DIGITAL TRANSFORMATION OF HIGHER EDUCATION IN THE CONTEXT OF EUROPEAN INTEGRATION OF UKRAINE

TRANSFORMAÇÃO DIGITAL DA EDUCAÇÃO SUPERIOR NO CONTEXTO DA INTEGRAÇÃO EUROPEIA DA UCRÂNIA

ЦИФРОВА ТРАНСФОРМАЦІЯ ВИЩОЇ ОСВІТИ В КОНТЕКСТІ ЄВРОПЕЙСЬКОЇ ІНТЕГРАЦІЇ УКРАЇНИ

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Abstract. The article presents a theoretical and methodological overview of various authors' positions and interpretations in solving the basic issues and problems associated with the study of the process of digital transformation of higher education in the context of a digital society. Particular attention in the study is paid to the features of digital transformation in the educational space of the EU, as well as the challenges facing the Ukrainian system of higher education in the context of European integration. As a result, key areas of digital transformation of education were identified within the paradigm of connectivism, aimed at updating the content, forms, and methods of professional training in higher education in the context of digital realities.

Keywords: digital transformation, higher education, connectivism, digital technology, sustainable development, university, transition

Resumo. O artigo apresenta uma visão teórica e metodológica das posições e interpretações de vários autores na resolução das questões e problemas fundamentais associados ao estudo do processo de transformação digital da educação superior no contexto de uma sociedade digital. Uma atenção especial é dada às características da transformação digital no espaço educacional da União Europeia, bem como aos desafios enfrentados pelo sistema de ensino superior ucraniano no contexto da integração europeia. Como resultado, foram identificadas áreas-chave da transformação digital da educação dentro do paradigma do conectivismo, com foco na atualização do conteúdo, das formas e dos métodos de formação profissional na educação superior em realidades digitais..

Palavras-chave: transformação digital, educação superior, conectivismo, tecnologia digital, desenvolvimento sustentável, universidade, transição

Анотація. У статті представлено теоретико-методологічний огляд різних авторських позицій та інтерпретацій у вирішенні основних питань і проблем, пов'язаних із дослідженням процесу цифрової трансформації вищої освіти в контексті цифрового суспільства. Особливу увагу в дослідженні приділено особливостям цифрової трансформації в освітньому просторі ЄС, а також викликам, які постають перед українською системою вищої освіти в контексті євроінтеграції. У результаті було визначено ключові напрямки цифрової трансформації освіти в рамках парадигми коннективізму, спрямовані на оновлення змісту, форм і методів професійної підготовки у вищій школі в контексті цифрових реалій.

Ключові слова: цифрова трансформація, вища освіта, коннективізм, цифрові технології, сталий розвиток, університет, перехід

1. INTRODUCTION

Ukrainian universities play an active role in developing Ukraine and its local communities, as well as promoting civic society. With the goal of creating civic society not just in Ukraine but throughout the world, universities must increase their efforts to create change and influence through innovative academic programs. Many Ukrainian institutions have implemented innovative study programs that eliminate disciplinary hurdles. For example, multidisciplinary programs such as post-conflict territory management have evolved, bringing together political science and management (CIVICA, 2023). Digital business, diplomacy, and social entrepreneurship have emerged as key focus areas, reflecting global issues and possibilities (Borodin et al., 2023; Gavkalova et al., 2023).

Moreover, to boost the effect of research, Ukrainian institutions must collaborate with European peers. Joint research collaborations, by combining knowledge and resources, can produce really meaningful scientific results. This collaboration will not only improve research achievements, but will also raise Ukrainian institutions' international reputation and prestige (Zadorina et al., 2023).

However, in order to successfully align development of higher education in Ukraine with the country' European integration, digital transformation of Ukrainian universities should not lag behind overall trends in EU higher education digital transformations. In this context, outlining and summarizing the features of landscape of digital transformation in higher education within the globalized context represents highly relevant task.

2. THEORETICAL FRAMEWORK OR LITERATURE REVIEW

In recent decades, universities and colleges have undergone significant changes as a result of technical and societal tendencies toward digitization. Currently, university technology adoption is associated with a paradigm change, in which technology is viewed as a dynamic and linked environment that facilitates digital learning (Mahlow & Hediger, 2019).

Rojas and Chiappe (2024) note that the digital ecosystem has radically altered higher education, changing the way students study, faculty educate, and institutions function. Emerging technologies, together with students' shifting expectations of technology, are paving the way for more efficient, accessible, and customized learning experiences.

To be as effective as feasible, digital educational development should follow a strategy that is clearly defined and backed by an academic plan (Lappo & Soichuk, 2022; Vasylevska et al., 2023). According to an Ernst & Young poll performed in 2017 among colleges and their students, 93% believe that digital transformation will have a substantial influence on universities over the next decade. The same institutional officials say that colleges should adopt digitalization since it contributes to more efficient learning and improved student outcomes (EY-Parthenon, 2017).

