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ORIGINAL

Synergy of social and institutional transformations in higher education in the context of post-war recovery: foreign experience for Ukraine

Sinergia de las transformaciones sociales e institucionales en la enseñanza superior en el contexto de la recuperación de posguerra: experiencia extranjera para Ucrania

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ABSTRACT

Introduction: the strategic directions for post-war recovery in Ukraine involve preserving and enhancing higher education institutions' educational and cultural potential, intensifying knowledge-intensive technologies' development, and transforming the education system towards public management and digitalisation. There is a growing demand for the development of higher education in productive educational-cognitive directions, specialisation, and universalisation. The article aims to analyse the potential synergy of the transformation of institutional and social concepts in the functioning of higher education in the context of post-war recovery in Ukraine.
Method: the study employed general research methods, including generalisation, comparison, systematisation, abstraction, analysis, synthesis, and concretisation, to analyse the experience of foreign countries in adapting their higher education systems to crisis and post-crisis conditions.
Results: the study examined the requirements and possibilities for modernising and improving the higher education system in Ukraine through the interaction between the labour market and the educational environment. The research summarised the issues with the functioning of the higher education system during martial law. It proposed a comprehensive approach to regenerating and optimising the higher education system during the post-war recovery period.
Conclusions: the study demonstrated the need for synergy between social and institutional dynamics in higher education transformation. The results suggest ways to improve higher education by integrating different vectors of the social-institutional environment.

Keywords: University Transformational Activities; Cooperation Between Universities And Communities; University Innovations In Territorial Restoration.

RESUMEN

Introducción: las direcciones estratégicas para la recuperación de posguerra en Ucrania incluyen preservar y mejorar el potencial educativo y cultural de las instituciones de educación superior, intensificar el desarrollo de tecnologías intensivas en conocimiento y transformar el sistema educativo hacia la gestión pública y la digitalización. Existe una creciente demanda de desarrollo de la educación superior en direcciones educativas-cognitivas productivas, especialización y universalización. El artículo tiene como objetivo analizar la sinergia potencial de la transformación de los conceptos institucionales y sociales en el funcionamiento de la educación superior en el contexto de la recuperación de posguerra en Ucrania.
Método: el estudio empleó métodos de investigación generales, incluyendo generalización, comparación, sistematización, abstracción, análisis, síntesis y concretización, para analizar la experiencia de países extranjeros en la adaptación de sus sistemas de educación superior a las condiciones de crisis y poscrisis.
Resultados: el estudio examinó los requisitos y posibilidades para modernizar y mejorar el sistema de educación superior en Ucrania a través de la interacción entre el mercado laboral y el entorno educativo. La investigación resumió los problemas con el funcionamiento del sistema de educación superior durante la ley marcial. Se propuso un enfoque integral para regenerar y optimizar el sistema de educación superior durante el período de recuperación de posguerra.
Conclusiones: el estudio demostró la necesidad de sinergia entre la dinámica social e institucional en la transformación de la educación superior. Los resultados sugieren formas de mejorar la educación superior mediante la integración de diferentes vectores del entorno social e institucional.

Palabras clave: Actividades Transformadoras Universitarias; Cooperación Entre Universidades Y Comunidades; Innovaciones Universitarias en Restauración Territorial.

INTRODUCTION

Implementing quality educational and scientific activities in higher education requires developing and integrating specific progress models, which are determined by regional peculiarities. The recovery and optimisation of the educational environment in higher education institutions after the war will be characterised by the intensification of knowledge-intensive technologies, digitalisation, and integration processes.

Interdisciplinary scientific research is dedicated to investigating the functioning of the higher education system in times of crisis and instability. Contemporary scholars such as Levchuk and Havryliuk[1] and Dombrovska[2] explore the transformation of target development strategies in higher education in the context of global digitalisation and integration of the educational environment. The works of several researchers,[3,4] reflect the issue of implementing innovative educational tools that form practical communication skills and compliance with the requirements of digitalisation of socioeconomic processes. Other researchers[5,6] have noted that studying mechanisms for forming social-institutional integration becomes significant in political, economic, and financial instability and crisis phenomena. It is achieved through the development of adaptation strategies for post-crisis recovery.

It is essential to acknowledge that there needs to be more focus on identifying the synergy between social and institutional transformations in higher education. Many developed countries prioritise the democratisation and informatisation of the educational environment, which leads to new approaches in higher education.[7] The study's relevance stems from the impact of wartime and the need to enhance the competitiveness of the national education system in the global arena. It also aims to address the imbalance between higher education opportunities and the demands of the modern labour market and mitigate the adverse effects of demographic emigration processes on the number of higher education institutions in Ukraine.

