vaptsarov Naval Academy for Enhancing Students' Knowledge and Skills Regarding Safety. *Varna Free University, e-Journal VFU*, Issue 16.

- VELINOV, S., 2013. Measures to Enhance Safety of Containerized Cargo Transport by Revising Standards for Cargo Information and EDI BAPLIE and MOVINS Messages' Structure. *Journal of Marine Technology and Environment*, vol. II. Constanta, Constanta Maritime University.
- VISVIKIS I.D.; PANAYIDES, P.M.. 2017. Shipping Operations Management. *WMU Studies in Maritime Affairs*, Vol.4, Springer. ISBN 978-3-319-62365-8 (eBook).
- ZÁRATE J., 2009. Risk of delay in charterparties: like a ping-pong game? *REVIST@e-Mercatoria*, vol. 8, no. 1.

✉ **Dr. Christiana Atanasova, Assist. Prof.**

ORCID iD: 0000-0003-2102-037X

Web of Science ResearcherID: ABC-1889-2021

Nikola Vaptsarov Naval Academy  
Varna, Bulgaria

E-mail: k.atanasova@nvna.eu