Researchers of the European domain of higher education claim that digital transformation in Higher Education (HE) is a top goal for the European Union. In the coming years, Higher Education Institutions (HEIs) will be rebuilt at all levels of operation. On September 30, 2020, the EU adopted the Digital Education Action Plan (2021-2027), which aims to provide high-quality, accessible, and inclusive digital education to help Member States transition into the digital era (Orr et al., 2020). Implementing learning and training has been regarded as critical domain in preparing modern communities and economy to handle the challenges of globalization and technological advancement.

Developing digital skills has become critical in this paradigm for promoting lifelong learning and reducing inequities. By the year 2030, there should be 414 million university students globally, and universities must satisfy their demands by providing excellent and relevant future-proof skills, fostering diversity and inclusion, and promoting and protecting democratic processes, basic rights, and academic ideals (Capogna & Greco, 2024).

During the COVID-19 epidemic, digital literacy seemed to be a significant barrier to digital adaption in higher education institutions. All stakeholders confront a severe digital literacy issue, necessitating worldwide skill updates (Jakoet-Salie & Ramalobe, 2023). Preliminary studies in the education area, particularly in K-12 and high schools, have focused on digitalization in response to the COVID-19 pandemic, highlighting various challenges that may impede this process (Arlinwibowo et al., 2020). At this level of education, the negative implications are mostly on student engagement, the efficacy of online learning, and disparities caused by the digital divide (Lai & Widmar, 2020).

Distance learning, on the other hand, was generally embraced in higher education institutions and recognized for its ability to reduce physical distance (Bozkurt, 2020; Daniel, 2020). Digital pedagogical transformation may not only alter, but also improve the efficiency of teaching and learning processes, therefore accomplishing all pedagogical development objectives. In this regard, digitization is predicted to be one of the most promising transitions toward SD (Del Río Castro et al., 2021; Gouvea et al., 2018; Walker et al., 2019), particularly in higher education (Ahel & Lingenau, 2020). For the environment, the biggest prospects for digitization are in the energy sector; the largest threats stem from resource use and digital device disposal.

HEIs also play an important role in promoting and implementing the United Nations 2030 Agenda for Sustainable Development (Vallez et al., 2022) as well as the digitization of society by creating knowledge for new technologies and social innovation (Carayannis & Morawska-Jancelewicz, 2022). Students are required to gain a comprehensive grasp of their reality and its major conflicts, taking into account social, environmental, and economic factors (Del Olmo & Sánchez, 2019). Digital learning may be an excellent education sustainable development (ESD) tool, or a means of sharing sustainability projects and experiences, as well as addressing problems collaboratively (Castro & Zermeño, 2020; Habibova & Jafarov, 2019).

The scheme offered by Abad-Segura et al. (2020), represents comprehensive conceptualization of the connection and correlation between sustainable development and digital transformation of higher education (see Fig. 1).

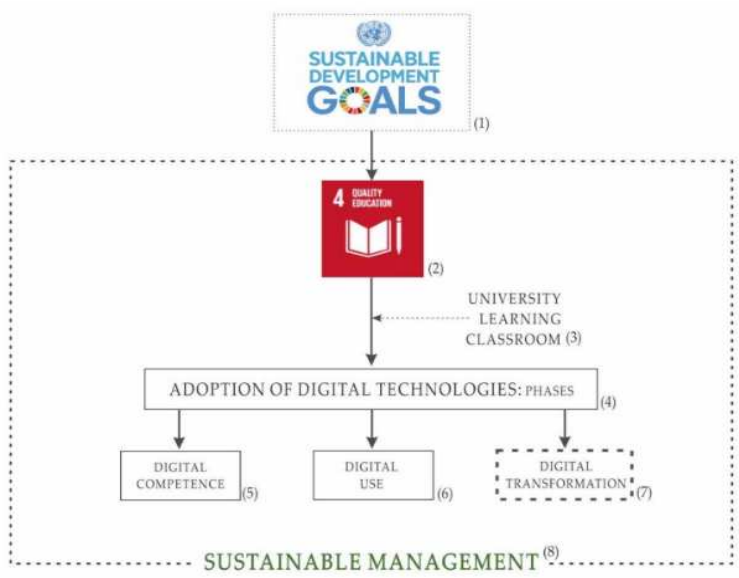

Figure 1. *Conceptual structure on the sustainable management of digital transformation in higher education* (Abad-Segura et al., 2020)

Global sustainable development and the enhancement of people's quality of life are predicated on education (Ghosn-Chelala, 2018; Klumpp et al., 2021). Access to fair and inclusive education may also assist provide people the skills they need to come up with creative solutions to issues. In this way, connecting high-quality education with technology, which leads to digital transformation (DT), enables to mobilize youth, provide academic or vocational training to implement solutions to the SDGs, and create more opportunities for students and professionals from developing nations to develop their capacity to address the challenges associated with the SDGs. According to the definition of sustainable management, it is a decalogue of human, ethical, and environmental values that aims to give societies a tool for the sustainable growth of businesses, organizations, and communities in order to maintain competitiveness and fortify the social and economic fabric of the world (Bush, 2018).