Contemporary researchers have shown significant interest in forming a strategy for post-war regeneration and optimising the educational environment of higher education. This topic has become particularly relevant during martial law, requiring a prospective transformation of the development concept of higher education in Ukraine. Numerous research studies have reflected on the problem and its various aspects from different scientific perspectives.

Contemporary works analyse the modern innovative experience of European universities[8,9] and the process of forming convergence of social and managerial transformations of the education system[10,11,12] examine the potential for crisis periods to drive adaptive improvements in higher education institutions. Additionally, Wisnumurti et al.[13] explore the global trend of digital optimisation in socio-cultural reforms.

Some scholars have examined the functioning of higher education during socio-political crises.[14] Recent studies have prioritised the development of the higher education system within the context of public management and institutional dynamics.[15] Scholars[16] suggest that global challenges are expanding the conceptual horizons

of the problem being studied, leading to an increased focus on the integrity of higher education.

Overall, contemporary scholars generally believe that the obstacles to developing the innovative and professional potential of the higher education system in the post-crisis period can be overcome by implementing a mechanism for interaction between the labour market, the concept of educational services, and innovative university complexes. However, despite the significant number of scientific works, issues related to higher education, which were caused by limitations and obstacles during wartime, remain mainly outside the focus of contemporary research or need to be studied more. It highlights the need to address them in the concept of the post-war development of the educational system in Ukraine.

This study aims to evaluate the potential for synergistic interaction of institutional and social transformations in higher education. Practical recommendations for improving the modernisation of higher education services through an innovative development model in the post-war recovery of Ukraine will be further developed.

METHOD

To achieve its goals, the research employed various scientific methods, including analysis, synthesis, abstraction, induction, deduction, and comparison. Analysis and synthesis methods were used to identify the main factors that shape the essential functionality of higher education in the concept of innovative development. The research applied the inductive method to formulate prognostic directions for developing the investigated process. The deductive method was also utilised to delineate the directions for forming an innovative educational concept in higher education during the post-war recovery period in Ukraine. The study employed an abstraction method to extract theoretical generalisations, identify vital categories and concepts, and form conclusions regarding the priority vectors of higher education development in the national post-war context. A comparison was made to identify specific features of the contemporary innovative paradigm in the education system optimisation sector involving modern educational technologies compared to traditional approaches to professional training. The research was conducted based on the principles of complexity and systematicity in scientific studies. This approach enabled the analysis of the research object as a comprehensive system with a series of interconnections and interdependencies.

RESULTS

In the context of the rapidly changing socio-institutional environment and the prioritisation of innovative development in higher education, practical effectiveness in implementing the strategy of post-war regeneration of the national educational environment is a top priority. The current societal processes require the higher education system to innovate in its communicative-functional interaction with society and maximise managerial decision efficiency.

Ukrainian higher education is characterised by institutional complexity and endogenous imbalance due to the significant influence of informal institutions, which will only increase in the post-war recovery period. The development of modern science is closely related to the implementation of integration processes and strongly influences transformations.

Higher education today aims to synthesise scientific and practical activities, innovative research, and developments to achieve practical results. Digitisation and automation of the educational process play a significant role in this process, as they facilitate the coexistence of socio-institutional and scientific aspects in synthesising theory and practice.

An innovative systems dynamics strategy is employed in developed countries' educational spaces. This strategy is based on the interaction between academic knowledge production, product manufacturing, and normative managerial control. The result of this approach is seen in the model of institutional transformations, which envisages a significant impact of knowledge and innovation on the mechanism of social coordination.

In developed socioeconomic environments of foreign countries, universities strive to find ways to respond to crisis phenomena within the current competitive model. However, the absence of collaboration between the scientific and socio-institutional environment risks exacerbating the inequality of key local sectors under pressure due to the crisis. Conversely, by improving connections and interactions, higher education institutions can better meet regional social demands.

To effectively realise this potential in developed countries, a joint university partnership program has been established to form sustainable partnerships. The University of Brighton collaborates closely with the local community, social enterprises, and voluntary and statutory organisations. This collaboration stimulates the transformation of scientific ideas into practical projects, provides initial funding, and promotes the development of social practices.

Some organisations are creating an educational module in the Asia-Pacific region to enhance universities' ability to engage with local communities. One such organisation is the Asia-Pacific University Community Engagement Network (APUCEN), which unites 60 universities. Examples of projects involving APUCEN include Universiti Teknologi Malaysia and Mae Fah Luang University in Thailand. These universities actively work to

increase learning opportunities and support local social transformations.

Today, higher education institutions can provide improved access to education for disadvantaged and rural students. For instance, Zhenmin University in China has implemented a new program offering 90 places exclusively for rural students while improving admissions process transparency. In China, the educational process is currently undergoing transformation, where 600 state regional universities are being reformed into professional institutions that are closer to actual socio-institutional realities.

An example of effective synergy between higher education and social institutions is the formation of the UM System in Missouri (USA), which unites four higher education institutions. The universities successfully develop Missouri communities through teaching and research activities, participation in state institutional formations, and processes of socioeconomic regional development. Furthermore, the UM system frequently utilises the potential of all community participants, encouraging interaction with communities and promoting the resolution of regional issues.

World practice suggests that integrating structural elements of institutional establishments, transforming the educational environment through cooperation, forming cross-border scientific-educational services, and developing the global education platform market are practical tools for building relationships in the researched environment. The concept of dual unity between theoretical basis and practical production implementation is actively applied in Denmark, Germany, Austria, Switzerland, the Netherlands, and Norway. This approach enables meeting modern labour market requirements for highly qualified professionals capable of adapting to the dynamics of the socio-managerial environment.

The British agency Times Higher Education has identified 1591 universities from 112 countries worldwide in its latest ranking of the world's best universities for 2023. The evaluation stage included analytics of the scientific research level, education quality, internationalisation, and innovation. Among the universities that dominate the top 100 rankings, one-third are in the United States, followed by the United Kingdom with 12 higher education institutions. Figure 1 shows that two universities from China are among the top twenty leaders, while Switzerland and Singapore each have one. The ranking includes a record number of Ukrainian HEIs, with 32 institutions listed, although none are in the top one hundred.
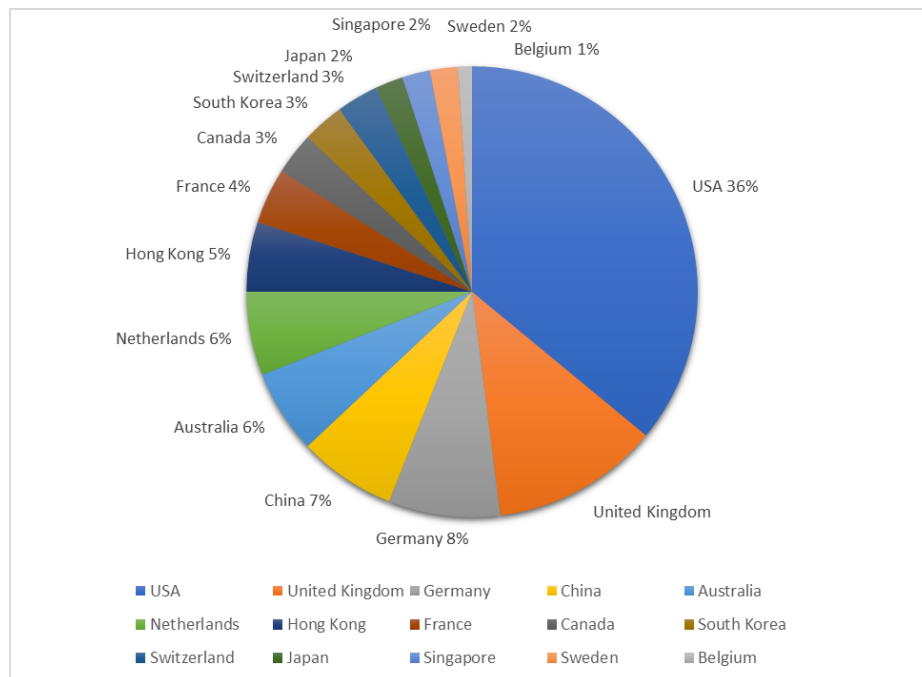
Source: the author based on Empowering Global Higher Education[21]
Figure 1. Countries with Top 100 World Universities in 2023

As of today, 21 universities in Ukraine have been destroyed due to military actions, while 157 have been damaged and 31 have relocated. The Strategy for the Development of Higher Education in Ukraine for 2022-2032 aims to make higher education accessible to various population groups. In the context of war, it is important to consider regional differences that impact the educational process. Therefore, developing a modern and effective higher education system should focus on enhancing competitiveness in the global market for educational services and ensuring internal consistency with the socio-institutional transformation of the educational process Sustainable development necessitates interdisciplinary knowledge in higher education produced in various institutions such as research institutions, laboratories, industrial companies, and non-profit

organisations.