With this is mind, it seems relevant task to deepen consideration of the features of this landscape.

3. METHODOLOGY

The work uses two directions of studying education as a social institution: 1) intra-institutional direction, which covers internal processes in the field of education, as well as structure, elements, functions, status of teachers, etc.; 2) external-institutional direction, which considers education along with other social institutions and in connection with the educational process with other processes occurring in society.

The work is based on the principles of functionalism, which focus on the analysis of the functions of education, on its role in society. Also, the provisions of the phenomenological approach, which analyze the everyday practices of participants in the educational process (social interactions, behavior, positions, values, roles) are used. The connecting link in the "fabric" of the study is also the theory of sustainable development.

4. RESULTS AND DISCUSSION

Unlike digitalization, which is often wrongly associated with digital transformation, real digital transformation affects the overall landscape of educational institution functioning, all its processes and organizational behavior. Moreover, like in other industries, the ultimate goal

of DT should be high level of competitiveness and satisfaction/loyalty of customers (students) and stakeholders (state, employers, etc.). In this vein, digital transformation attributes also can be aligned with the overall trends for industries (see Fig. 2).

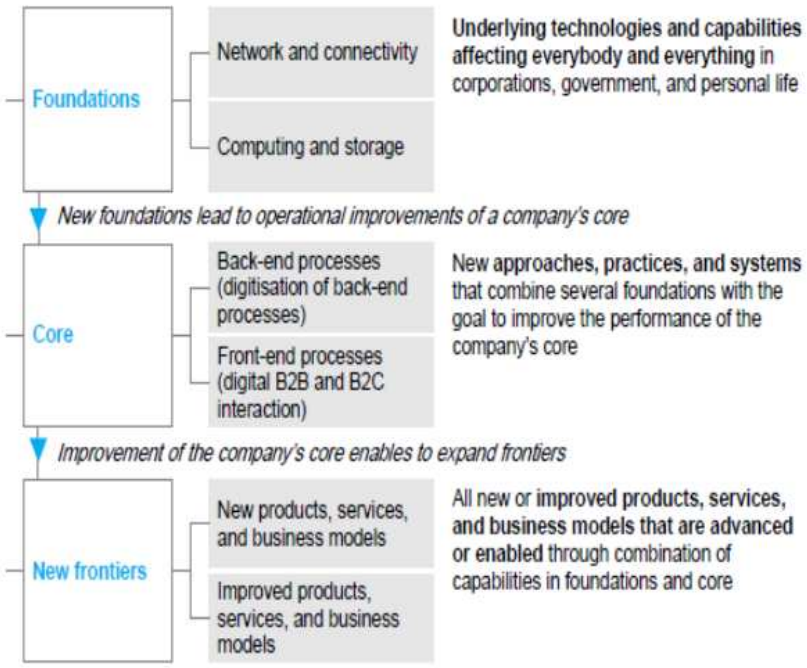

Figure 2. *Digital transformation attributes* (Schank, 2023)

B2B and B2C components for the university represent accordingly teaching and researching activities

According to Marks et al. (2020), digital transformation involves a complete overhaul of the business model in addition to changes to tools, technology, and procedures. It alters how a company functions and engages with both the outside world and internally. The idea that business is changing more quickly than we are adjusting is known as business transformation. A strategic goal for digital transformation should be outlined in an operational architecture that includes business use cases.

In order to simplify operations, better understand their consumers, service delivery, product creation, asset usage, and other operational areas, higher education institutions must make well-informed decisions - and sometimes fast ones - just like other sectors. In order to make decisions that will have the biggest possible impact on the business, data should be used to uncover hidden patterns and underlying performance in particular areas. Budgets might be strained and large costs can arise from legacy systems. Furthermore, there is a greater need than ever for security and intelligence on students and employees due to threats to higher education, both on and off campus. Forms and procedures that are done by hand cannot handle those difficulties. More than ever before, higher education institutions need to incorporate digital technology into their operations (Marks et al., 2016).

Higher education must assure long-term DT management in order to achieve its aim of becoming an open, digital, innovative, and networked institution (Habibova, 2023). Thus, sustainable management must use best-practice management methods to achieve greater competitiveness and organizational development. In this opinion, stakeholders value transparency in educational institutions' operations to preserve their long-term existence (Cristina et al., 2018).

One of the most significant obstacles to sustainable development is the need for innovative alternatives and fresh ways of thinking in higher education institutions. Thus, the sustainable administration of educational institutions is a top priority in all progressive educational policies.

Changes in higher education are required and inescapable, as are changes in the structure of a learning process and governance via the adoption of new forms of online professional cooperation, as well as student desire to engage in more student-centered learning. Fig. 3 presents connections between various elements of the landscape of digital transformation in HE.

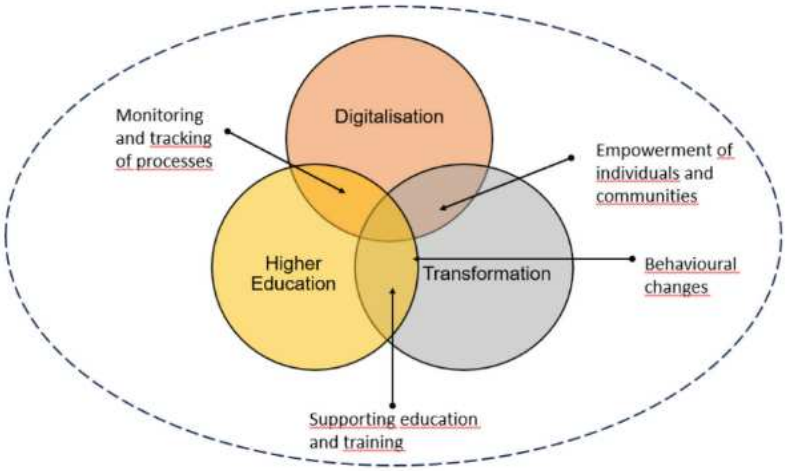

Figure 3. *Connections between various elements of the landscape of digital transformation in HE* (Filho et al., 2024)

Schurmann et al. (2022) contend that digitalization is transforming education systems, particularly higher education, into digitalized ecosystems by combining economic, environmental, and social processes into a unified system. The technical and technological components of system design are integrated by digitizing and automating educational, administrative, and service functions. The interaction of various factors in a higher education digital ecosystem facilitates close-to-reality modeling and the view of theoretically based, practice-oriented use of educational processes in regional, national, as well as international (global) higher education networks via a multidimensional, realistic approach.

Taking a complete picture of the interplay of many components of teaching, learning, and support processes provides new insights into knowledge transfer in higher education, enabling for more effective promotion and innovation development. As a result, it is reasonable to analyze higher education's digital ecosystems through the lens of innovation incubators. Incubators have the ability to provide additional assistance for processes or topics of special interest while dramatically speeding their growth.

The appropriate entrance of new resources, the focus on these unique processes and areas, and the construction of development-friendly framework conditions will all improve the conditions for innovations to originate, develop, and be deployed. Institutional units or types of organization can function as innovation incubators if they have the necessary innovation-promoting traits. Universities, as educational organizational entities, are typically capable of generating, developing, and applying innovation.

Thus, they can serve as innovation incubators. Emerging technologies are, on the one hand, a way of accelerating innovation, but they are also subjects of study and development in inventive processes, particularly for universities and non-university research institutes. Because of the potential for innovation, new instructional technologies in higher education are

becoming increasingly important in the digital university ecosystem. They can, however, only realize their full potential if they are given rapid support and completely integrated into the higher education system.

Outstanding developing technologies are currently being connected in the context of digitalization with hybrid techniques and AI applications (Rodríguez et al., 2023). They act as innovation catalysts for universities. Their incorporation into higher education's digital ecosystems necessitates the merging of all other components as well as each other. The epidemic has given both developing technologies an extra push, and they are critical for the growth of education, thus development is moving quickly. Their integration and merging are being planned and implemented through continuing university education programs. The authors propose a schematic portrayal of the notion of university incubation drivers for developing technologies such as hybrid and AI applications (Fig. 4).

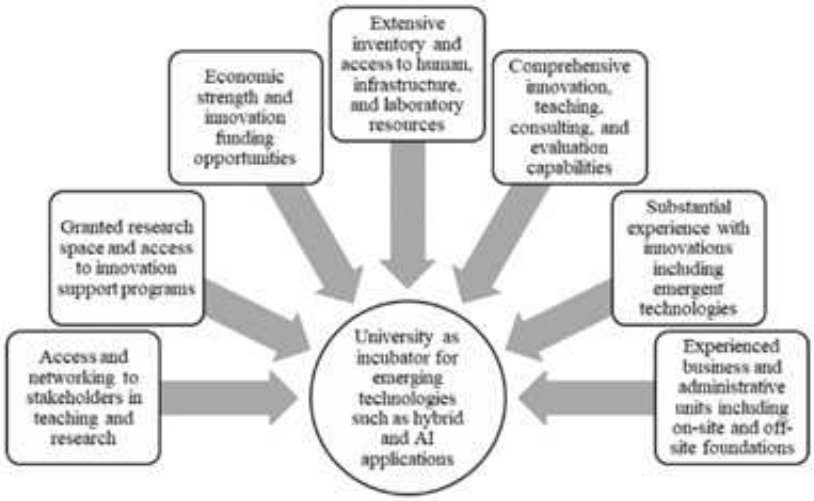

Figure. 4. *University incubation drivers for emerging technologies as hybrid and AI applications* (Schurmann et al., 2022)

DT promotes practical and creative education by embracing new didactic models for students to learn and instructors to teach (Shaughnessy, 2018), such as the digital cooperative learning (DCL), flipped classroom, gamification, augmented reality, virtual reality, or mixed reality. Betting on creativity and entrepreneurship, DT in education argues for learning techniques centered on tailored training, content customization, and the development of one's own abilities through social learning (Jahnke & Kumar, 2014).