The pandemic and military actions have already caused significant transformations in traditional educational forms. To improve the interaction between business and higher education during the post-war recovery, relevant positions include developing vectors, implementing innovative programs and dual education technologies, and synergising transformation processes in the scientific-educational and socio-institutional environment.

DISCUSSION

It is important to consider scholars' findings on key competencies when researching the potential of innovative technologies for developing synergy between social and institutional transformations in higher education during periods of societal crises. The multifactorial process of socio-institutional dynamics in the higher education environment is most optimally studied based on practical performance in the international educational space.

Some researchers, in the broader sense, shaping the convergence process of social and institutional transformations in higher education involves combining traditional principles of education, such as a scientific approach, purposeful learning, learner activity, thoroughness, and independence in learning, with the principle of linking education with practical activity and real-life situations. Innovative approaches, such as intensifying the learning process, utilising interactive learning opportunities, and promoting creative development, are also critical.[1,2] In this context, the function of social dynamics is not restricted to identifying priority vectors of demand and significance in the societal space of individual educational directions. The phenomenon of institutional transformations is based on expanding the functionality of public administration. The tools of institutionalism enable the identification of latent interrelationships. The dynamics of higher education correlate with the needs of the labour market, thereby initiating the intensification of socio-educational relations.[17,18]

According to the development strategy of higher education in developed European countries, priority is given to innovative methods of acquiring education. Open online learning is the fundamental educational form, with mobile devices as the primary tools for organising the learning process. Electronic multimedia content and open educational resources form virtual mobility, levelling barriers between national education systems.[3,4] The progress of higher education in a globalised and integrated environment indicates the formation of a platform for a future knowledge society. This platform is based on innovative technologies, mobile applications, and cloud services.

Analysing theoretical approaches to innovative technologies for higher education development during periods of transformation and societal crises allows for identifying specific functional groups of methods and tools, depending on their expected effectiveness. Methodologies based on critical thinking processes, analysis, fact synthesis, and evaluation implementation should be highlighted, including brainstorming and SWOT analysis. Furthermore, techniques based on emotions, imagination (such as modelling and role-playing), and technologies for promoting accountability, decision-making, and assessment are successful.[5,6] The digitalisation of the educational process and the use of interactive technologies and digital tools provide opportunities to intensify the development of higher education and adapt it to the specificities of social transformations and societal crises.[19,20] According to Berchin et al.[15] dual education programs in France, Brazil, and Mexico have been successful due to the integration of professional pedagogical and production-technical components. It enables innovative professional training that considers the interests of production stakeholders, scientific-educational institutions, and foreign partners.

One of the main approaches to optimising the higher education system, as identified by scholars, is to view it as a systemic phenomenon that combines institutional paradigms, social formations, and scientific fields. This synergy stimulates the proper realisation of the professional functionality of higher education.[22,23] According to Sujchaphong, et al.[24] higher education is often viewed as a means of developing personal competence and leadership skills through the synergy of science and social process management. At the same time, some representatives of the scientific community emphasise the importance of sustainable development in higher education from a systemic perspective and in terms of digital optimization.[25, 26]

Contemporary scholars[27] identify interaction with the social environment as a primary prerequisite for the formation and effective development of higher education. Researchers suggest that motivational and meaningful relationships, regulatory components, and elements of public administration define this strategy.

Among contemporary approaches to the convergence of social and institutional transformations in the higher education system, researchers[28,29,30] advocate for the creation of a community for educational transformations in the educational environment.

The research results, and analysis conducted by modern scholars convincingly demonstrate the relevance of the trend towards forming an innovative paradigm of higher education. This paradigm is oriented towards sustainable development and establishing interaction between universities and communities, prioritising public administration in institutional transformations. Interaction is considered an influential factor in the successful advancement of contemporary society.