The digital learning space redefines the roles of students and teachers, allowing for more in-depth learning experiences. The technical solutions enable the digital learning area, but they must be implemented by students and instructors. Pedagogically, it provides a chance to experiment with novel learning modalities, such as new roles for professors and students, data exploration, and the inclusion of non-university actors (Jackson, 2019).

The digital topics stream is knowledge-based and focuses on digitized domain knowledge. In computer science, this is programming; in medical, it is e-learning materials; and in economics, it is transactional data used to study econometrics. Digital knowledge representation transforms many disciplines and allows new learning forms by offering two essential affordances: visualization of information, data, and ideas, and interactivity as a method of providing learners with tools for information modification and exploration (Churchill, 2017). At a deeper level, digitization of subjects reshapes disciplines.

The digital learning space is neither a predetermined solution, nor is it a single space, but several (Ellis & Goodyear, 2016). Bomsdorf used the term "plasticity" back in 2005 to

characterize a digital learning space's capacity to remain suitable for learning in a variety of shifting situations (Bomsdorf, 2005). In example, the worldwide case study from The University of Queensland and UniQuest illustrates how collaborating with students as content authors and assessors may tailor the learning experience in big undergraduate courses. This initiative uses adaptive learning as a complement to instruction, while simultaneously putting students at the center of their learning experience.

Furthermore, incorporating gamification features into student-facing platforms has made learning more dynamic and engaging. Game-like characteristics can assist instructors encourage students and improve the learning experience. In addition to making everyday lectures, discussions, and projects in the classroom more exciting, gamification is increasing student participation in co-curricular activities through the use of points, leaderboards, reward programs, and other gamified elements.

Shorter, pre-recorded video sessions are replacing traditional 2×45 min lectures in the teaching process. With so many digital resources available, the teacher's job will shift away from direct instruction and toward resource facilitation (Bygstad et al., 2022). The teacher's responsibilities include planning and monitoring activities throughout time. Lectures (long or short) are simply one activity that counts; in order to enhance students' learning paths, teachers must have access to new sorts of data, such as student involvement with digital sources.

The new learning environments include Big Data and Artificial Intelligence as teaching tools, providing value to challenging topics in higher education. Thus, Big Data enables students to identify patterns in connection to new teaching approaches, such as adaptive learning, which provides individualized instruction based on the gathering of student data linked to age, customs, or behavior. This technology incorporates training at a lesser cost, which increases user skills and generates a tailored student profile. This will improve the teaching areas where it is tough, resulting in a one-of-a-kind course delivered via the e-learning system. On the other hand, HEIs use AI to customize the student admissions process and identify which students are most likely to succeed in their degrees and master's programs. Furthermore, this technology enables the teacher to, among other things, identify the student's progress or alter the teaching process if she or he notices a gap in comprehension (Dennis, 2018).

The digital era necessitates a flexible education that enables new abilities in order to achieve one's full potential at a period of perpetual change, such as the present. Thus, digital education is defined as face-to-face and distant education that uses digital technology with the goal of acquiring skills and abilities to learn from both teachers and students in an ongoing training process (Abad-Segura et al., 2020). On the other hand, it provides a potential to expand educational coverage and productivity inside institutions.

The rise of digital technology has led to the transformation of classrooms and learning methodologies. For this reason, the DT must align with the university's goal and vision (Knox, 2014).

The introduction of technology into society has changed the nature of services and goods, as well as the meaning of work time and learning processes (Karpa et al., 2023; Nussbaum & Diaz, 2013). Currently, technology has created a new scenario in the educational sphere. In this environment, connectivism emerges as a digital-age learning theory that attempts to explain complicated learning in a rapidly changing digital social world (Goldie, 2016). The educational world has studied this notion, therefore the computer science model defines learning as a network with nodes and connections (Turner, 2014).

Connectivism defines learning as a continuous process that takes place in a variety of contexts, including group, personal, and geographical. Connectivism distinguishes itself from standard learning theories by emphasizing the importance of learning network connections. Thus, in 2004, Siemens stated that several classic learning theories, such as behaviorism,

cognitivism, and constructivism, had limits since they were designed before technology had a significant influence on learning (Dogan, 2014; Saykili, 2019). That is, these ideas were formed when knowledge increased slowly; today, knowledge expands at a faster pace.

Connectivism's concepts are founded on the fact that learning and knowledge accept diverse points of view and that the link between sources of information is valued, allowing for continual learning. Similarly, the capacity to recognize connections between subjects, ideas, and concepts is critical. Finally, decision-making is a learning process, which includes deciding what to learn and altering the meaning of information obtained.

Many stakeholders are manifesting increasing interest in using digital technologies into higher education systems. Universities are famously resistant to change, making it even more difficult to adapt. Managing change in universities (in this case, digital transformation) is arguably the most challenging challenge facing senior management in Ukraine's higher education institutions today.

When universities develop the necessary combinations of key components (AI, cloud computing, and Big Data) of digital transformation to compete in the global market, the entire university must be concerned about the ultimate goal(s) of digitalization and how it will provide superior value to students/stakeholders. Meaning that digital transformation initiatives are based on cross-functional aspects and must be linked to other functional strategies inside universities. However, alignment is thought to be an issue.

In the information age, universities have pioneered a number of projects to research innovative digital technologies that might improve students' learning experiences. This necessitates a reform of core activities affecting the product portfolio, delivery, integration, and organizational structure (Matt et al., 2015; Shaughnessy, 2018). Universities require a mix of technological and cultural reform. Guiding the move to a digital culture is difficult. The digital transformation plan has not only changed university educational delivery methods, but it has also altered students' expectations for globalized education (Kane, 2017; Powell & McGuigan, 2021; Rosin et al, 2020).

The digital transformation strategy (DTS) is motivated by the need to provide the highest quality education, enable a world-class educational experience, and prepare students to meet the expectations of a worldwide industry. Universities cut their investment on digital transformation skills to save capital expense. However, they failed to see that by spending on DTS, they are also investing in the development of long-term competitive advantages (SCA), which would undoubtedly have an impact on future profitability.

Meanwhile, digital change in the global education business confirms the future path to sustainable education management. The condition for universities to achieve a relatively sustainable position is their readiness to adapt the very quick changes imposed by the macro environment, as well as the integration of important trends into their digital transformation plan.

Reis et al. (2018) list three important anchors of digital transformation:

- Technological aspects include the utilization of modern technology such as social media, tablets/mobile devices, and online learning resources.
- Organizational aspect what causes organizational processes to alter or be created.
- The social component refers to human-related influences such as user experience, willingness to change, and resistance.

All three domains should be handled simultaneously as part of Ukraine's digital transformation of higher education, and ideally, these three transformation vectors should result in a synergy effect. As a result, it is critical for modern Ukrainian higher education to identify a viable and appropriate leadership style or approach to adapt to today's reality through transformation and change within higher education.

Collaboration should become the norm, with diverse departments and offices encouraged to work together to foster a culture of digital innovation and openness. Leadership support is critical. Institutional leaders should promote digital transformation projects, establishing a digital-first culture from the top down. Leaders should also guarantee that academics, students, and staff have continual training and development opportunities so that they can successfully use digital technologies.

5. CONCLUSION

In the modern world, digital transformation has become an essential component of higher education. It goes beyond just digitizing manual procedures; rather, it involves a fundamental transformation process made possible by digital technology with the goal of drastically enhancing and innovating an organization.

Thus, digital transformation in education is not something extremely unique in comparison with other industries, and, evidently, within the ongoing process of European integration, Ukrainian HEIs should care about digital competitiveness to no less extent than business sector companies. In particular, the issue of digital maturity is one of the critical ones for HEIs, since it implies sufficient level of digital transformation not only in teaching and learning process, but in organizational behavior, communications, stakeholder management, etc.

The dimensions of digital transformation process in the result will determine overall digital maturity of HEI, and ultimately should include the purpose, degree of strategy, speed of strategy, and the value source.

REFERENCES

Abad-Segura, E., González-Zamar, M.-D., Infante-Moro, J., Garcia, G. (2020). Sustainable management of digital transformation in higher education: *Global research trends. Sustainability, 12*, 2107.

Ahel, O., & Lingenau, K. (2020). Opportunities and challenges of digitalization to improve access to education for sustainable development in higher education. In: W. Filho et al., eds. Universities as living labs for sustainable development: supporting the implementation of the sustainable development goals (pp. 341–356). Cham: Springer International Publishing.

Arlinwibowo, J., Retnawati, H., Kartowagiran, B., Kassymova, G. (2020). Distance learning policy in Indonesia for facing pandemic COVID-19: School reaction and lesson plans. *Journal of Theoretical and Applied Information Technology, 98*(14), 2828–2838.

Bomsdorf, B. (2005). Adaptation of learning spaces: Supporting ubiquitous learning in higher distance education. In Dagstuhl Seminar Proceedings. Schloss Dagstuhl-Leibniz-Zentrum fr Informatik.

Borodin, Y., Sorokina, N., Tarasenko, T., Volkova, N., Akimova, L., & Akimov, O. (2023). Social policy development in the conditions of digital transformation of society. *Ad Alta: Journal of interdisciplinary research, 13*(01), XXXIV, 40-46. DOI: 10.33543/1301344046

Bozkurt, A. (2020). Educational technology research patterns in the realm of the digital knowledge age. *JIME*, 2020(1), 18.

Bush, T. (2018). Research on educational leadership and management. *Educational Management Administration & Leadership, 46*, 359–361.

Bygstad, B., Ovrelid, E., Ludvigsen, S., Daehlen, M. (2022). From dual digitalization to digital learning space: Exploring the digital transformation of higher education. *Computers & Education, 182*, 104463.