CONCLUSION

The research suggests that the priority direction for developing higher education in Ukraine, in the context of post-war recovery, is the synergy of social, institutional, and information-digital transformations. It should consider:

- the trend of integrating the educational space into the European community;
- the fundamental principles of modern innovative technologies for developing entrepreneurial competence in complex and uncertain conditions during times of socioeconomic crisis and societal transformation;
- the expansion of the social and institutional functionality of education leads to a dynamic shift of traditional priorities;
- integrating scientific-educational space and production is considered the foundation for the innovative development of higher education in the context of post-war recovery in Ukraine. Research has shown that universities' innovative activities in territory recovery can stimulate interaction between higher education institutions and territorial communities. It can lead to the creation of organisational forms of interaction and the resolution of funding issues, involving various institutional forms in converging the educational environment and social transformations.

Ukraine has the necessary prerequisites to successfully implement foreign experience in the interaction between the social-institutional environment and higher education. The effectiveness of synergy in the outlined concept depends on several factors, including intensifying the public management development process, forming institutional activity direction, exploring universities' innovative potential, strategic planning of joint activities, and establishing a system to monitor its effectiveness.

Further scientific research should urgently address the variability of organisational interaction between higher education and socio-institutional formations.

REFERENCES

1. Levchuk, O., and Havryliuk, N. A holistic approach to training specialists: synergy of education, science and industry in modern universities. Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology. Theory Experience Problems, 68 (2023) 123-135. https://vspu.net/sit/index.php/sit/article/view/5531/4980

2. Dombrovska, S. M. Theoretical foundations of state regulation in higher education in social transformations. Zaporizhzhia 2012.

3. Tkachenko, V. Ensuring the efficiency of educational activities of higher education institutions in Ukraine. The 9th International Scientific and Practical Conference "Scientists and Existing problems of Human Development", Zagreb, Croatia. International Science Group. (2023) 276-280.

4. Illiashenko, S. M., Shypulina, Yu. S., and Illiashenko, N. S.Digital transformation of educational activities of higher education institutions in Ukraine during the war. Doctoral dissertation. (2022). https://repository.kpi.kharkov.ua/handle/KhPI-Press/56918

5. Mospan, N. The transformation of national higher education during the COVID-19 pandemic through the eyes of students and teachers. Educational discourse, 35(4) (2021) 141-153. https://doi.org/10.28925/2312-5829.2021.49

6. Shemelynets, I. I. Transformation of the legal education system in the war and post-war period. Knowledge of European law, 2. (2022). 8-13. http://www.jes.nuoua.od.ua/archive/2_2022/2.pdf

7. Zaspa, H. O. Concentric information technology for organising digital transformation of educational activities in higher education institutions. Doctoral dissertation, (2021). https://er.chdtu.edu.ua/handle/ChSTU/1985

8. Ramskyi, A. Digital transformation of communication strategies of higher education institutions of Ukraine during the war. Scientific Bulletin of the International Association of Scientists. Series: Economics, Management, Security, Technology, 2(1) (2023). https://doi.org/10.56197/2786-5827/2023-2-1-7

9. Ivanova, S. M. and Kilchenko, A. V. Digital transformation of education and science: foreign experience. (2021). https://lib. iitta. gov. ua/727860/1/% D0, 86, D0.

10.   Totska, O. L. Conceptual foundations of management of higher education development in Ukraine: transformation of state policy directions. Problems of innovation and investment development, 22 (2020) 64–70. https://doi.org/10.33813/2224-1213.22.2020.8

11.   Metelenko, N., Nikitenko, V., Vasylchuk, H., Kahanov, Yu., and Voronkova, V. Digital transformation of education as a trend in the development of educational reforms and a process of social and cultural change. Humanities Studies, 16(93) (2023) 122-134. https://doi.org/10.32782/hst-2023-16-93-13

12.   Sychenko, V. V., Shevchenko, O. O., and Rybkina, S. O. Problems of the higher education system in Ukraine and ways to solve them in the post-war period. Scientific Notes of Vernadsky TSNU, 6 (2022) 149-155. https://pubadm.vernadskyjournals.in.ua/journals/2022/6_2022/23.pdf

13.   Wisnumurti, A. G. O., Candranegara, I. M. W., Suryawan, D. K., and Wijaya, I. G. N. Collaborative Governance: Synergity Among the Local Government, Higher Education, and Community in Empowerment of Communities and Management of Potential Tourism Village. 2nd Annual International Conference on Business and Public Administration (2020) 112-115. Atlantis Press. DOI 10.2991/aebmr.k.201116.024

14.   Morawska-Jancelewicz, J. The role of universities in social innovation within quadruple/quintuple helix model: Practical implications from polish experience. Journal of the Knowledge Economy, 13(3) (2022) 2230-2271. https://doi.org/10.1007/s13132-021-00804-y

15.   Berchin, I. I., de Aguiar Dutra, A. R., and Guerra, J. B. S. O. D. A. How do higher education institutions promote sustainable development? A literature review. Sustainable Development, 29(6) (2021) 1204-1222. https://doi.org/10.1002/sd.2219

16.   Carayannis, E. G., and Morawska-Jancelewicz, J. The futures of Europe: Society 5.0 and Industry 5.0 as driving forces of future universities. Journal of the Knowledge Economy, 13(4) (2022) 3445-3471. https://doi.org/10.1007/s13132-021-00854-2

17.   Semenets-Orlova, I., Kushnir, V., Rodchenko, L., Chernenko, I., Druz, O., and Rudenko, M. Organizational development and educational changes management in public Sector (case of public administration during war time. International Journal of Professional Business Review, 8(4) (2023). https://doi:10.26668/businessreview/2023.v8i4.1699

18.   Kryshtanovych, M., Akimova, L., Akimov, O., Parkhomenko-Kutsevil, O., Omarov, A. Features of creative burnout among educational workers in public administration system. Creativity Studies, 15(1) (2022)116-129. https://doi.org/10.3846/cs.2022.15145

19.   Tserklevych, V., Prokopenko, O., Goncharova, O., Horbenko, I., Fedorenko, O., Romanyuk, Y. Virtual Museum Space as the Innovative Tool for the Student Research Practice" International Journal of Emerging Technologies in Learning, 16 (4), (2021) 213-231. DOI: 10.3991/ijet.v16i14.22975

20.   Bahno, Y.M., Serhiichuk, O.M., Tanana, S.M., Tkachenko, L.V., and Khmelnytska, O.S. Inclusive Education as a Condition for Innovative Activities at Higher Education Institutions. Journal of Intellectual Disability - Diagnosis and Treatment, 9(5) (2021) 432-441. https://doi.org/10.6000/2292-2598.2021.09.05.2

21.   Empowering Global Higher Education. https://www.timeshighereducation.com/

22.   Gunn, A. 2020. The European universities initiative: A study of alliance formation in higher education. European higher education area: Challenges for a new decade, 13-30. Springer International Publishing.

23.   Nurtjahjani, F., Noermijati, N., Hadiwidjojo, D., and Irawanto, D. W. Transformational leadership in higher education: (A Study in Indonesian Universities)". 3rd Asia Pacific international conference of management and business science, (2020) 95-101. Atlantis Press. https://www.atlantis-press.com/proceedings/aicmbs-19/125938751

24.   Sujchaphong, N., Nguyen, B., and Melewar, T.C. A framework of brand-centred training and development activities, transformational leadership and employee brand support in higher education. J Brand Manag, 27 (2020) 143–159. https://doi.org/10.1057/s41262-019-00171-9

25. Giesenbauer, B., and Tegeler, M. The transformation of higher education institutions towards sustainability from a systemic perspective. Universities as Living Labs for Sustainable Development: Supporting the Implementation of the Sustainable Development Goals, (2020) 637-650. https://link.springer.com/chapter/10.1007/978-3-030-15604-6_39

26. Barzman, M., Gerphagnon, M., Aubin-Houzelstein, G., Baron, G. L., Benard, A., Bouchet, F., and Mora, O. Exploring digital transformation in higher education and research via scenarios. Journal of Futures Studies, 25(3) (2021) 65-78. https://agroparistech.hal.science/hal-02911665/

27. Varma, R. R., Umesh, I. M., Nagesh, Y. N., and Kumara Swamy, K. S. Digital transformation in higher education institutions-an overview. International Journal of Applied Engineering Research, 16(4) (2021) 278-282. http://surl.li/exjiql

28. Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., and Burgos, D. Digital transformation in higher education institutions: A systematic literature review. Sensors, 20(11) (2020). https://doi.org/10.3390/s20113291

29. Reynolds-Cuéllar, J., Stump, G. S., and Bagiati, A. Building a Community for Educational Transformation in Higher Education. IEEE Frontiers in Education Conference (FIE). 1-5. IEEE. (2020). Doi: 10.1109/FIE4(2020).4824.2020.9274003.

30. Bygstad, B., Øvrelid, E., Ludvigsen, S., and Dæhlen, M. From dual digitalisation to digital learning space: Exploring the digital transformation of higher education. Computers & Education, 182. (2022). https://doi.org/10.1016/j.compedu.2022.104463

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest

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