Capogna, S., & Greco, F. (2024). *The digital transformation of European higher education: Technological, ecological, and social challenges*. Springer.

Carayannis, E.G., & Morawska-Jancelewicz, J. (2022). The futures of Europe: Society 5.0 and Industry 5.0 as driving forces of future universities. *Journal of Knowledge Economy, 13*(4), 3445–3471.

Castro, M.P., & Zermeño, M. (2020). Challenge based learning: innovative pedagogy for sustainability through e-learning in higher education. *Sustainability, 12*(10), 4063.

Churchill, D. (2017). *Digital resources for learning*. Springer.

CIVICA (2023). Challenges and needs of Ukrainian universities. The Project "CIVICA for the European Future of Ukraine". https://www.civica.eu/files/PDFs/PDFs_2024/C4U__Report_Challenges_and_needs_of_Ukrainian_institutions__report_final.pdf

Cristina, S.T., Popescu, D.M., Stoica, E., Erculescu, L.M. (2018). Managing the influence of resources on educational performance. *The International Journal of Sustainable Economies Management, 7*, 37–44.

Daniel, S.J. (2020). Education and the COVID-19 pandemic. *Prospects, 49*(1–2), 91–96.

Del Olmo, M.A., & Sánchez, J.S. (2019). El desarrollo sostenible como reto pedagógico de la universidad del siglo XXI. *Anduli. 19*(19), 59–80.

Del Río Castro, G, Fernández, M., & Colsa, A. (2021). Unleashing the convergence amid digitalization and sustainability towards pursuing the Sustainable Development Goals (SDGs): A holistic review. *Journal of Cleaner Production, 280*(1), 122204.

Dennis, M.J. (2018). Artificial intelligence and higher education. Enrollment Management Reports, 22, 1–3.

Dogan, M.E. (2014). A theory for knowing in the network society. *International Journal of Information Communication Technologies and Human Development, 6,* 21–31.

Ellis, R. A., & Goodyear, P. (2016). Models of learning space: Integrating research on space, place and learning in higher education. *Review of Education, 4*(2), 149-191.

EY-Parthenon (2017). *University strategy in a digital world. Can digital approaches help improve student outcomes?*, Ernst & Young LLP.

Filho, W. et al. (2024). Digital transformation and sustainable development in higher education in a postpandemic world. *International Journal of Sustainable Development & World Ecology, 31*(1), 108-123.

Gavkalova, N., Akimova, L., & Akimov, O. (2023). Anti-crisis management mechanism in the digital age**.** *Marketing and Management of Innovations***,** *14*(4), 188–199. https://doi.org/10.21272/mmi.2023.4-14

Ghosn-Chelala, M. (2018). Exploring sustainable learning and practice of digital citizenship: Education and place-based challenges. *Education, Citizenship and Social Justice, 14*, 40–56.

Goldie, J.G.S. (2016). Connectivism: A knowledge learning theory for the digital age? *Medical Teacher, 38*, 1064–1069.

Gouvea, R., Kapelianis, D., & Kassicieh, S. (2018). Assessing the nexus of sustainability and information & communications technology. *Technological Forecasting and Social Change, 130*, 39–44.

Habibova, K. A., & Jafarov, Y. M. (2019, May). Language policy in the virtual space. In 1st International Scientific Conference "Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth" (MTDE 2019) (pp. 788-791). Atlantis Press.

Habibova, K. (2023). Virtual discourse as a communicative requirement of the modern era. *Ad Alta. Journal of Interdisciplinary research, 13*(1), 173-176.

Jackson, N. C. (2019). Managing for competency with innovation change in higher education: Examining the pitfalls and pivots of digital transformation. *Business Horizons, 62*(6), 761-772.

Jakoet-Salie, A., & Ramalobe, K. (2023). The digitalization of learning and teaching practices in higher education institutions during the covid-19 pandemic. *Teaching Public Administration, 41*(1), 59-71.

Jahnke, I., & Kumar, S. (2014). Digital didactical designs: Teachers' integration of iPads for learning-centered processes. *Journal of Digital Learning in Teacher Education, 30*, 81-88.

Kane, G. C. (2017). MetLife centers its strategy on digital transformation. *MIT Sloan Management Review, 59*(1), 88.

Karpa, M., Kitsak, T., Domsha, O., Zhuk, O., & Akimov, O. (2023) Artificial Intelligence as a tool of public management of socio-economic development: Economic systems, smart infrastructure, digital systems of business analytics and transfers. *Ad Alta: Journal of Interdisciplinary Research, 13*(01), XXXIV, 13-20. DOI: 10.33543/1301341320

Klumpp, C., Nascinemto, E., & Nascinemto, J. (2021). Active methodologies and professional learning: Literature review. *Cadernos de Educação Tecnologia e Sociedade, 14*(4). https://doi.org/10.14571/brajets.v14.n4.628-640

Knox, J. (2014). Digital culture clash: "Massive" education in the E-learning and Digital Cultures MOOC. *Distance Education, 35*, 164-177.

Lai, J., & Widmar, N.O. (2020). Revisiting the digital divide in the COVID-19 era. *Applied Economic Perspectives and Policy, 43*(1), 458-464.

Lappo, V.V., & Soichuk, R.L. (2022). Digital technologies of support the spiritual development of students. *Information Technologies and Learning Tools, 88*(2), 103-114. DOI: 10.33407/itlt.v88i2.3403

Mahlow, C., & Hediger, A. (2019). Digital transformation in higher education - buzzword or opportunity? *ELearning*, *2019*, 13.

Marks, A., AL-Ali, M., Atassi, R., Abualkishik, A., Rezgui, Y. (2020). Digital transformation in higher education: A framework for maturity assessment. *International Journal of Advanced Computer Science and Applications, 11*(12), 504-513.

Marks, A., Alali, M., Reitesema, K. (2016). Learning management systems: A shift toward learning and academic analytics. *International Journal on Emerging Technologies in Learning, 11*, 77-82.

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business and Information Systems Engineering, 57*(5), 339–343.

Nussbaum, M., & Diaz, A. (2013). Classroom logistics: Integrating digital and non-digital resources. Computers & Education, 69, 493–495.

Orr, D., Rampelt, F., Knoth, A. (2020). "Bologna Digital"—Actively Shaping the Digital Transformation in European Higher Education. In: Curaj, A., Deca, L., Pricopie, R. (eds) European Higher Education Area: Challenges for a New Decade. Springer, Cham. https://doi.org/10.1007/978-3-030-56316-5_36

Powell, L., & McGuigan, N. (2021). Teaching, virtually: A critical reflection. *Accounting Research Journal, 34*(3), 335-344.

Reis, J., Amorim, M., Melão, N., Matos, P. (2018). Digital Transformation: A Literature Review and Guidelines for Future Research. In: Rocha, Á., Adeli, H., Reis, L.P., Costanzo, S. (eds) Trends and Advances in Information Systems and Technologies. WorldCIST'18 2018. Advances in Intelligent Systems and Computing, vol 745. Springer, Cham.

Rodríguez, D., Arias, P., & Jimenez, M. (2023). Use of virtual resources for the development of spatial vision in high school students. *Cadernos de Educação Tecnologia e Sociedade, 16*(3). https://doi.org/10.14571/brajets.v16.n3.473-489

Rosin, A. F., Proksch, D., Stubner, S., & Pinkwart, A. (2020). Digital new ventures: Assessing the benefits of digitalization in entrepreneurship. *Journal of Small Business Strategy, 30*(2), 59–71.

Sa'adi, S. (2016). Introduction to views of connectivism theory of learning. *Register Journal of Language Teaching, IAIN Salatiga 3*(2), 177376.

Saykili, A. (2019). Higher education in the digital age: The impact of digital connective technologies. *Journal of Educational Technology and Online Learning, 2*(1), 1–15.

Schank, M. (2023). *Digital transformation success: Achieving alignment and delivering results with the process inventory framework*. Apress.

Schurmann, Ch.-A., Otto, F., Kling, N., Tittmann, C., Nitsche, A.-M. (2022). Digital ecosystem "university" as innovation incubator for merging hybrid and AI-supported higher education. Proceedings of 2022 Annual Conference "Shaping the Digital Transformation of the Education Ecosystem in Europe", Tallinn, 20-22 June, 2022, pp. 5-10.

Shaughnessy, H. (2018). Creating digital transformation: Strategies and steps. Strategy and Leadership, 46(2), 19–25.

Türkeli, S., & Schophuizen, M. (2019). Decomposing the complexity of value: Integration of digital transformation of education with circular economy. *Transition. Social Sciences, 8*, 243.

Turner, W. (2014). Connectivism learning and teaching: A new learning theory or an evolution in blended theory and pedagogy? *International Journal of Asian Social Science, 14*, 46–56.

Vallez, M., Lopezosa, C., & Pedraza-Jiménez, R. (2022). A study of the web visibility of the SDGs and the 2030 agenda on university websites. *International Journal of Sustainable Higher Education, 23*(8), 41–59.

Vasylevska, T., Shevchenko, S., Sydorenko, N., Gradivskyy, V., Akimova, L., & Akimov, O. (2022). Development of professional competence of public servants in the conditions of decentralization of public authority. *Ad Alta: Journal of Interdisciplinary Research, 12*(2), XXIX, 61-66.

Walker, J., Pekmezovic, A., Walker, G., Walker, J. (2019). *Sustainable development goals: Harnessing business to achieve the SDGs through finance, technology and law reform*. John Wiley & Sons.

Zadorina, O., Burchak, L., Panas, O., Ardelian, O., Apalat, H. (2023). Shaping the competencies of the future. *Cadernos de Educação Tecnologia e Sociedade, 16*(2). https://doi.org/10.14571/brajets.v16.n2.361-371